ACQUISITION INNOVATION RESEARCH CENTER

Implementing the DoD's Digital Data Strategy for Acquisition and Sustainment

Strategic Implementation Approaches and Options

EXECUTIVE SUMMARY AND REPORT

JULY 2024

PROJECT MANAGER
Natalie Wells, *VT-ARC*

PRINCIPAL INVESTIGATOR
Maegen Nix, *VT-ARC*

CONTRIBUTING AUTHORS
Grant Beanblossom, *VT-ARC*
Daniel Wolodkin, *VT-ARC*
Kobie Marsh, *VT-ARC*

SPONSOR
Mr. Mark E. Krzysko, Deputy Director, Acquisition Policy and Innovation
Office of the Under Secretary of Defense for Acquisition and Sustainment

DISCLAIMER

The Acquisition Innovation Research Center (AIRC) is a multi-university partnership led and managed by the Stevens Institute of Technology and sponsored by the U.S. Department of Defense (DoD) through the Systems Engineering Research Center (SERC)—a DoD University-Affiliated Research Center (UARC).

This material is based upon work supported, in whole or in part, by the U.S. Department of Defense through the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) and the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) under Contract HQ0034-19-D-0003, TO#0285.

The views, findings, conclusions, and recommendations expressed in this material are solely those of the authors and do not necessarily reflect the views or positions of the United States Government (including the Department of Defense (DoD) and any government personnel), the Stevens Institute of Technology, or Virginia Tech Applied Research Corporation (VT-ARC).

No Warranty.

This Material is furnished on an "as-is" basis. The Stevens Institute of Technology and VT-ARC make no warranties of any kind—either expressed or implied—as to any matter, including (but not limited to) warranty of fitness for purpose or merchantability, exclusivity, or results obtained from use of the material.

The Stevens Institute of Technology and VT-ARC do not make any warranty of any kind with respect to freedom from patent, trademark, or copyright infringement.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

RESEARCH TEAM

Name	Organization	Labor Category
Laura Freeman	Virginia Tech	Subtask Lead
Philip S. Antón	Stevens Institute of Technology	Subtask co-lead
Maegen Nix	VT-ARC	Subtask co-lead
Natalie Wells	VT-ARC	Research Scientist, Project Manager
Grant Beanblossom	VT-ARC	Research Scientist
Daniel Wolodkin	VT-ARC	Research Scientist
Kobie Marsh	VT-ARC	Research Scientist
Scott Lucero	Virginia Tech	Research Scientist

ACKNOWLEDGEMENTS

The research team expresses its sincere gratitude to the many Department of Defense (DoD), service, program office, and research community representatives who took time to provide valuable insights into this body of work, including the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) and representatives supporting the Air Force Material Command (AFMC) Digital Material Management (DMM) initiative, National Security Innovation Network (NSIN), Army digital engineering transformation efforts, Navy PEO data and analytics efforts, Space Force data and analytics efforts, and Army acquisition intelligence efforts. Your insights, expertise, and enthusiasm toward digital transformation of acquisition processes were instrumental in shaping our findings and future state vision and model presented in this work. The team extends a special thanks to Mr. Mark Krzysko, Deputy Director, Acquisition Policy and Innovation, OUSD(A&S) for his strategic guidance and support of this effort.

ACRONYMS AND ABBREVIATIONS

A&S	Acquisition and Sustainment
AAF	Adaptive Acquisition Framework
ACQBIZ AABEP	Acquisition Business Army Acquisition Business Enterprise Portal
ADP	Army Data Platform
AE	Acquisition Executive
AESIP	Army Enterprise Systems Integration Program
AFIT	Air Force Institute of Technology
AFMC	Air Force Material Command
AI2	Acquisition Integration and Interoperability
AIR	Acquisition Information Repository
AIRC	Acquisition Innovation Research Center
APG	Aberdeen Proving Ground
API	Acquisition Policy and Innovation Office
ARDAP	Army Data and Analytics Platforms
ARES	Airborne Reconnaissance and Electronic Warfare System
ASA ALT	Assistant Secretary of the Army for Acquisition, Logistics, and Technology
AVDF	Acquisition Visibility Data Framework
AVSG	Acquisition Visibility Steering Group
AVWG	Acquisition Visibility Working Group
C/S/P	Cost, Schedule, Performance
CADE	Cost Assessment Data Enterprise
CDAO	Chief Digital and Artificial Intelligence Officer
CDRL	Contract Data Requirements List
CIO	Chief Information Officer
COE	Center of Excellence
DA	Data Analytics
DAC	Data Analytics Consortium
DACM	Director of Acquisition Career Management
DAF	Department of Air Force
DAMIR	Defense Acquisition Management Information Retrieval

DASA DES	Deputy Assistant Secretary of the Army (Data, Engineering and Software)
DASD	Deputy Assistant Secretary of Defense
DAU	Defense Acquisition University
DAVE	Defense Acquisition Visibility Environment
DBB	Defense Business Board
DE	Digital Engineering
DIB	Defense Innovation Board
DID	Data Item Description
DIICE	Digital Integration and Innovation Center of Excellence
DMM	Digital Material Management
DoD	Department of Defense
DON	Department of Navy
DTIC	Defense Technical Information Center
DTO	Digital Transformation Office
EBS-C	Enterprise Business Systems–Convergence
EIS	Enterprise Information Systems
ERDC	Engineer Research and Development Center
EVM	Earned Value Management
EVM-CR	Earned Value Management Central Repository
FY	Fiscal Year
GCSS	Global Combat Support System
GFEBS	General Fund Enterprise Business System
IC	Intelligence Community
IDEAS	Innovative, Data-Enabled Acquisition Strategy
JCS KM/DS	Joint Chiefs of Staff Knowledge Management and Decision Support System
M&S	Modeling and Simulation
NAVSEA	Naval Sea Systems Command
NIWC	Naval Information Warfare Center
NLP	Natural Language Processing
NSIN	National Security Innovation Network
NSWC	Naval Surface Warfare Center
O&S	Operations and Sustainment

OEM	Original Equipment Manufacturer
OpenDAGIR	Open Data and Applications Government-owned Interoperable Repositories
OSD	Office of the Secretary of Defense
OUSD(A&S)	Office of the Under Secretary of Defense for Acquisition and Sustainment
OUSD(R&E)	Office of the Under Secretary of Defense for Research and Engineering
PEO	Program Executive Officer
PIO	Performance Improvement Office
PMRT	Project Management Resource Tools
PWPM	Platform and Weapon Portfolio Management
RA	Reference Architecture
RDAIS	Research, Development, and Acquisition Information System
SMDII	Ship Maintenance Data Improvement Initiative
SMP	Strategic Management Plan
SSC	Space Systems Command
SSIPM	Strategic, Space, and Intelligence Portfolio Management
SWOT	Strengths, Weaknesses, Opportunities, Threats
T&E	Test and Evaluation
TOPIC	The Online Project Information Center
TTAG	Transition Tracking Action Group
UDL	Unified Data Layer
UDRA	Unified Data Reference Architecture
USAF	United States Air Force
USMC	United States Marine Corps
USSF	United States Space Force
VAMOSC	Visibility and Management of Operating and Support Costs
VAULTIS	Visible, Accessible, Understandable, Linked, Trusted, Interoperable and Secure
VT-ARC	Virginia Tech Applied Research Corporation

EXECUTIVE SUMMARY

The Department of Defense (DoD) is pursuing increased use of data management and analytics to improve decision-making and acquisition and sustainment (A&S) outcomes. To support this transformation in digital acquisition, the Acquisition Innovation Research Center (AIRC) assessed data needed across DoD functions and organizations to inform next steps for DoD's continued transformation. This effort aligns with Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD(A&S)] efforts to implement the DoD Data Strategy and digitally transform acquisition and sustainment functions to improve acquisition outcomes.

This effort developed foundational frameworks, approaches, models, and practical next steps for transforming the DoD A&S community into a next-generation data-driven organization. The team conducted a cross-cutting analysis and leveraged Kotter's Leading Change framework,[1] the OUSD(A&S) *Digital Acquisition Strategy*,[2] and approaches in AIRC's prior Innovative, Data-Enabled Acquisition Strategy (IDEAS) research[3] for addressing strategic challenges and barriers, evaluating the current and future-state digital data strategy and acquisition processes, and making recommendations for next steps. This report identifies models, approaches, and tools that can help accelerate advancement in digital acquisition and data-driven decision making. It provides an overarching Digital Acquisition Vision, an Acquisition Decision Landscape Model (current and future state), and recommendations to accelerate progress toward the proposed vision.

Proposed Digital Acquisition Vision:

Transform the A&S community through a cohesive, ubiquitous, and cross-functional approach to data and information management and digital acquisition. Enable cross-functional digital integration across the acquisition lifecycle to advance data-driven decision-making, improve acquisition outcomes, and deliver more timely capabilities to the warfighter.

This report also summarizes initial analytic results in a SWOT (strengths, weaknesses, opportunities, & threats) format. Six key findings are highlighted below.

Key Findings:

- ***Multi-faceted Challenge –*** Digital transformation of acquisition processes is a multi-faceted challenge with many dimensions surrounding data, organizational structures, and factors associated with the acquisition decision landscape.
- ***Existing Strengths –*** DoD and the Military Services have many strengths surrounding strategies, frameworks, initiatives, implementations and platforms, which are leading to change in functional areas withing the Services and Defense Agencies. These strengths present opportunities that OUSD(A&S) could leverage, amplify, align, and expand to consolidate and expand gains.
- ***Independent, Distributed, Short-Term Wins –*** This project is part of a larger AIRC portfolio of efforts identifying innovative ways to transform and improve A&S functions across the DoD. Collectively, these projects are identifying practical options that can be combined with ongoing DoD and Service-level change efforts to further advance Digital Acquisition.
- ***Needed Vision and Integration –*** Despite individualized progress, change within functional areas in the Services and Agencies remain uncoordinated, impeding DoD's ability to move forward in functions described by two areas of Kotter's framework: consolidating gains and anchoring lasting change enterprise-wide. The A&S community across the DoD needs an overarching vision and implementing *coalition* focused on a concerted effort to translate and amplify individual progress into scaled, broad-based, integrated capabilities across the DoD to drive lasting change.
- ***Current State Acquisition Decision Landscape Model –*** The research team created an Acquisition Decision Landscape Model to help understand the current state of acquisition transformation to identify high-impact areas for OUSD(A&S) and the greater DoD to drive progress toward a common vision. This model portrays core elements and relational aspects constitute the DoD A&S decision landscape. The model illustrates how various higher-level decisions rely on access to lower-level data generators. Given most A&S efforts are isolated and not interoperable, this model can serve to inform the coalition on selecting next steps to focus on.
- ***Future State Acquisition Decision Landscape Model –*** Finally, the team created a future state version of the model to describe the state of the possible and portray critical areas that require further alignment and progress to consolidate gains.

Based on these findings, the research team formulated recommendations surrounding six critical areas, building on key themes and approaches across our targeted analysis of the data state, the Acquisition Decision Landscape Model, and our FY 2023 IDEAS recommendations.

Recommendations

Table ES-1 lists the recommended concepts and approaches along with a mapping to who in the DoD could lead and contribute to these efforts and what specific steps they can take in the short term to advance the transformation to Digital Acquisition.

Table ES-1. Strategic Recommendations and Potential Lead Organizations

Strategic Recommendation Area and Approach	Short-Term Options and Potential Lead(s)
1. *Continue Piloting Efforts* – Explore and refine concepts surrounding the Acquisition Decision Landscape; core decisions and metrics used to pursue, formalize, and improve the use of acquisition data to inform decision-making processes; and additional technical solution, process, and policy development aligning and in coordination with the execution of the rest of the recommendations.	**1.1. Pilot 1:** Apply the Acquisition Decision Landscape Model in practice, develop a process for persistent monitoring of acquisition data to track program/capability progress and maturity over time to inform: • Portfolio level roll-ups (**Potential Leads:** ***Deputy Assistant Secretary of Defense for Acquisition Integration and Interoperability [DASD(AI2)],[4] DASD for Platform and Weapon Portfolio Management [DASD(PWPM)], DASD for Strategic, Space, and Intelligence Portfolio Management [DASD(SSIPM)], and the Data Analytics division of the Acquisition Policy and Innovation Office (API)[API/DA]***). • Status/maturity of mission thread/kill chains for readiness tracking (**Potential Leads:** ***DASD(AI2), DASD(PWPM), DASD(SSIPM), and API/DA***). • Status/maturity of critical technology areas for S&T/R&D investments tracking across the lifecycle (**Potential Leads:** ***DASD(AI2), DASD(PWPM), DASD(SSIPM), the Transition Tracking Action Group[5] (TTAG)/DTIC, and API/DA***). **1.2. Pilot 2:** Analyze program(s) that reached milestones early or below costs. Develop a process for tracking early indicators of positive trends. Potential to design a concept for persistent capability for monitoring early positive trend indicators to inform incentives & best practice sharing/identification across AAF (**Potential Lead:** ***API/DA***). **1.3. Pilot 3:** Conduct Defense Data Grand Prix competitions[6] leveraging Acquisition Decision Landscape Model to explore data analytics & visualizations methods leveraging unstructured acquisition data, to tap into an underutilized resources to inform acquisition decisions across the landscape (**Potential Lead:** ***API***). **1.4. Pilot 4:** Create a natural language processing (NLP) capability/workflow to process annual open-source documents (e.g., budget reports, Justification books, etc.) to persistently monitor for new data and analytics capability initiatives across the DoD. This would be used to inform expansion of AV Governance and a newly formed Digital Transformation-focused forum (see Recommendation 2.1 and 2.3) to coordinate efforts (**Potential Lead:** ***API***).

Strategic Recommendation Area and Approach	Short-Term Options and Potential Lead(s)
2. ***Guiding Coalition & Consortium*** – Coordinate cross-organizational progress, lessons learned sharing, resource sharing and reuse, and co-development of standards and frameworks for shared implementations toward the vision. All service and program-level initiatives the research team engaged expressed interest in forming or participating in this cross-organizational entity.	**2.1.** Expand Acquisition Visibility Governance body (AV Governance) membership and scope with broader representation across localized data and digital transformation initiatives identified in our analysis (listed in Appendix A) to integrate and federate these initiatives, improve data sharing, and scale digital transformation efforts (**Potential Leads:** ***API, AV Governance***). **2.2.** Utilize AV Governance to identify activities that OUSD(A&S) could pursue across the other recommendation areas to bring the Acquisition Decision Landscape Model into practice (**Potential Leads:** ***API, AV Governance***). **2.3.** Utilize AV Governance to establish a new forum for digital transformation collaboration, connecting working-level representatives from initiatives identified in our analysis (Appendix A). Establish regular meetings and activities – in addition to AV Governance activities – to collectively share and coordinate implementations surrounding digital transformation of A&S processes and functions. Include the API-chaired Acquisition Analytic Forum as members of this newly established forum.[7] (**Potential Lead:** ***API/DA***).
3. ***Decision Framework Documentation*** – Capture and standardize the key decisions, core metrics, detailed touchpoints, data lifecycle, and map the existing AVDF to the foundational Acquisition Decision Landscape model.	**3.1.** Utilize AV Governance to determine required standards, documentation, and data requirements relevant to bringing the Acquisition Decision Landscape Model into practice (**Potential Leads:** ***API, AV Governance***). **3.2.** Conduct data science pilots (under Recommendation Area 1) to develop and experiment with analytic workflows and visualizations surrounding identified Acquisition Decision Landscape Model standards, documentation, and requirements (**Potential Leads:** ***API***).
4. ***Digital Acquisition Reference Architecture*** – Build upon and formalize alignment across existing efforts, standards and frameworks, guidance, and lower-level reference architectures aiming to align all to the Acquisition Decision Landscape Model.	**4.1.** Utilize AV Governance, ensuring representation from OSD CIO, Chief Digital and Artificial Intelligence Officer (CDAO), and Military Service CIOs, to discuss current/in-progress reference architectures to date and determine next steps for aligning the Acquisition Decision Landscape Model to them for building the connective tissue between lower-level efforts and enterprise-wide architectures (**Potential Leads: *API, AV Governance***). **4.2.** Coordinate use of the Acquisition Decision Landscape Model with current/in-progress digital transformation reference and implementation architectures, (i.e., CDAO's and Army's Data Mesh Reference Architectures, and others discovered through AV Governance activities) (**Potential Leads:** ***API, CIO, CDAO***). **4.3.** Determine relevant architecture guidance, taxonomies, and ontology components required to document and drive alignment across lower-level initiatives and architectures to use the Acquisition Decision Landscape Model (**Potential Leads:** ***API, AV Governance***).

Strategic Recommendation Area and Approach	Short-Term Options and Potential Lead(s)
5. ***Digital Literacy Training/ Education Requirements & Curricula*** – Develop tailored curricula for the technical skills required to implement digital acquisition; to ensure understanding of decision framework among all stakeholders; and to educate all functional stakeholders on the Decision Landscape.	**5.1.** Leverage past OUSD(A&S) digital literacy work and current DAU offerings to create tailored curricula framework for six learning paths[i] specific to the Acquisition Decision Landscape and digital acquisition (**Potential Leads: *AV Governance, API/DA, DAU, Naval Postgraduate School (NPS), Air Force Institute of Technology (AFIT), Army War College***). **5.2.** Identify current course offerings to leverage across curriculum, identify where tailored acquisition-specific workforce course gaps exist to drive new course development (**Potential Leads: *DAU, API***). **5.3.** Develop workforce training requirements and incentives surrounding frequency, role-based, & implementation considerations for the curricula across functional areas (**Potential Leads: *API, A&S Functional Leads,[8] Directors of Acquisition Career Management (DACMs)***).
6. ***Cohesive Digital Acquisition Implementation Enablers*** – Beyond the reference architecture, pursue the policies, standards, incentives, contracting, technical ecosystem development that will enable and accelerate implementation.	**6.1.** Utilize AV Governance, ensuring representation from CDAO and initiatives identified through this analysis (Appendix A), to discuss actions needed surrounding policies, standards, incentives, guidance, and technical ecosystem alignment to: 1) scale lower-level standards/practices[ii] into enterprise-wide practice; 2) bring Acquisition Decision Landscape Model into practice; 3) and establish the connective tissue between lower-level efforts and enterprise-wide anchored change (**Potential Leads: *API, AV Governance***). **6.2.** Utilize AV Governance to discuss the existing array of data and analytics platforms and related actions the A&S community can take to drive further connectivity amongst platforms through the Acquisition Decision Landscape Model, especially in light of forthcoming infrastructure and vendor changes to Advana[9, 10](**Potential Leads: *API, AV Governance***).

[i] Six learning paths: 1) Data architecting for acquisition data lifecycle management; 2) Data management & analytics; 3) Digital acquisition; 4) Acquisition Decision Landscape; 5) Digital acquisition governance and incentives; 6) Contracting for digital acquisition.

[ii] Including but not limited to core digital engineering/acquisition elements, digital maturity model and assessment process, contract language, and incentives critical to Acquisition Decision Landscape Model.

Conclusion:

In assessing the A&S community's current state and future envisioned state of digital transformation along Kotter's Leading Change framework, the research team found several key strengths, weaknesses, opportunities, and threats (SWOT) regarding digital acquisition and data-driven decision-making processes in the DoD. The team found strengths in individual functional change efforts that have resulted in short-term wins and capabilities; these wins provide the DoD further opportunities to scale, amplify, and integrate existing success models. While there is some evidence of urgency and a vision surrounding the need for digital transformation generally, the A&S community needs further progress guided by a common vision and dedication to broad data sharing to consolidate gains and anchor change specific to digital acquisition and acquisition decision-making (See Figure ES-1).

To lay a foundation toward addressing these gaps, the research team developed an overarching Digital Acquisition vision, an Acquisition Decision Landscape Model (current and future state), and recommendations to accelerate progress toward a common vision. Building on this enthusiasm, we identified recommendations to build on and consolidate existing progress that will anchor lasting enterprise-wide change for the A&S community (See Figure ES-2). In doing so, the A&S community will improve acquisition decision-making and outcomes for our warfighters and operators.

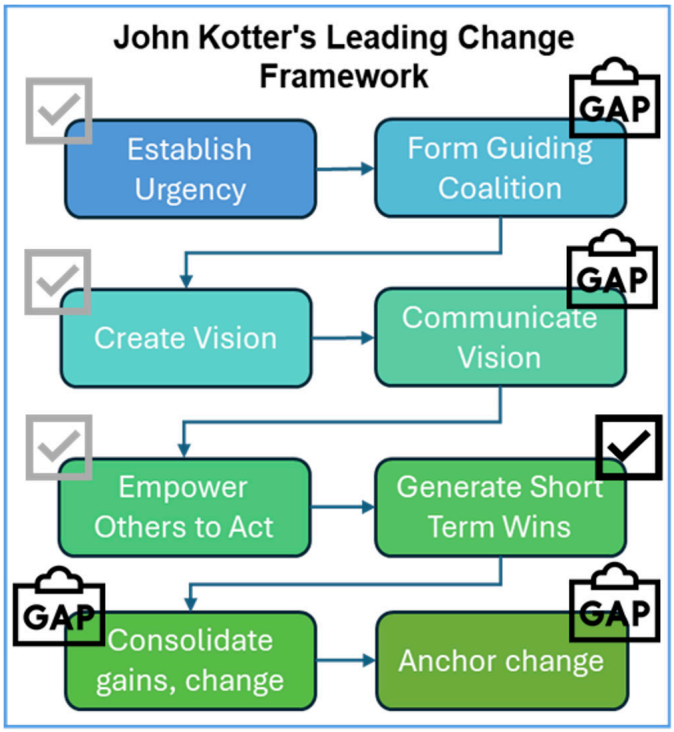

Figure ES-1: Strengths and Gaps Assessed Along Kotter's Leading Change Framework

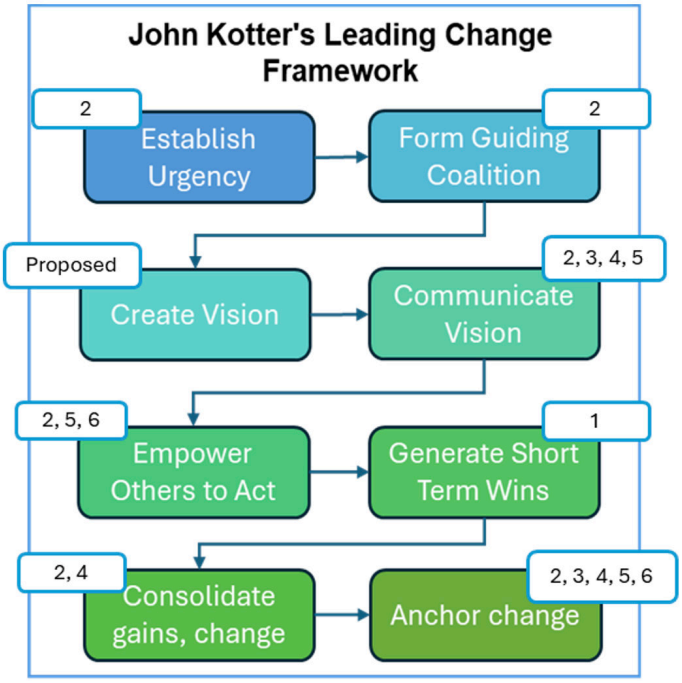

Figure ES-2: The Six Recommendation Areas Mapped to Kotter's Leading Change

1.0 BACKGROUND

1.1 THE CHALLENGE

> *"[D]espite the increasingly robust internal knowledge and experiential base and the impressive groundwork to date, the Department's transformation initiatives are moving too slowly to meet international pacing threats nor the pace of technological advances."* (Defense Business Board, 2024)

The defense acquisition and sustainment (A&S) community is actively seeking to transform digital acquisition, data strategy, and data-driven approaches for acquisition decision making. The Department of Defense (DoD) faces a multi-faceted challenge in this transformation given the dimensionality of acquisition information,[iii] complexity of organizational structures and culture across A&S functions, and a layered cross-functional decision-making landscape. Motivations and goals for improved processes are similar across program, Military Service, and DoD levels: improve the DoD's ability to keep pace with adversaries, the changing operational environment, and the exponential growth in acquisition information surrounding acquisition decision-making. Digital transformation of acquisition processes, as well as inherent data and information management practices and governance, is a key enabler of such goals.

[iii] This report uses "acquisition information" to encompass structured and unstructured data, information, and knowledge the A&S community generates throughout a system/capability's lifecycle across functions.

1.2 PROJECT OVERVIEW

In FY23, the Acquisition Innovation Research Center (AIRC) created the *Innovative, Data-Enabled Acquisition Strategy (IDEAS)*, identifying insights for how the DoD can drive innovation surrounding data-driven acquisition decision-making within the A&S community along four strategic facets. The four facets depicted in Figure 1, include Information, Acquisition Tools and Functions, Decision and Policy Tools, and People and Culture. The FY23 work recommended the DoD pursue actions aligned to seven strategic areas to motivate and implement change: 1) Incentives and Empowerment, 2) Innovation and Agility, 3) Trust and Security, 4) Improved Access, 5) Leveraging Communities Inside and Outside Acquisition, 6) Metrics, and 7) Incremental Progress and Iteration.

Figure 1. Strategic Facets for Driving Acquisition Innovation

To build on FY23 *IDEAS*, the A&S community and greater DoD must understand the current state and the existing gaps and barriers to accelerated progress and implementation. The FY24 effort sought to holistically evaluate the A&S community's current state, capture success models, define the future envisioned state, and determine tactical steps to achieve the defined vision using the *IDEAS* recommendations as a foundation.

To scope and guide the FY24 effort, the team developed an overarching framework that articulates the various dimensions and layers that contribute to or affect data strategy implementation surrounding acquisition decision making (Figure 2). The team used this framework and OUSD A&S's *Data Cube: Acquisition Data Layer* (Figure 3) to identify high-impact areas to explore in depth through engagements, literature reviews, and analysis. The team dove into only select aspects of these frameworks but acknowledges the cross-organizational and cross-functional nature of the dimensions is essential to understand and address for the DoD to lead change in digital transformation of acquisition processes. Given multiple dimensions, this challenge is not for the A&S community to solve alone; it ***will require tight coordination and convergence across various initiatives and organizational seams through a cohesive enterprise vision to tackle barriers across all dimensions.***

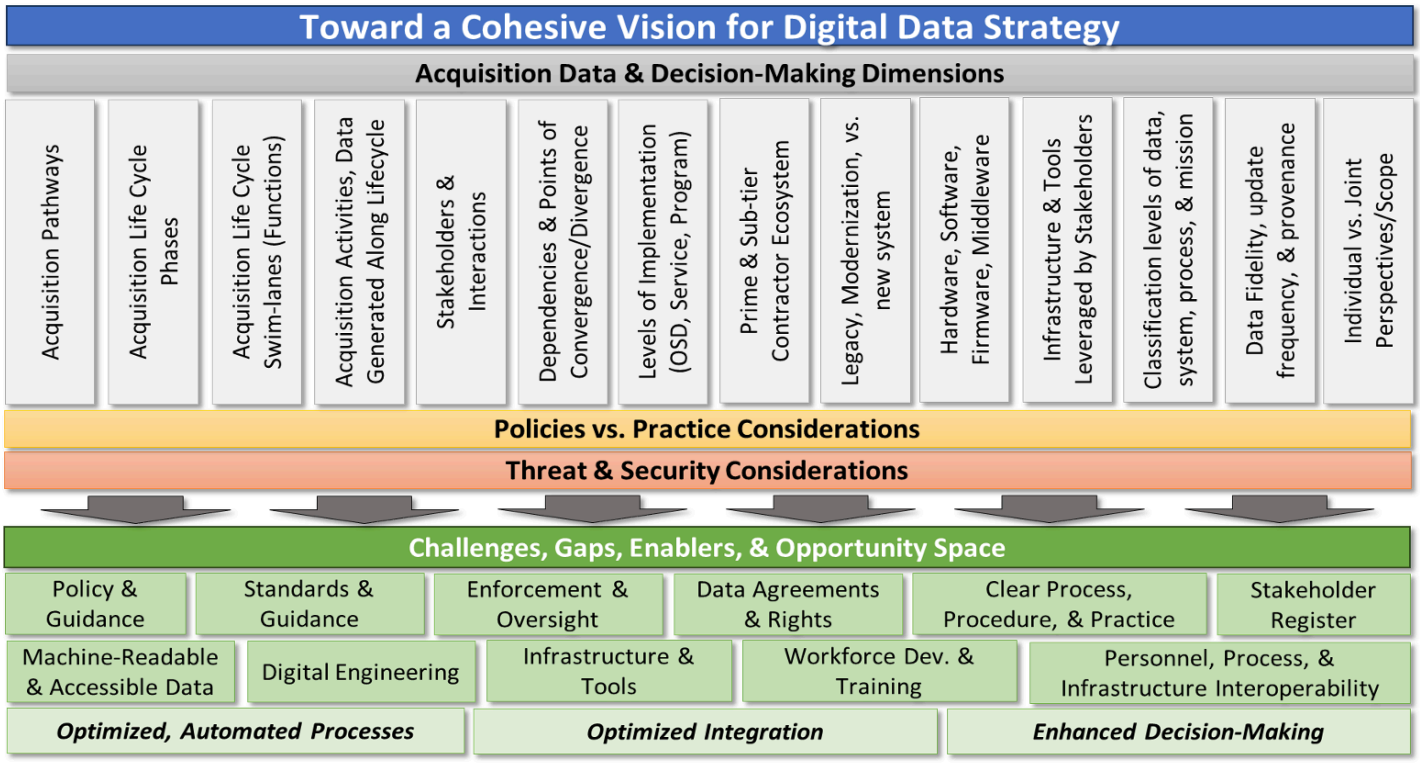

Figure 2. The Dimensionality of Data Strategy Implementation Across A&S Functions

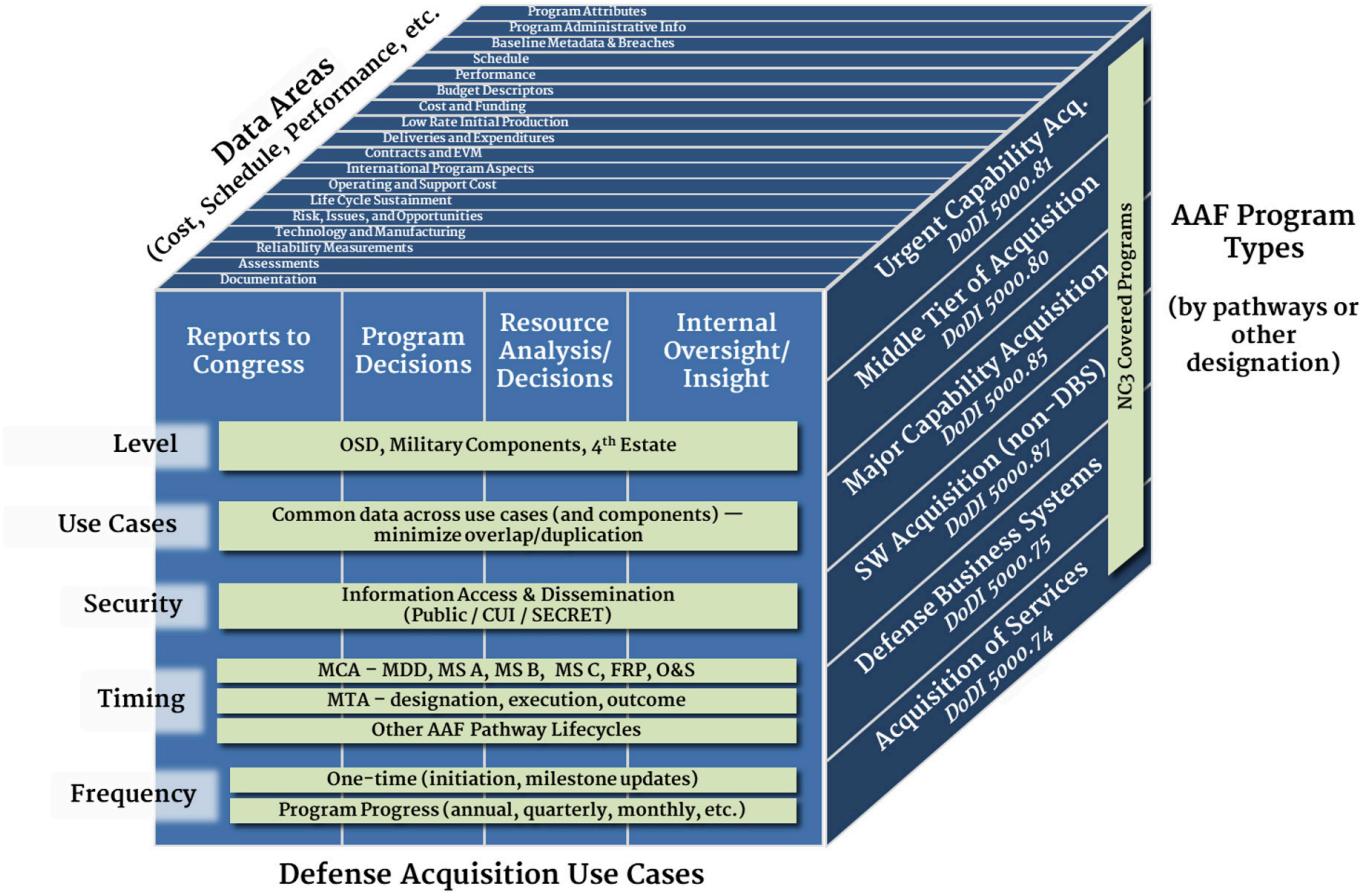

Figure 3. Problem Framing: OUSD A&S's Acquisition Data Layer Cube

1.3 KOTTER'S LEADING CHANGE FRAMEWORK

The A&S community clearly recognizes the need for change. Ongoing conflict in Europe has challenged the resiliency of the U.S. industrial base. Coupled with increasingly aggressive actions by China in the South Pacific, these challenges have created a sense of urgency. There are many DoD-wide and Service-level efforts pursuing key aspects of digital transformation of acquisition processes at various points across the lifecycle, highlighted in this report. The question becomes: *How does the A&S community and greater DoD measure progress and assess high-impact areas to capitalize on and scale bellwether efforts, focus resources, and close gaps?* Leading change, particularly for a transformation involving a wide network of stakeholders like the A&S community, requires the application of a structured strategic framework. John Kotter's *Leading Change* framework (Figure 4), has been in use for four decades.[11]

Kotter argues that complex organizational transformation requires a change process through a series of phases and "critical mistakes in any of the phases can have a devastating impact, slowing momentum and negating hard-won gains."[12] This framework emphasizes that organizations need a concerted effort for lasting change while also achieving lower-level progress through change agents to pursuing short term wins. This report uses Kotter's framework to assess the DoD's progress in digital transformation across A&S functions.

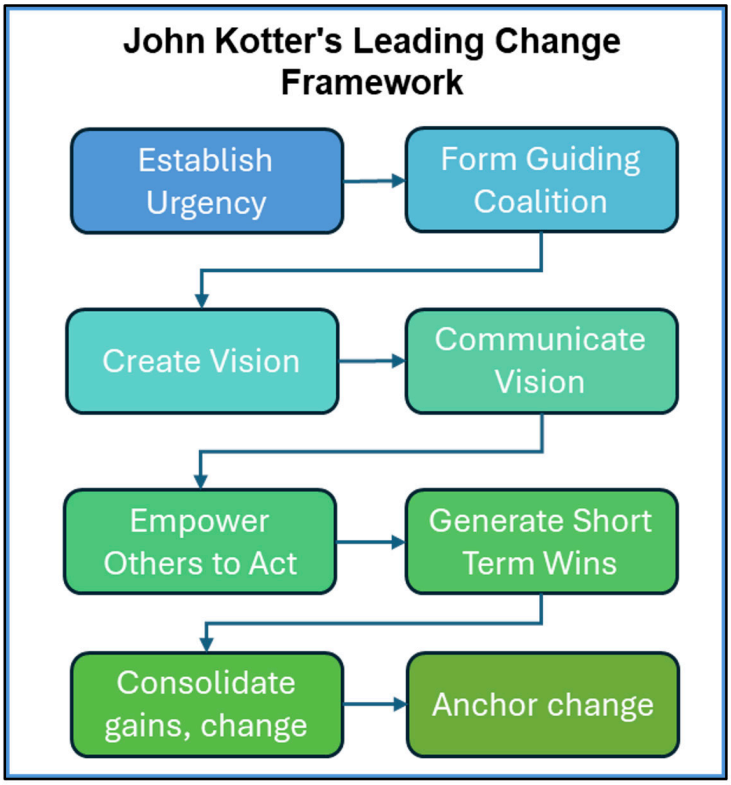

Figure 4. John Kotter's Leading Change Framework

1.4 THE VISION

> *"[T]he **need is clear** for the Department… to fully commit to the creation of requisite structures, practices, policies, and processes to enable rapid evolution of a digital ecosystem across the Defense enterprise…*
>
> *[T]he Department is **making real progress** in its digital journey… DoD nonetheless **significantly lags behind** the commercial sector in the adoption of proven capabilities…*
>
> ***DoD has yet to articulate a clear, cohesive vision** to the Services and Components who must work collaboratively."* (Defense Business Board, 2024)

Recent DoD and industry studies emphasize a need for the DoD's accelerated progress surrounding digital transformation of acquisition and operations processes to keep pace with adversaries. Notably, recent studies call for DoD to break down siloes and converge toward a ***cohesive effort and vision***. Noted in these reports, the DoD lacks an overarching vision and guiding coalition focused on translating and amplifying siloed progress into scaled, broad-based benefit to drive lasting change. To fill this gap, this report offers a proposed overarching vision for needed change in the A&S community's approach to data-driven decision making:

> ***Proposed Digital Acquisition Vision:***
>
> *Transform the A&S community through a cohesive, ubiquitous, and cross-functional approach to data and information management and digital acquisition. Enable cross-functional digital integration across the acquisition lifecycle to advance data-driven decision-making, improve acquisition outcomes, and deliver more timely capabilities to the warfighter.*

2.0 APPROACH & REPORT OVERVIEW

2.1 APPROACH & REPORT OVERVIEW

The research team conducted a cross-cutting analysis–anchored in Kotter's Leading Change framework–to evaluate the current and future state of digital transformation of acquisition processes and to identify success models, technical approaches, and tools to accelerate progress. The team's multi-faceted analytic process included the following steps:

- ***SWOT*** [iv] ***analysis*** to inform a comprehensive understanding of the current state, future state vision, and tangible next steps for the A&S community to drive momentum in leading change across Kotter's framework. As part of SWOT analysis, the approach included:
  - » ***Strategic analysis*** of DoD and Service strategies surrounding DoD digital transformation efforts.
  - » ***Literature review and synthesis*** of DoD and industry-derived studies surrounding DoD digital transformation efforts.
  - » ***Outreach and engagements*** to collect program and Service-level perspectives on gaps, barriers, best practices, and success models relating to digital transformation. For all content captured in this report from non-attributional program and Service-level engagements, the team cross-referenced and cited with open-source reporting.

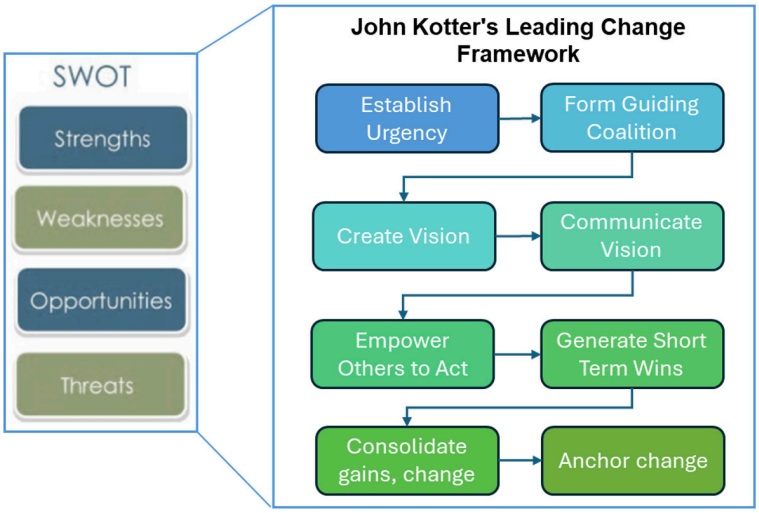

Figure 5. SWOT Analysis Informing Assessment Along Kotter's Framework

- ***Characterizing acquisition decisions*** through a foundational Acquisition Decision Landscape Model to organize current state and opportunity areas for enhancements.
- ***Developing a way forward*** that translates the SWOT findings into result-oriented recommendations for closing gaps and accelerating tactical and strategic progress toward the future state of the Acquisition Decision Landscape Model.

Section 3.0 of this report provides key findings and recommendations generated from this cross-cutting analysis.

[iv] SWOT: Strengths, Weaknesses, Opportunities, and Threats; a technique for assessing four aspects of an organization and to devise a successful strategy for future improvements.

3.0 SWOT ANALYSIS KEY FINDINGS

Building upon the FY23 *IDEAS* framework and leveraging the frameworks described in Section 1.2, the research team conducted a SWOT analysis to evaluate the current state, future state vision, and tangible next steps for the A&S community to drive momentum in leading change surrounding the proposed vision introduced in Section 1.4. A full list of references used throughout the SWOT analysis is included in Appendix B.

Fulfillment of this vision will transform the A&S community through a cohesive, ubiquitous, and cross-functional approach to data and information management and digital acquisition, and enable capabilities to achieve interoperability, integration, and data-driven decision-making across the acquisition decision landscape. Key SWOT findings included the following:

- **Strength – Strategic Alignment & Motivation**: There is no shortage of Service and enterprise-level strategies inspiring and driving successful lower-level change efforts across DoD departments, Services and program offices (see Figure 6). Aligned with the first step of Kotter's Leading Change Framework, common themes across these strategies show a shared sense of motivation and urgency for change. A full list of strategies and documentation surveyed in this work can be provided upon request.

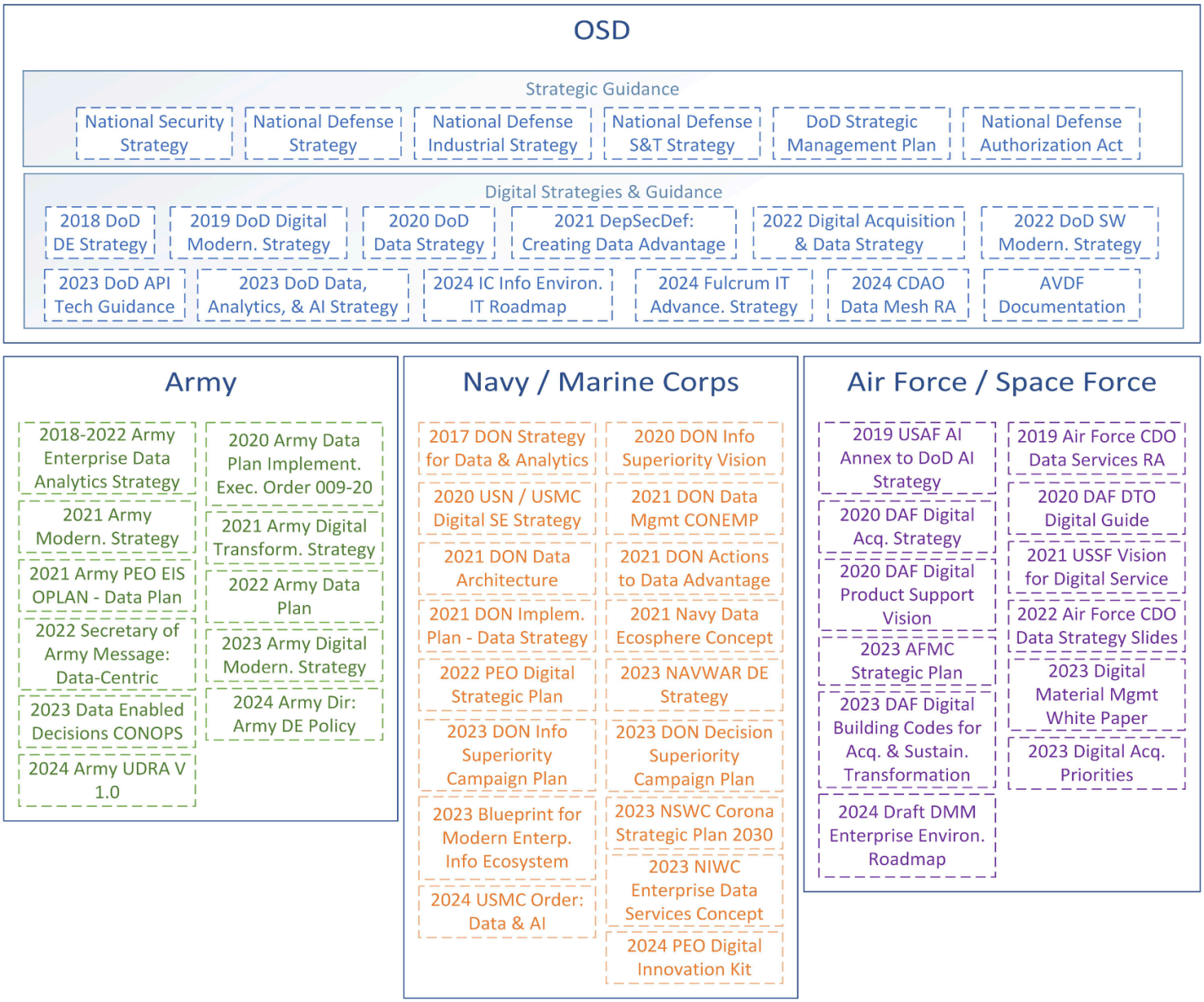

Figure 6: DoD & Service Strategies & Documentation for Digital Transformation Efforts

- **Strength – Generating Lower-level Progress**: There are several lower-level digital transformation, modernization, and acquisition innovation initiatives underway across the Services, program offices, and DoD departments. The team assessed over 30 initiatives pursuing digital transformation surrounding data, digital engineering, and data-driven decision making across the Services, programs, and DoD departments (see Figure 7). The team assessed over 40 data/information and analytics platforms across the Services, programs, and DoD departments (see Figure 8). These initiatives and platforms share similar goals of improving acquisition lifecycle processes and streamlining data/information integration, curation, and use to support decision making; they differ by use case, architecture, and domains of interest. Use cases varied across acquisition, sustainment, and operational decision making. A full list of initiatives and platforms surveyed in this work can be provided upon request.

Figure 7: DoD & Service Digital Transformation Initiatives

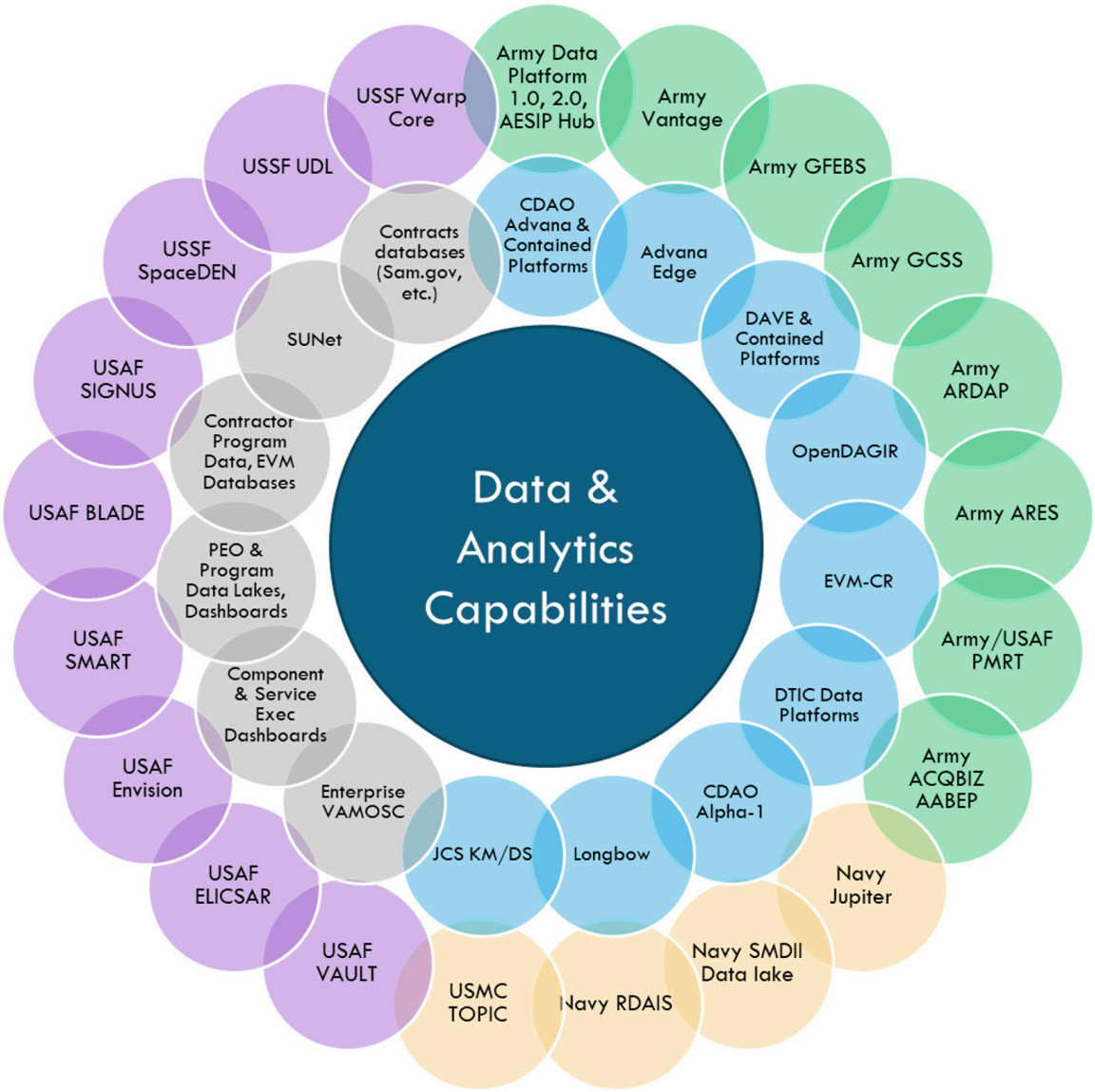

Figure 8: DoD & Service Data/Information & Analytics Platforms

- **Strength – AIRC Portfolio's Targeting Key Innovation Building Blocks**: AIRC has several ongoing efforts seeking to drive tactical progress in several areas across acquisition and sustainment functions. Many of these projects, including this FY24 AIRC project, aim to accelerate the development and testing of innovative methods surrounding technical and policy building blocks critical to achieving the proposed vision, including model-based tools and digital engineering innovations, enhanced T&E methods, and improving contracting and requirements management (see Figure 9).

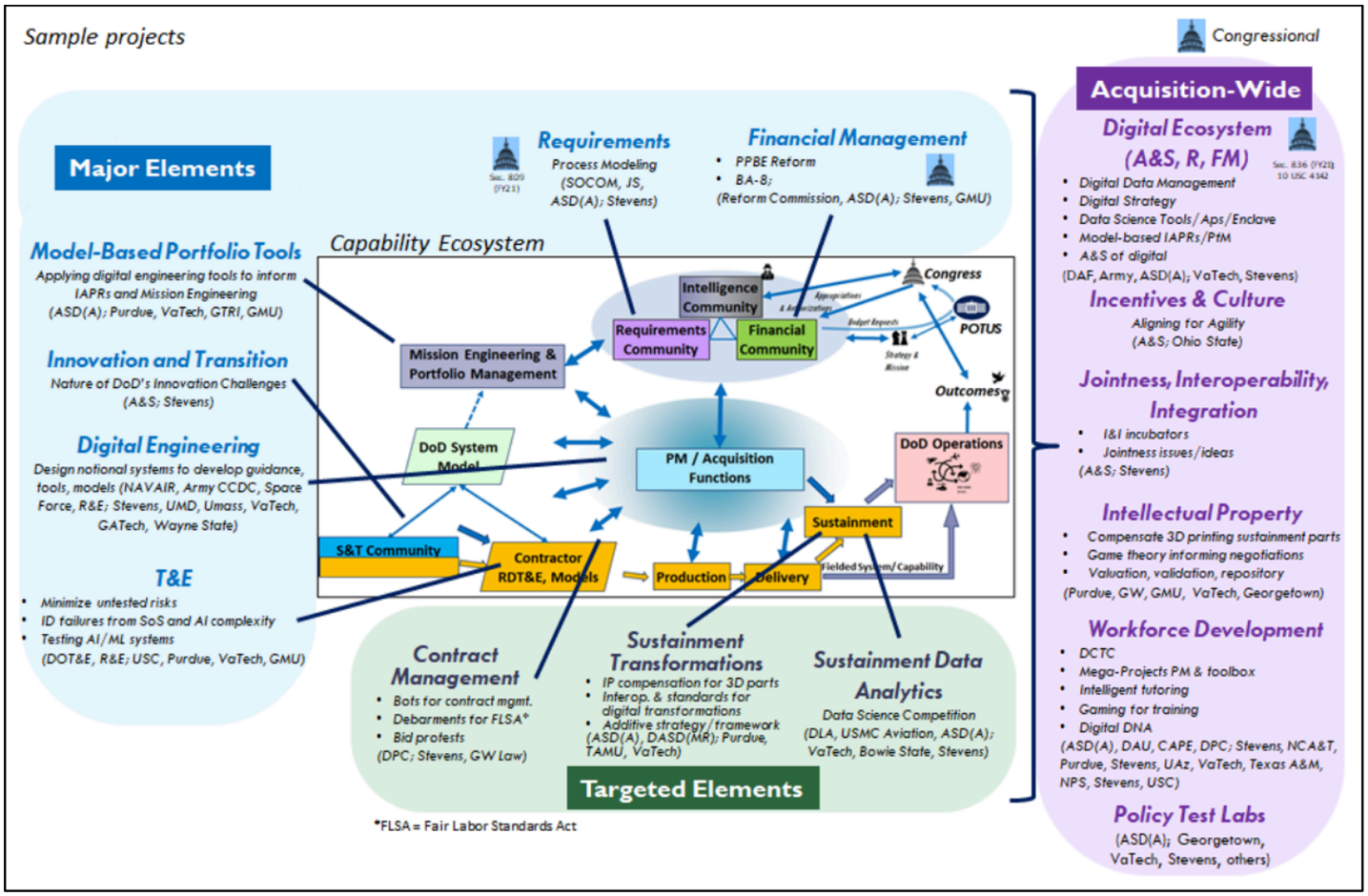

Figure 9: Select AIRC Projects Toward Improving A&S Functional Processes[13]

- **Weakness – Functional Siloes of Excellence**: Lower-level change efforts described above, i.e., strategies, process/ architecture frameworks, platforms, initiatives, while effective and transformative at their levels, remain siloes of excellence (see Figure 10). There are select success stories and efforts to align initiatives and platforms to create interoperability through employing the DoD Data Strategy VAULTIS principles,[14] CDAO Data Mesh[15] concept, and through interoperability initiatives with Advana and DAVE. At the same time, however, this alignment is not ubiquitous and many reports indicate that DoD lags behind in this transformation as compared to industry best practices.[16] Additionally, while strategies align in high level concepts and vision, cohesive practical guidance and implementation documentation is lacking, causing differences in the "how" of implementation across stakeholders.

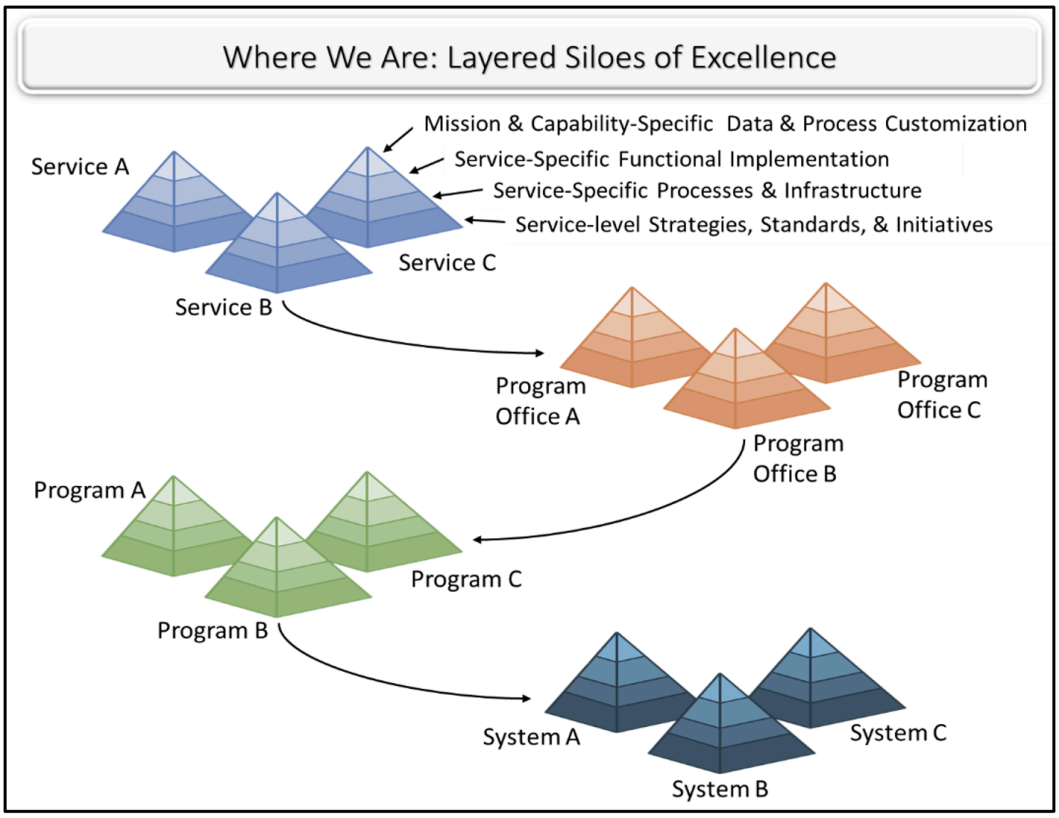

Figure 10. Layered Siloes of Excellence

- **Threat – Hurdles Limit Ability to Translate Short-Term Wins into Consolidating Gains**: Layers of disjointed standards, processes, technical implementations, and underlying frameworks and approaches present major hurdles in consolidating gains for enterprise-wide change and benefit. These hurdles include the following common themes found through engagements and analysis across the industry and DoD reports surveyed.
  - » Initiatives, platforms, policies, and tools are purpose-built, scoped to specific users, decision types, and domain/use cases with varied terminology, approaches, and processes (e.g., "data mesh, data fabric," "data integration layer," "data/information ecosystem," "data ecosphere," etc.).
  - » Different languages, tools, and purpose-built implementations undermine integration and interoperability for higher level decision-making that relies on the roll-up of data from across multiple programs, portfolios, or across the Services.
  - » Lack of mutual understanding exist between decision-makers and data generators; data generators are not always privy to the decisions their data supports, and decision makers are not always privy to the data that does or could exist to inform their decisions.
  - » Lack of cross-cutting efforts are focused on connective tissue across these siloes of excellence to repurpose, amplify, and extend practices in a way that optimizes rather than recreate or reinvent the wheel.
  - » Lack of cohesive strategy and documentation direct how the acquisition workforce handles the data life cycle, and limited disjointed data management and governance procedures leave large swaths of data underutilized.
  - » Lack of data/digital literacy education, workforce development, and incentives cannot enable and empower further change efforts and scalability.
  - » Data sharing is hindered by security concerns, inconsistent access policies, and data labeling issues.
  - » Data contracting rights are not properly fleshed out in contracts, creating data access and usage issues.

- **Opportunity – Amplify and Align Lower-Level Efforts for Consolidated Gains**: The A&S community and broader DoD should pursue a concerted effort to consolidate and translate lower-level progress and success models into cross-Service and cross-enterprise standardization frameworks and change (see Figure 11). There is an opportunity for A&S to play a role in driving this effort. There are several aspects across the lower-level change efforts that can be leveraged, amplified, extended, and expanded. Examples are included below and in Appendix A.
  - » OUSD A&S's Acquisition Visibility Data Framework (AVDF), which is a governed set of data elements, definitions, rules, and other metadata for the Adaptive Acquisition Framework (AAF)[17]
  - » CDAO's[18] and Army's Data Mesh concept and reference architectures[19]
  - » Army's digital engineering transformation efforts, including FY24 DE Modernization Pathfinder Programs[20] and the Army Digital Contracting Center of Excellence (COE)[21,22]
  - » Navy's digital engineering efforts, including NAVWAR's DE roadmap[23]
  - » Core metrics, building upon those recommended in the Defense Business Board's Business Health Metrics Report and those metrics used daily across the Services and programs in decision support dashboards and data analytics platforms (e.g., Navy's DON Performance Improvement Office's dashboard[24, 25] for enterprise operations and progress, PEO/program-level data lakes and dashboards for program-level business operations and decision making)[26]
  - » Air Force's Digital Building Code and associated Digital Guide resources, including the Air Force Digital Transformation Office's (DTO) Digital Engineering Maturity Model,[27] Key DE Features framework[28] and associated contract language guidance[29]
  - » Outputs of the AFMC Digital Material Management initiative surrounding data standards, policy, acquisition function integration, workforce improvement, digital environments (e.g., the draft DMM Enterprise Environment Roadmap)[30]

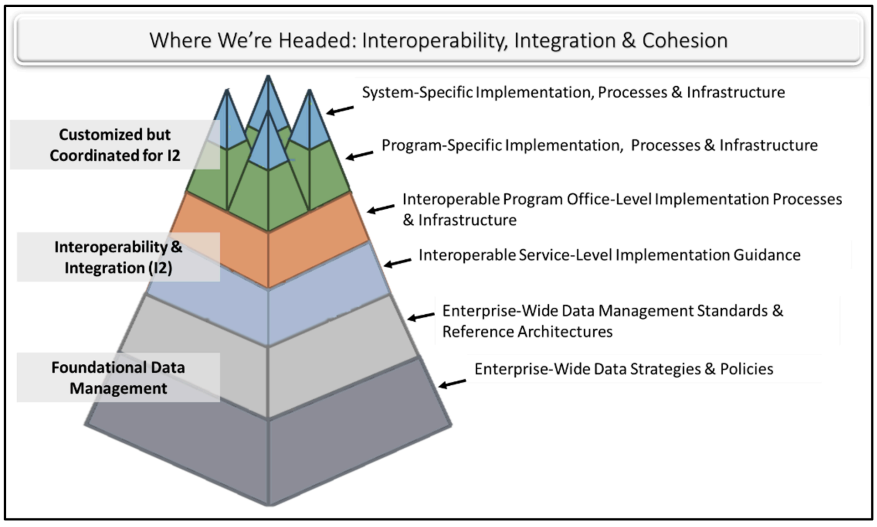

Figure 11. Aligning the Siloes of Excellence to Achieve Cohesive Knowledge Management Toward Vision

- **Opportunity – Employ a Cohesive Cross-Functional Approach to Data/Information Management, Digital Acquisition, & Data Strategy Implementation**: Leverage this foundational FY24 Acquisition Decision Landscape Model effort and implement a cohesive cross-functional approach to data and information management and digital acquisition aligned with the following high impact areas (expanded upon in the Acquisition Decision Landscape Model and Recommendations sections).
  - » Decision-driven and outcomes-driven approach to data and information management and acquisition outcomes through a clear understanding of the decision landscape, key decisions, key metrics, associated data needed, and key stakeholders along the data lifecycle supporting those decisions.
  - » Cross-cutting efforts that guide connectivity and standardization of initiatives and their respective digital transformation implementations and platforms.
  - » Improved data/digital literacy for common understanding and awareness amongst stakeholders, shared innovations, scaled implementation, and interoperability.
  - » Collaborative stakeholder network that shares, coordinates, and amplifies cross-functional and cross-service success models, initiatives, architectures, and remaining gaps to drive continuous consolidation of gains and anchoring of approaches for lasting change.
- **Opportunity – Consolidate Gains to Achieve the Vision**: To achieve the proposed vision, the DoD should leverage the opportunities described above and focus on consolidate gains surrounding the following key areas (expanded upon in the Acquisition Decision Landscape Model and Recommendations sections).
  - » Improve acquisition data management and access through enhanced data flows into analysis environments (e.g., Advana and DAVE) and improve methods for analyzing this data by introducing easier workflows for more complex data analysis.
  - » Enhance digital acquisition efficiencies and strengthen its foundation by leveraging digital engineering and digital acquisition processes and tools, model-based processes and tools, and application of agile and DevSecOps practices.
  - » Create and implement tailored data literacy and workforce training in data science, data engineering/architecture fields, and data analytics for acquisition professionals that integrate realistic data and challenges relevant to acquisition processes, the acquisition decision landscape, and surrounding data lifecycle.
  - » Continue improvements and scalability of enterprise data and information management through formalized acquisition data standards, governance functions and tools, and analytical capabilities to harness the power of standardized structured data and unstructured data.

The research team created the Acquisition Decision Landscape Model (current and future state) and recommendations in the next two sections of this report as a ***foundational framework and way forward to act on these opportunities and drive results toward the overall vision.***

In addition to the Acquisition Landscape Model and recommendations, the greater portfolio of AIRC projects ***continues to form key technical building blocks generating short term wins and tactical progress toward the vision***.

4.0 ACQUISITION DECISION LANDSCAPE MODEL

The SWOT analysis findings coalesce around a key point: ***the acquisition decision landscape is multi-dimensional, complex, and siloed across functional layers and hierarchies of decision makers. These dimensions must be understood to drive progress in data and information management standardization and scalability to drive digital transformation of acquisition processes and improve acquisition outcomes.*** The research team created the Acquisition Decision Landscape Model to characterize the current state of acquisition data and decision-making processes. A full list of references that informed this model is included in Appendix B.

The Acquisition Decision Landscape Model provides a comprehensive characterization of core elements (Figure 12 for high level elements and Figure 14 for full model depiction) surrounding the decision landscape.

- ***Cross-Domain Data Generators*** – Key cross-organizational, cross-functional stakeholders that play a role in the data lifecycle across acquisition activities.
- ***Data Sources*** – Current picture of data/information platforms known to store, share, and curate data, information, and knowledge surrounding programs and their respective capabilities.[v]
- ***Data Types*** – Leveraging and building upon the AVDF, the types of data generated across the lifecycle by data generators.
- ***Decision Categories and Decision Support Knowledge Sought*** –Major categories of acquisition decisions across acquisition functions and cross-organizational stakeholders and the type of knowledge each decision category aims to glean.
- ***Decision Makers*** – Key stakeholders surrounding the decision categories.
- ***Standards, Frameworks, Practical Guidance*** – Current state picture of the standards, frameworks, and practical guidance to guide standardization and implementation of digital transformation and digital data strategy across stakeholders. Alignment is noted where possible, based on open-source research, and emphasizes a key SWOT weakness relating to limited alignment of lower-level efforts.

The model depicts the relational aspects of the core elements through arrows and brackets. Stakeholders (both the Data Generators on the left and the Decision Makers on the right) use standards, frameworks, and practical guidance (depicted at the bottom) to guide their processes surrounding the data and decision landscape, including the type and format of data generated (data types), how and where it is stored (data sources), and acquisition decision making processes (decision framework).

[v] This is a non-exhaustive list discovered across the team's engagements, literature review, and open-source research. Recommendations include expanding this list through automated pipelines to create a comprehensive view.

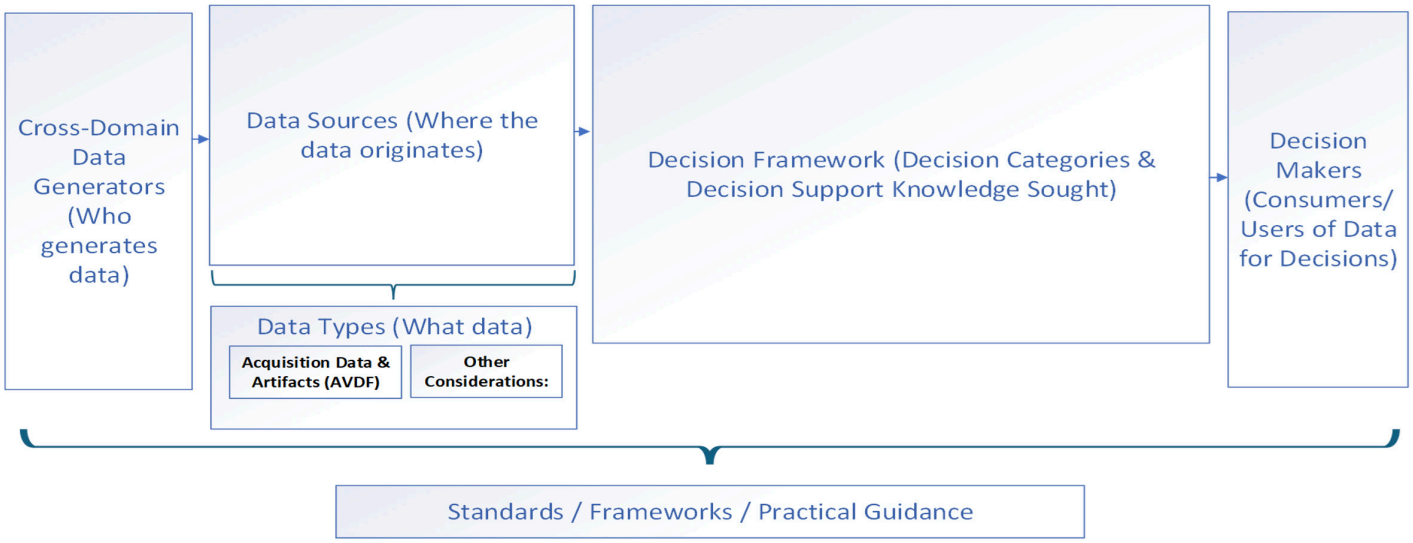

Figure 12. High-Level Elements of the Acquisition Decision Landscape Model

The research team assessed the relationship between stakeholders and decision types through the development of an initial process flow, which maps decisions along the "Decision Chain" of stakeholders, depicted in Figure 13. A major implication from this mapping is that higher-level decisions rely on the roll-up of data generated at the lower, program-level. ***Therefore, the disconnect and disjointedness in data generation and management at lower levels noted in the SWOT analysis will have negative impacts on efficient and effective decision making across the decision chain.***

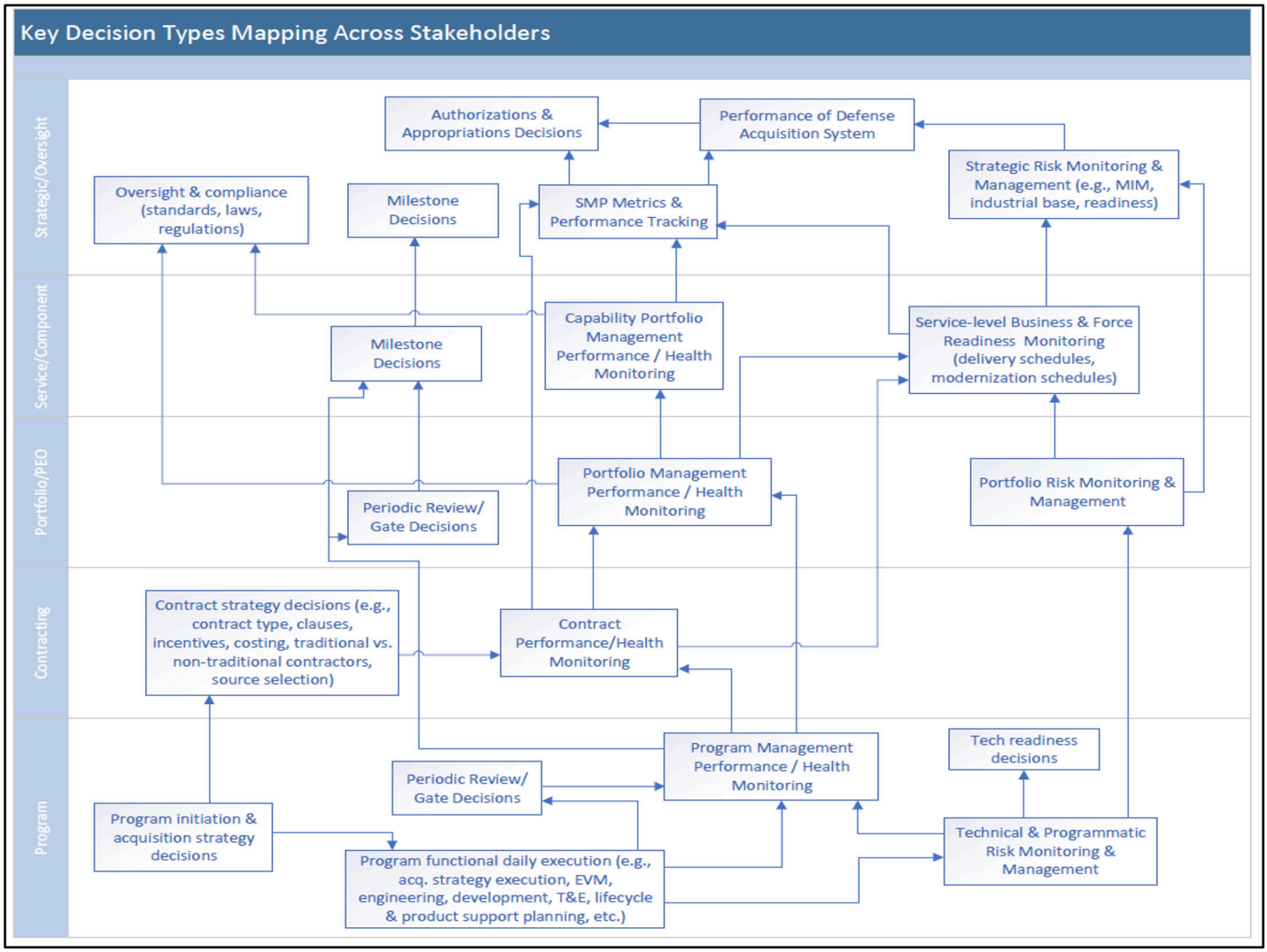

Figure 13. Key Decision Types Mapping Across Stakeholders

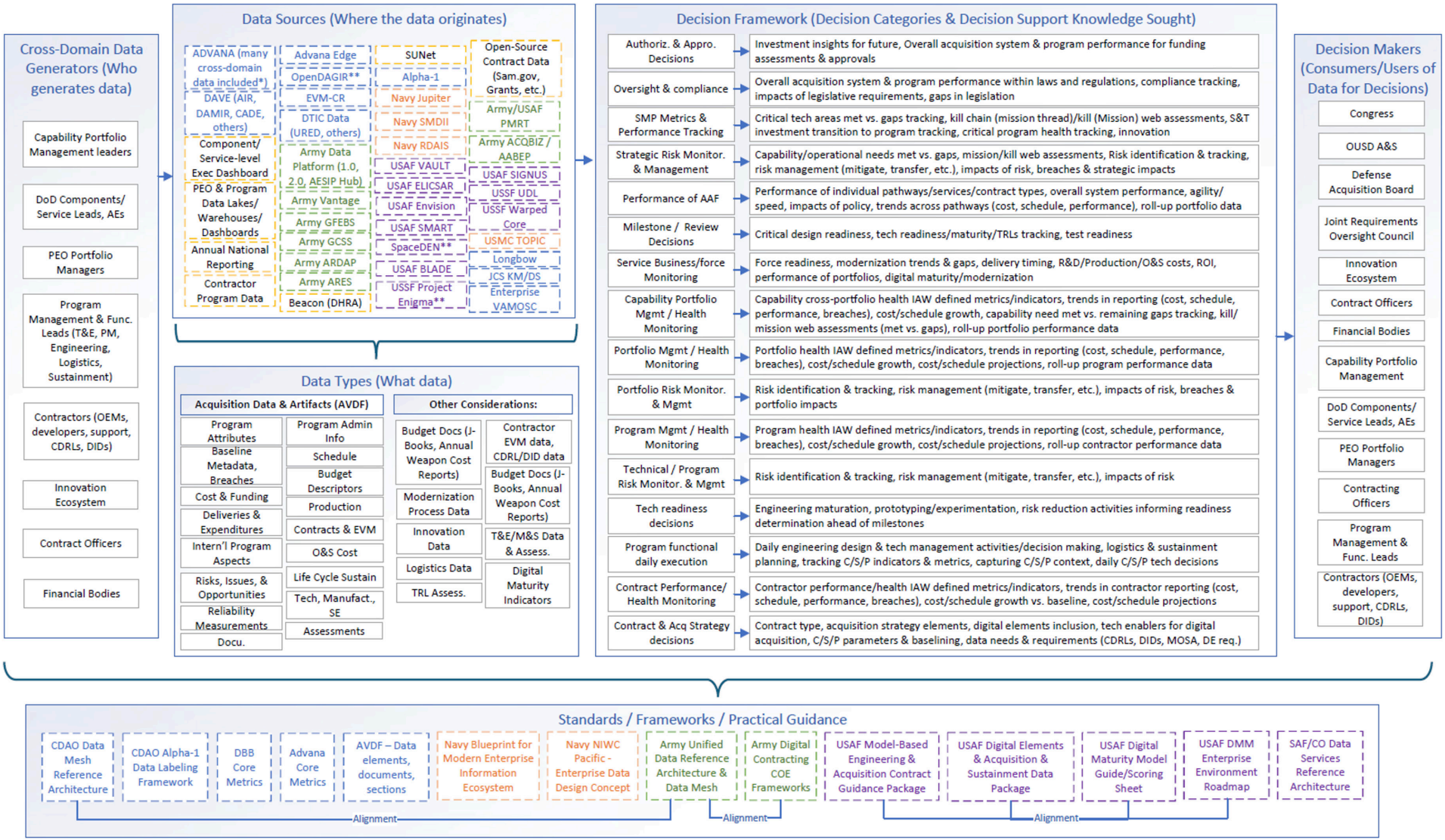

Figure 14. Current State Acquisition Decision Landscape Model

The team used the current state Acquisition Decision Landscape Model to assess high impact areas for A&S and the greater DoD to drive progress. This assessment led to the development of a future state depiction of the Acquisition Landscape Model, depicted in Figure 16. The end-state vision proposed in this report is to transform the A&S community through ***a cohesive, ubiquitous, and cross-functional approach to data and information management, digital acquisition, and enabling capabilities achieving interoperability, integration, and data-driven decision-making across the acquisition decision landscape***.

To get there, the future state model illuminates critical areas to pursue alignment and progress in consolidating gains, depicted in the bottom element of the model: Standards, Frameworks, and Practical Guidance. The future state model aimed to strike the right balance between program/Service-level individuality (use case-specific platforms supporting daily business functions and operations) with enterprise-wide data and decision-making needs. To strike this balance, the future state model offers a foundational framework for prioritizing data needs according to decision types, which can guide A&S and the greater DoD in efforts to standardize and align data generation and data sharing processes along the decision chain to support those decisions.

The core areas to drive cohesive data and information management, digital acquisition, and data strategy implementation are articulated in the bottom element of the model visual, aligned with the FY23 *IDEAS* Strategic Facets surrounding Information, Acquisition Functions and Tools, Decisions and Policy Tools, and People and Culture. These five core areas seek to provide tractable areas to harness, amplify, and align lower-level efforts for consolidated gains. These are further expanded upon in this report's recommendations. See Figure 15.

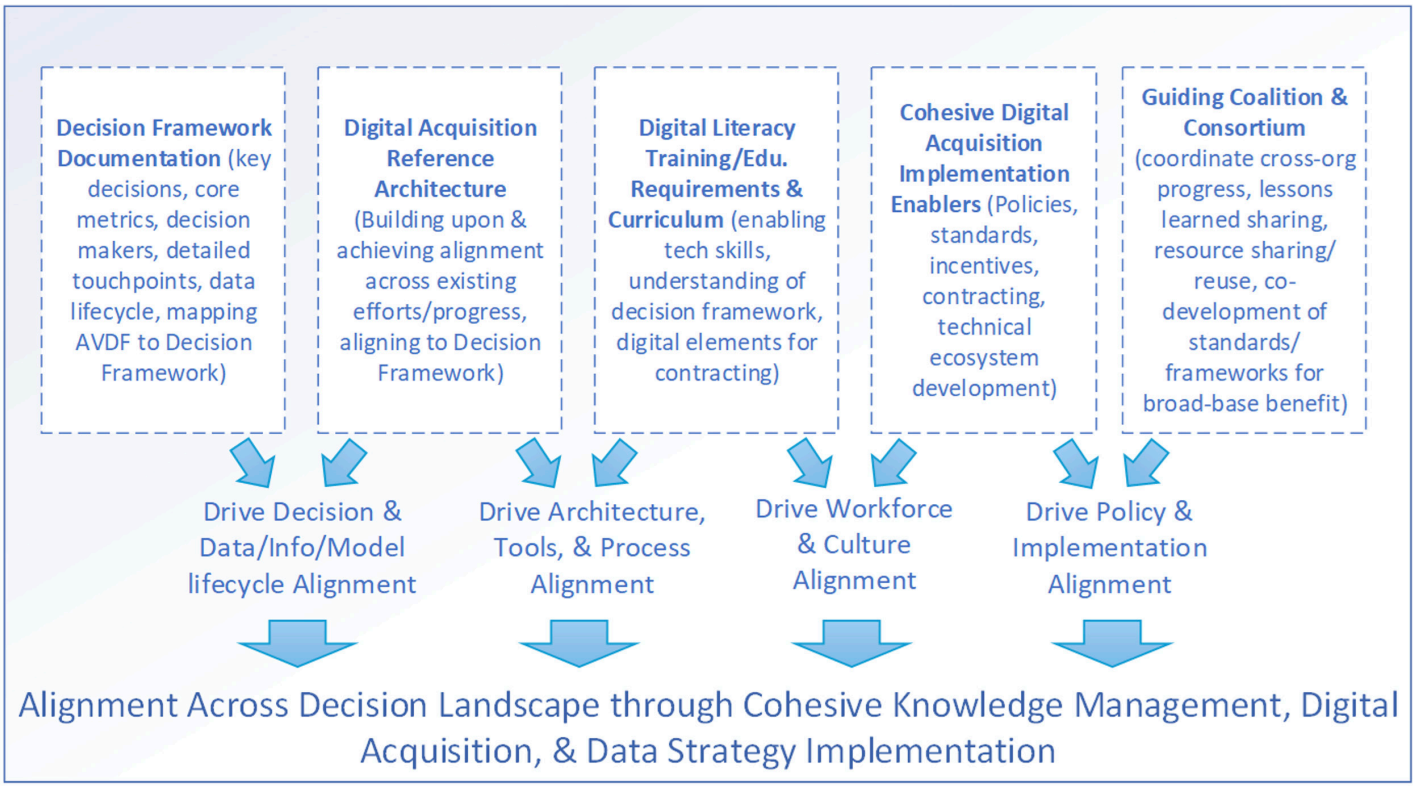

Figure 15: Core Areas to Target Alignment

This future model formed the basis of the team's recommendations for future steps and proposed pilot ideas. See Figure 16.

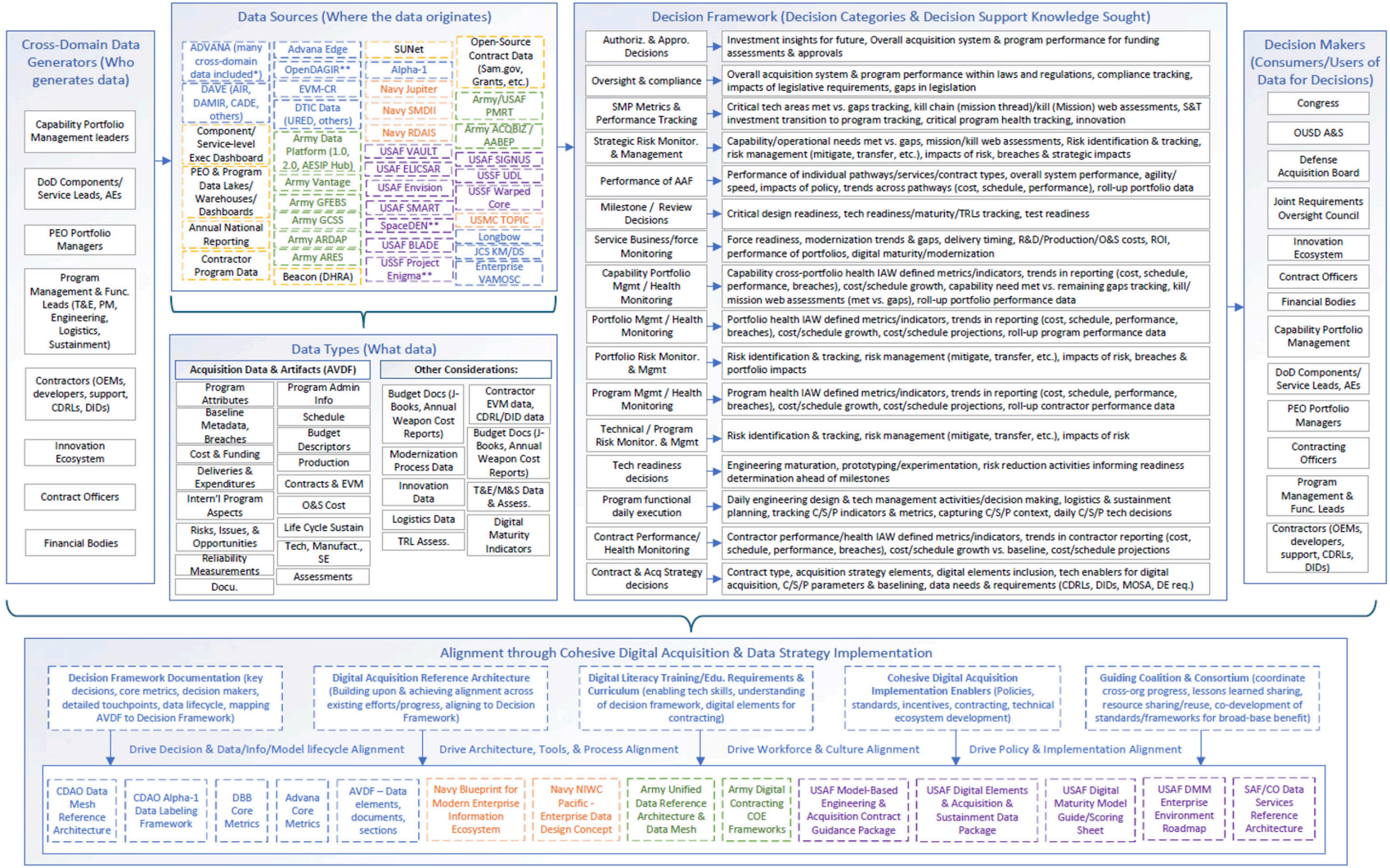

Figure 16: Future State Acquisition Decision Landscape Model

5.0 RECOMMENDATIONS FOR ACCELERATING DIGITAL TRANSFORMATION OF ACQUISITION PROCESSES

The research team created the Acquisition Decision Landscape Model as a foundational framework for understanding the current state of data-driven acquisition decisions and related processes, and to chart a way forward for the future state of this model toward achieving the end-goal vision. The team envisions the current and future state Acquisition Decision Landscape Models as living artifacts that the A&S community can iteratively assess, refine, and formalize into processes and standards to digitally transform processes, consolidate gains, and anchor new approaches.

As emphasized, this challenge will require tight coordination and convergence across various initiatives and organizational seams through a cohesive vision to tackle barriers across all dimensions. The recommendations focus on core areas where A&S can focus efforts, but the team acknowledges that most recommendations will require coordination, collaboration, and cohesion among cross-organizational stakeholders.

These recommendations focus on harnessing the opportunities, aspirations, and results captured in the SWOT analysis:

- ***Recommendation 1 – Continue AIRC Piloting Efforts***: Alongside and informing Recommendations 2-6, conduct piloting efforts to explore and refine concepts surrounding the Acquisition Decision Landscape, core decisions and metrics to pursue and formalize, and improved use of acquisition data to inform decision-making processes.

Short-Term Pilot Ideas to Consider
1.1. Pilot 1: Apply the Acquisition Decision Landscape Model in practice, develop a process for persistent monitoring of acquisition data to track program/capability progress and maturity over time to inform: » Pilot 1.A: Portfolio level roll-ups (**Potential Leads**: ***DASD(AI2),***[31] ***DASD(PWPM), DASD(SSIPM), and API/DA***). » Pilot 1.B: Status/maturity of mission thread/kill chains for readiness tracking (**Potential Leads**: ***DASD(AI2), Portfolio DASDs, and API/DA***). » Pilot 1.C: Status/maturity of critical technology areas for tracking S&T/R&D investments across the acquisition lifecycle (**Potential Leads**: ***Portfolio DASDs, Transition Tracking Action Group***[32] ***(TTAG)/DTIC, API/DA***).
1.2. Pilot 2: Analyze program(s) that reached milestones early or below costs. Develop a process for tracking early indicators of positive trends from acquisition baseline. Potential to design a concept for persistent capability for monitoring early positive trend indicators to inform incentives & best practice sharing/identification across AAF (**Potential Lead**: ***API/DA***).
1.3. Pilot 3: Conduct Defense Data Grand Prix competitions[33] leveraging Acquisition Decision Landscape Model to explore data analytics & visualizations methods leveraging unstructured acquisition data, to tap into an underutilized resources to inform acquisition decisions across the landscape (**Potential Lead**: ***API***).
1.4. Pilot 4: Create a natural language processing (NLP) capability/workflow to process annual open-source documents (e.g., budget reports, Justification books, etc.) to persistently monitor for new data and analytics capability initiatives across the DoD. This would be used to inform participants in AV Governance and a Digital Transformation-focused forum to decrease future stovepipes and coordinate efforts (**Potential Lead**: ***API***).

- ***Recommendation 2 – Guiding Coalition & Consortium***: Coordinate cross-organizational progress, lessons learned sharing, resource sharing/reuse, co-development of standards/frameworks for implementation of this vision.

Short-Term Recommendations
2.1. Expand Acquisition Visibility Governance (AV Governance) membership and forum scope with broader representation across localized data and digital transformation initiatives identified in our analysis (listed in Appendix A) to integrate and federate these initiatives, improve data sharing, and scale digital transformation efforts (**Potential Leads**: ***API, AV Governance***).
2.2. Utilize AV Governance to identify activities that OUSD(A&S) could pursue across the other recommendation areas to bring the Acquisition Decision Landscape Model into practice (**Potential Leads**: ***API, AV Governance***).
2.3. Utilize AV Governance to establish a new forum for digital transformation collaboration, connecting working-level representatives from initiatives identified in our analysis (Appendix A). Establish regular meetings and activities – in addition to AV Governance activities – to collectively share and coordinate implementations surrounding digital transformation of A&S processes and functions. Include the API-chaired Acquisition Analytic Forum as members of this newly established forum.[34] (**Potential Lead**: ***API/DA***).

Long-Term Recommendations
2.4. Execute the battle rhythm and charter, involving the expanded AV Governance participants as an integral group to inform outputs of Recommendations 3–6.
2.5. Develop technical solutions for capturing and sharing progress, success models, best practices, and design choices across the AV governance participants and stakeholders.
2.6. Collaboratively design strategy inputs, frameworks, and guidance through the AV Governance, in execution of Recommendations 3–6.

- ***Recommendation 3 – Decision Framework Documentation****:* Capture and standardize further the key decisions, core metrics, decision makers, detailed touchpoints, data lifecycle, and map the existing AVDF to the Decision Framework.

Short-Term Recommendations
3.1. Utilize AV Governance to determine required standards, documentation, and data requirements relevant to bringing the Acquisition Decision Landscape Model into practice (**Potential Lead**: ***AV Governance***). As part of this meeting, determine next steps for the following: » Develop a set of core metrics associated with each decision category in the Acquisition Decision Landscape Model, leveraging DBB Business Health Metrics and associated recommendations surrounding Strategic Management Plan (SMP) performance measures,[35] metrics available in Advana, metrics used across the Services and programs in decision support dashboards and data analytics platforms (e.g., Navy's DON Performance Improvement Office[36] dashboard[37] for enterprise operations and progress), and metrics offered by the participants in the AVSG. » Map core metrics to the AVDF,[38] illuminate and formalize priority data/information and related requirements and gaps to address through Recommendations 3 and 6. » Refine and formalize the Acquisition Decision Landscape Model with inputs and lessons learned provided by AV Governance participants.
3.2. Conduct data science pilots (under Recommendation Area 1) to develop and experiment with analytic workflows and visualizations surrounding identified Acquisition Decision Landscape Model standards, documentation, and requirements (**Potential Lead**: ***API***).

- ***Recommendation 4 – Digital Acquisition Reference Architecture***: Build upon and formalize alignment across existing efforts, standards and frameworks, guidance, and lower-level reference architectures aiming to align all to the Acquisition Decision Landscape Model.

Short-Term Recommendations
4.1. Utilize AV Governance, in coordination with OSD CIO, CDAO, and Military Service CIOs, to discuss current/in-progress reference architectures to date and determine next steps for aligning the Acquisition Decision Landscape Model to them for building the connective tissue between lower-level efforts and enterprise-wide architectures (**Potential Leads**: ***API, AV Governance***). As part of this effort, determine next steps for the following: » Whether the community needs a Digital Acquisition Reference Architecture concept, incorporating and aligning relevant digital transformation reference and implementation architectures. » Discuss what can be leveraged from CDAO's and Army's Data Mesh Reference Architectures, NAVWAR's DE roadmap, FY24 DE Modernization Pathfinder Programs[39] and the Army Digital Contracting Center of Excellence (COE)[40] [41], and Air Force's DTO Digital Guide as a starting point.
4.2. Coordinate use of the Acquisition Decision Landscape Model with current/in-progress digital transformation reference and implementation architectures (i.e., CDAO's and Army's Data Mesh Reference Architectures, and others discovered through AVSG meeting) (**Potential Leads**: ***API, AV Governance, OSD CIO, CDAO***).
4.3. Determine relevant architecture guidance, taxonomies, and ontology components required to document and drive alignment across lower-level initiatives and architectures to use the Acquisition Decision Landscape model (**Potential Lead**: ***API***).

- ***Recommendation 5 – Digital Literacy Training/Education Requirements & Curriculum***: Develop tailored curricula surrounding the enabling technical skills required to implement digital acquisition; to ensure comprehensive understanding of decision framework amongst all stakeholders (data generators and decision makers); and to educate all functional stakeholders on the Decision Landscape.

Short-Term Recommendations
5.1. Leverage past OUSD(A&S) digital literacy work and current DAU offerings to create tailored curricula framework for six learning paths[vi] specific to the Acquisition Decision Landscape and digital acquisition (**Potential Leads**: ***AV Governance, API, DAU, API/DA, DAU, Naval Postgraduate School (NPS), Air Force Institute of Technology (AFIT), Army War College***).
5.2. Identify current course offerings to leverage across curriculum, identify where tailored acquisition-specific workforce course gaps exist to drive new course development (**Potential Lead**: ***API, DAU***).
5.3. Develop workforce training requirements and related incentives surrounding frequency, role-based factors, & implementation considerations for the curricula across functional areas (**Potential Lead**: ***API, A&S Functional Leads,***[42] ***Directors of Acquisition Career Management (DACMs)***).

Long-Term Recommendations
5.4. Apply crawl-walk-run approach to full curriculum development and implementation (**Potential Lead**: ***DAU***).

[vi] Six learning paths: 1) Data architecting for acquisition data lifecycle management; 2) Data management & analytics; 3) Digital acquisition (core aspects of digital/mission/model-based engineering, implementation of digital acquisition); 4) Acquisition Decision Landscape Model; 5) Digital acquisition oversight to enable governance and incentives surrounding digital acquisition; 6) Contracting for digital acquisition (leveraging Army's Digital Contracting Center of Excellence (COE) and other initiatives lessons learned).

- ***Recommendation 6 – Cohesive Digital Acquisition Implementation Enablers***: Beyond the reference architecture, pursue the policies, standards, incentives, contracting, technical ecosystem development that will enable and accelerate implementation.

Short-Term Recommendations
6.1. Utilize AV Governance, ensuring representation from CDAO, and from initiatives identified through this analysis (Appendix A), to discuss actions needed surrounding policies, standards, incentives, guidance, and technical ecosystem alignment to: 1) scale select lower-level standards/practices[vii] into enterprise-wide practice; 2) bring the Acquisition Decision Landscape Model into practice; 3) and establish the connective tissue between lower-level efforts and enterprise-wide anchored change (**Potential Leads**: ***API, AV Governance***). As part of this effort, determine next steps for the following: » How to best leverage and extend Service resources, including NAVWAR's DE roadmap, Army FY24 DE Modernization Pathfinder Programs[43], Army Digital Contracting Center of Excellence (COE)[44 45], Air Force Digital Engineering Maturity Model,[46] Air Force Key DE Features framework[47] Air Force model-based/DE contract language[48], and Air Force DMM effort outputs[49] to develop tailored department-wide acquisition guidance for core digital engineering/acquisition elements, digital maturity model and assessment process, contract language, and incentives critical to the Acquisition Decision Landscape Model. » Identify policy/strategy roadblocks the working-level representatives need lifted to accelerate short-term wins across lower-level efforts and consolidate gains across the enterprise.
6.2. Utilize AV Governance to discuss the existing array of data and analytics platforms and related actions the A&S community can take to in driving further connectivity amongst platforms through the Acquisition Decision Landscape Model, especially in light of forthcoming infrastructure and vendor changes to Advana[50, 51](**Potential Leads**: ***API, AV Governance***).

Long-Term Recommendations
6.3. Address roadblocks identified through policy development and implementation (**Potential Leads**: ***API, AV Governance***).

[vii] Including but not limited to core digital engineering/acquisition elements, digital maturity model and assessment process, contract language, and incentives critical to Acquisition Decision Landscape Model.

In conclusion, this effort developed foundational frameworks, approaches, models, and practical recommendations to help the DoD A&S community transform into a next-generation data-driven organization. The research team addressed strategic challenges and barriers and evaluated the current and future-state digital data strategy and acquisition processes. Ultimately, this report will help accelerate advancement in digital acquisition and data-driven decision making. It provides an overarching Digital Acquisition Vision, an Acquisition Decision Landscape Model (current and future state), and recommendations to accelerate progress toward the proposed vision. The ultimate vision is to transform the A&S community through a cohesive, ubiquitous, and cross-functional approach to data and information management and digital acquisition, one that enables cross-functional digital integration across the acquisition lifecycle, advances data-driven decision-making and acquisition outcomes, and delivers more timely capabilities to the warfighter.

APPENDIX A. DOD & SERVICE INITIATIVES DRIVING DIGITAL TRANSFORMATION

The research team discovered many initiatives focused on driving digital transformation across the DoD and services. The initiatives vary in scope, use cases, and levels of echelons, but many are generating practical guidance, architecture frameworks, and implementations at their respective levels that could offer scaling opportunities across the enterprise. Below provides a list of initiatives discovered, expanding on those depicted in Figure 7.

- Army:
  - » Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA-ALT) and Deputy Assistant Secretary of the Army (Data, Engineering and Software) digital engineering (DE) transformation initiative and pathfinder programs
  - » Army DE Pathfinder Programs: XM-30 Mechanized Infantry Combat Vehicle, Future Long-Range Assault Aircraft, Integrated Fires Mission, Joint Targeting Integrated Command and Control Suite, M113 Armored Personnel Carrier, and PEO Aviation Logistics Data Analysis Lab[52]
  - » Army UDRA initiative[53]
  - » Army Contracting Command Digital Center of Excellence[54]
  - » Army ERDC Big Data Analytics team[55]
  - » Army PEO EIS[56]
  - » Army Enterprise Business Systems–Convergence (EBS-C) Program[57]

- Navy:
  - » Navy PEO Digital[58]
  - » Navy PEO Manpower, Logistics and Business Solutions (MLB)[59]
  - » DON Data Analytics Consortium (DAC) (if still active, public coverage is dated 2017)[60]
  - » NAVSEA NSWC Corona[61] and PEO Ships data-driven decision initiatives[62]
  - » DON Performance Improvement Office (PIO) and dashboard initiative[63]
  - » Command & Control (C2) Technology and Experimentation Division (specifically Branch Codes 53629 and 53622) of Command & Control and Enterprise Engineering (C2E2) Department, Naval Information Warfare Center (NIWC) Pacific and their Enterprise Shared Data Services Design Concept[64]
  - » Chief of Naval Operations for Information Warfare (N2/N6)'s Modern Information Ecosystem Blueprint initiative[65]
  - » Navy Task Force Hopper[66]
  - » Navy Project OpenShip[67]
  - » Naval Surface Analytics Group[68]
- Air Force/Space Force:
  - » Air Force Digital Transformation Office (DTO)[69]
  - » Air Force Material Command Digital Material Management (DMM) initiative[70]
  - » Air Force Material Command DMM Enterprise Environment Roadmap team[71]
  - » Air Force DTO Digital Integration & Innovation Center of Excellence (DIICE)[72]
  - » AETC A3/6's Data Team & AETC/A9 Studies and Analysis Squadron's Command Analytic Office (CAO) Data Strategy Education Efforts[73]
  - » Space Force Space Systems Command (SSC) Cross Mission Data Branch and the Unified Data Layer[74]
  - » Space Force SSC Enterprise Data Architect Team[75]
  - » Space Force SSC Project Enigma[76]
  - » Space Force DE initiatives[77]

- OUSD(A&S):
  - » Data Analytics division of API[78]
  - » Acquisition Visibility Data Framework (AVDF) and Defense Acquisition Visibility Environment (DAVE) team[79]
- OSD CDAO:
  - » CDAO Data Mesh initiative[80]
  - » CDAO Alpha-1, Task Force Lima, program use case teams, and the Replicator Initiative[81]
  - » CDAO's Advana team[82]
  - » CDAO Open DAGIR (forthcoming)[83]
- DoD-Wide:
  - » Acquisition Visibility (AV) Governance body (i.e., Acquisition Visibility Steering Group (AVSG) / Acquisition Visibility Working Group (AVWG))[84]
  - » Acquisition Analytic Forum[85]

APPENDIX B: FULL REFERENCE LIST

The team synthesized information across the following sources throughout the cross-cutting analysis to formulate SWOT and Acquisition Decision Landscape findings, which are not directly cited in-text:

- https://aaf.dau.edu/storage/2023/01/Program-API-Strategy-Template-released-Guidance.pdf
- https://ac.cto.mil/wp-content/uploads/2019/06/2018-Digital-Engineering-Strategy_Approved_PrintVersion.pdf
- https://ac.cto.mil/wp-content/uploads/2022/12/Status-of-Adoption-and-Implementation-of-Digital-Engineering-Infrastructure-and-Workforce-Development-Within-the-Department-of-Defense.pdf
- https://acqirc.org/events/airc-research-review-2024/
- https://acqirc.org/events/airc-research-review-2024/
- https://guide.dafdto.com/industry-association-consortium-sharing-site/
- https://acqirc.org/publications/perspectives/critical-competencies-to-support-digital-transformation-in-acquisition/
- https://acqirc.org/publications/research/acquisition-with-digital-engineering/
- https://api.army.mil/e2/c/downloads/2021/10/20/3b64248b/army-digital-transformation-strategy.pdf
- https://api.army.mil/e2/c/downloads/2022/10/13/16061cab/army-data-plan-final.pdf
- https://api.army.mil/e2/c/downloads/2022/11/02/fdfd99c2/b3-data-the-key-to-modernization-panel.pdf
- https://api.army.mil/e2/c/downloads/2023/02/07/8c02cbd0/23-748-data-enabled-decision-making-dec-22-public.pdf
- https://api.army.mil/e2/c/downloads/2024/03/26/4b65a3b3/udra-v1-0-final.pdf
- https://apps.dtic.mil/sti/trecms/pdf/AD1126785.pdf
- https://apps.dtic.mil/sti/trecms/pdf/AD1204403.pdf
- https://apps.dtic.mil/sti/trecms/pdf/AD1204403.pdf
- https://www.doncio.navy.mil/contentview.aspx?id=14828
- https://apps.dtic.mil/sti/trecms/pdf/AD1210302.pdf
- https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN34818-SD_08_STRATEGY_NOTE_2021-02-000-WEB-1.pdf
- https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN40932-ARMY_DIR_2024-03-000-WEB-1.pdf
- https://aviationweek.com/mro/usafs-big-data-approach-logistics-predictive-maintenance
- https://belvoir.afceachapters.org/sites/default/files/files/2021-11-05%20-%20AFCEA%20-%20Creating%20DON%20Data%20Advantage.pdf
- https://breakingdefense.com/2021/05/air-force-department-mulls-options-for-data-sharing/
- https://breakingdefense.com/2024/06/gdits-project-enigma-inches-toward-production-contract/
- https://nstxl.org/enigma-awarded-to-gdit/
- https://buildersummit.com/wp-content/uploads/2020/08/Advana-101-Briefing_JUL2021.pdf
- https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2025/budget_justification/pdfs/01_Operation_and_Maintenance/O_M_VOL_1_PART_1/DHRA_OP-5.pdf
- https://dair.nps.edu/bitstream/123456789/2729/1/GMU-AM-18-224.pdf
- https://dbb.defense.gov/Portals/35/Documents/Reports/2023/DBB%20FY23-01%20Business%20Health%20Metrics_30%20Nov%2022_FINAL.pdf
- https://dbb.defense.gov/Portals/35/Documents/Reports/2024/FY24-03%20Digital%20Ecosystem%20-%20FINAL%20FOR%20PRINT%20with%20DOPSR%20Stamp%204-16-24.pdf
- https://defensescoop.com/2023/02/15/pentagon-chieftains-deploy-a-new-data-driven-tool-to-take-the-pulse-of-their-enterprise/
- https://defensescoop.com/2023/03/20/navys-new-project-openship-aims-to-swiftly-apply-ai-to-data-captured-by-vessels-at-sea/
- https://defensescoop.com/2023/03/20/navys-new-project-openship-aims-to-swiftly-apply-ai-to-data-captured-by-vessels-at-sea/

- https://fedscoop.com/ai-task-force-for-navy-surface-fleet-devising-comprehensive-data-catalog/
- https://defensescoop.com/2023/11/08/space-force-digital-modeling-strategy/
- https://defensescoop.com/2024/06/18/army-digital-engineering-strategy-interoperability-standards/
- https://disa.mil/en/NewsandEvents/2023/DISA-IPlan
- https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf
- https://fedscoop.com/ai-task-force-for-navy-surface-fleet-devising-comprehensive-data-catalog/
- https://guide.dafdto.com/2022/11/22/digital-guide-newcomers-page/
- https://guide.dafdto.com/2022/12/18/acquisition-and-sustainment-data-package/
- https://guide.dafdto.com/industry-association-consortium-sharing-site/
- https://guide.dafdto.com/wp-content/uploads/2023/01/Digital-Campaign-Acquisition-Guidance_25Oct_2021_PA-Request.pdf
- https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fguide.dafdto.com%2Fwp-content%2Fuploads%2F2023%2F01%2FKey_DE_Features_25Oct_2021.xlsx&wdOrigin=BROWSELINK
- https://guide.dafdto.com/wp-content/uploads/2023/01/Digitial-Building-Code-2022-Memo-Signature-Final.pdf
- https://guide.dafdto.com/wp-content/uploads/2023/03/DAF-Digital-Maturity-Guide_v2.0_PA.pdf
- https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fguide.dafdto.com%2Fwp-content%2Fuploads%2F2023%2F03%2FDAF-Digital-Maturity_v2.0_PA.xlsx&wdOrigin=BROWSELINK"
- https://guide.dafdto.com/wp-content/uploads/2024/05/Digital-Acceleration-Consortium-DAC-Prototype.pdf
- https://hbr.org/1995/05/leading-change-why-transformation-efforts-fail-2
- https://innovation.defense.gov/Portals/63/DIB%20ToR%20on%20Building%20a%20DoD%20Data%20Economy_1.pdf
- https://irp-cdn.multiscreensite.com/6e5efd05/files/uploaded/Leading%20Change.pdf
- https://media.defense.gov/2019/Jul/12/2002156622/-1/-1/1/DOD-DIGITAL-MODERNIZATION-STRATEGY-2019.PDF
- https://media.defense.gov/2020/Oct/08/2002514180/-1/-1/0/DOD-DATA-STRATEGY.PDF
- https://media.defense.gov/2021/Dec/08/2002906075/-1/-1/1/MEMORANDUM-ON-ESTABLISHMENT-OF-THE-CHIEF-DIGITAL-AND-ARTIFICIAL-INTELLIGENCE-OFFICER.PDF
- https://media.defense.gov/2021/May/06/2002635623/-1/-1/1/USSF%20VISION%20FOR%20A%20DIGITAL%20SERVICE%202021%20(2).PDF
- https://media.defense.gov/2021/May/10/2002638551/-1/-1/0/DEPUTY-SECRETARY-OF-DEFENSE-MEMORANDUM.PDF
- https://media.defense.gov/2022/Feb/03/2002932833/-1/-1/1/DEPARTMENT-OF-DEFENSE-SOFTWARE-MODERNIZATION-STRATEGY.PDF
- https://media.defense.gov/2022/Jul/26/2003042389/-1/-1/1/NAVIGATION%20PLAN%202022_SIGNED.PDF
- https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF
- https://media.defense.gov/2023/Aug/15/2003281336/-1/-1/1/DEPARTMENT%20OF%20THE%20NAVY%20DECISION%20SUPERIORITY%20VISION.PDF
- https://media.defense.gov/2023/May/09/2003218877/-1/-1/0/NDSTS-FINAL-WEB-VERSION.PDF
- https://media.defense.gov/2023/May/09/2003218877/-1/-1/0/NDSTS-FINAL-WEB-VERSION.PDF
- https://media.defense.gov/2023/Nov/02/2003333300/-1/-1/1/DOD_DATA_ANALYTICS_AI_ADOPTION_STRATEGY.PDF
- https://media.defense.gov/2023/Nov/02/2003333301/-1/-1/1/DAAIS_FACTSHEET.PDF
- https://media.defense.gov/2024/Mar/15/2003414274/-1/-1/1/dmra_paper.PDF
- https://mitchellaerospacepower.org/wp-content/uploads/2024/05/Digital_Engineering_Policy_Paper_49.pdf
- https://nap.nationalacademies.org/catalog/25979/empowering-the-defense-acquisition-workforce-to-improve-mission-outcomes-using-data-science
- https://ncmahq.org/Web/Shared_Content/CM-Magazine/CM-April-2022/Driving-Innovation-into-the-Defense-Acquisition-and-Sustainment-System-.aspx
- https://nps.edu/documents/112507827/0/2020+Dist+A+DON+Digital+Sys+Eng+Transformation+Strategy+2+-Jun+2020.pdf/

- https://nps.edu/documents/112507827/0/2020+Dist+A+DON+Digital+Sys+Eng+Transformation+Strategy+2+-Jun+2020.pdf/3bece018-cf24-0b8a-72b5-16d78507f922?t=1595965527526
- https://obamawhitehouse.archives.gov/sites/default/files/docs/2015_national_security_strategy_2.pdf
- https://orangeslices.ai/contract-award-5m-dod-advana-edge-support-services/
- https://sam.gov/opp/62db04c8cc084b7ebf4db225bf1c7ed2/view
- https://sam.gov/opp/6cf58173525446d09c1bb74ac14a7a24/view
- https://breakingdefense.com/2023/12/army-asks-industry-for-best-acquisition-approach-for-vantage-data-platform-re-compete/"
- https://ssc.spaceforce.mil/Portals/3/SSC%20Press%20Release_UDL%20Establishes%20connection%20w-Space%20Fence_b.pdf
- https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf
- https://web.archive.org/web/20220227161019/https://nova.afceachapters.org/file/30916/download?token=GhynNWKP
- https://www.acq.osd.mil/asda/ae/ada/docs/211101-psa%20Draft%20PDAS%202020%20Excerpts%20FINAL.pdf
- https://www.aetc.af.mil/News/Article-Display/Article/3357409/aetc-transforming-data-strategy-and-standards-to-enable-digital-age-training-ed/
- https://www.af.mil/News/Article-Display/Article/2974687/guide-serves-as-digital-campaign-repository/
- https://www.af.mil/Portals/1/documents/2019%20SAF%20story%20attachments/Tab%203%20SAF_CO_DSRA_Formatted.pdf?ver=2019-05-08-151010-237
- https://www.af.mil/Portals/1/documents/2020SAF/There_Is_No_Spoon_(Digital_Acquisition)_7_Oct_2020.pdf?ver=OU-Zskpiq5aw3laxqbYcZHQ%3d%3d
- https://www.af.mil/Portals/1/documents/5/USAF-AI-Annex-to-DoD-AI-Strategy.pdf
- https://www.aflcmc.af.mil/NEWS/Article-Display/Article/3004317/family-of-systems-connects-replacement-and-spare-parts-to-airframes/
- https://www.afmc.af.mil/About-Us/Digital/
- https://www.afmc.af.mil/News/Article-Display/Article/3423259/afmc-releases-white-paper-on-digital-materiel-management/
- https://www.afmc.af.mil/Portals/13/AFMC%20Strat%20Plan%202023%20%28digital%20copy%29.pdf
- https://www.army.mil/article/270109/the_u_s_army_and_dod_chief_digital_and_artificial_intelligence_office_cdao_accelerate_the_speed_and_efficiency_of_data_with_two_data_replication_pipelines
- https://www.army.mil/article/272677/peo_eis_helps_set_the_stage_for_agile_army_contracting
- https://federalnewsnetwork.com/defense-news/2023/11/army-to-set-up-digital-contracting-center-of-excellence/?readmore=1
- https://acc.army.mil/contractingcenters/acc-apg/"
- https://www.army.mil/standto/archive/2018/05/09/#:~:text=The%20Enterprise%20Data%20Analytics%20Strategy%20for%20Army%20Business%20is%20a,or%20outcomes%20for%20Army%20leaders.
- https://www.asafm.army.mil/portals/72/Documents/ArmyFinancialStrategy2028/FY24_Campaign-Plan.pdf
- https://www.asafm.army.mil/Portals/72/Documents/BudgetMaterial/2025/Base%20Budget/Research,%20Development,%20Test%20and%20Evaluation/RDTE%20-%20Vol%202%20-%20Budget%20Activity%205C.pdf
- https://www.c4isrnet.com/battlefield-tech/it-networks/2021/02/17/the-navys-top-data-official-wants-to-incentivize-interoperability/
- https://www.cdo.gov/assets/documents/cdo-council-charter-061820.pdf
- https://www.cdo.gov/success-stories/
- https://www.cto.mil/wp-content/uploads/2023/11/API-Guide-2023.pdf
- https://www.dau.edu/blogs/powerful-example-army-leader-dashboard
- https://www.army.mil/article/224036/army_leader_dashboard_creating_insight_driven_decisions

- https://www.dau.edu/sites/default/files/Migrated/CopDocuments/AF%20Digital%20Product%20Support%20%20Vision%20Feb%202023.pdf
- https://www.defense.gov/News/Releases/Release/Article/3791829/cdao-announces-new-approach-to-scaling-data-analytics-and-ai-capabilities/
- https://www.defense.gov/News/Releases/Release/Article/3816578/dod-releases-the-fulcrum-dod-information-technology-it-advancement-strategy/
- https://www.defensenews.com/air/2022/09/06/how-one-air-force-office-eliminates-barriers-to-digital-transformation/
- https://www.defensenews.com/pentagon/2023/02/03/pentagon-takes-own-pulse-with-internal-data-dashboard/
- https://www.dni.gov/files/documents/CIO/IC-IT-Roadmap-Vision-For-the-IC-Info-Environment-May2024.pdf
- https://www.dodig.mil/reports.html/Article/3268790/evaluation-of-cybersecurity-controls-on-the-dods-secure-unclassified-network-do/
- https://www.doncio.navy.mil/chips/ArticleDetails.aspx?ID=14830
- https://www.doncio.navy.mil/ContentView.aspx?id=13181
- https://www.doncio.navy.mil/ContentView.aspx?ID=14828
- https://www.doncio.navy.mil/ContentView.aspx?ID=14828#:~:text=UNSECNAV%20Memo%20%2D%20Publish%20Date%3A%2006%2F24%2F21&text=This%20memo%20confirms%20the%20Department,at%20the%20speed%20of%20mission .
- https://www.doncio.navy.mil/ContentView.aspx?ID=15982
- https://www.doncio.navy.mil/contentview.aspx?id=9475
- https://www.doncio.navy.mil/mobile/ContentView.aspx?ID=13804&TypeID=21
- https://www.dvidshub.net/news/412323/peo-eis-adopts-operational-plan-guide-internal-implementation-army-data-plan
- https://www.dvidshub.net/publication/issues/69517
- https://www.dvidshub.net/video/904141/defense-innovation-board-holds-november-2023-public-meeting
- https://www.eis.army.mil/army-vantage
- https://www.eis.army.mil/mission-areas/data
- https://www.eis.army.mil/mission-areas/data
- https://www.eis.army.mil/programs/ardap
- https://www.eis.army.mil/newsroom/news/peo-eis-wide-data/peo-eis-collaborates-dasades-turning-army-enterprise-data-mesh
- https://www.eis.army.mil/sites/default/files/2021-01/Army%20Vantage%20Info%20Paper%20-%20VDCA%20Tech%20Info%20Paper_v1.4_0.pdf
- https://www.eis.army.mil/sites/default/files/2022-11/2022-10%20AESIP%20Hub%20Fact%20Sheet%20FINAL%20%2824%20OCT%2022%29.pdf
- https://www.eis.army.mil/sites/default/files/2022-11/2022-11%20Vantage%20Fact%20Sheet%20update%20FINAL%20%283%20Nov%2022%29.pdf
- https://www.eis.army.mil/strategy
- https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf
- https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/513502p.pdf
- https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002p.PDF
- https://www.gao.gov/assets/720/719329.pdf
- https://www.gao.gov/assets/gao-22-104687.pdf
- https://www.linkedin.com/posts/dod-advana_advanasuccess-yearinreview-advana2023-activity-7149144214629482496-nSUK
- https://www.marcorsyscom.marines.mil/About-Us/Office-of-the-Counsel-OC/FOIA-Reading-Room/FileId/175256/
- https://www.marcorsyscom.marines.mil/Staff/Professional-Staff/Operations-Programs/

- https://www.marcorsyscom.marines.mil/Portals/105/HOMEMCSC/FY21-01%20MAG%20v1.0%2020201030.pdf?ver=qXi-YXXTwtK32bWq6IoT5IQ%3D%3D"
- https://www.marines.mil/Portals/1/Publications/MCO%205231.4%20.pdf?ver=bJ7pCmovPBoE_7Fsug-Mdg%3D%3D
- https://www.mors.org/Events/Special-Meetings/2024-DAF-Data-Analytics-and-AI-Forum
- https://www.navsea.navy.mil/Portals/103/Documents/Exhibits/SNA2020/SNA2020-SurfaceShipReadinessAndSustainment-CaptSteveMurray.pdf?ver=2020-01-15-154400-340
- https://www.navsea.navy.mil/Portals/103/Documents/NSWC_Corona/Strategic%20Plan%202030%20Brochure%20FINAL.pdf?ver=ybKyRR7UVP7S5xpci7xDFA%3D%3D
- https://www.navsup.navy.mil/Navy-Data-Platform/
- https://www.navwar.navy.mil/Portals/93/Images/Documents/NAVWAR_DE_Strategy_20230817%20(2).pdf?ver=zIDueb-L6JRmgU9PRbNrfCQ%3d%3d
- https://www.peodigital.navy.mil/Portals/96/Documents/2024_Engagement_Booklet/IE_Booklet_Web_June_2024.pdf?ver=d8RBx-yj06gwRsbFZwuo1g%3d%3d
- https://www.peodigital.navy.mil/Portals/96/Documents/PDFs/PEODigital_Innovation_Adoption_v3.pdf?ver=kfbq-KeRadI-LcOJfRJ6TwQ%3d%3d
- https://www.peodigital.navy.mil/Portals/96/Documents/PEO-Digital-Strategic-Plan-FY-22-25_FINAL.pdf?ver=OAiN3W-5JCb1OMv4FhVfNKQ%3d%3d
- https://www.rand.org/content/dam/rand/pubs/research_reports/RRA1300/RRA1349-1/RAND_RRA1349-1.pdf
- https://www.rand.org/pubs/corporate_pubs/CPA2580-2.html
- https://www.rand.org/pubs/research_briefs/RB10085.html
- https://www.rand.org/pubs/research_briefs/RBA1735-1.html
- https://www.rand.org/pubs/research_reports/RR1476.html
- https://www.rand.org/pubs/research_reports/RR1534.html
- https://www.rand.org/pubs/research_reports/RR2221.html
- https://www.rand.org/pubs/research_reports/RR3130.html
- https://www.rand.org/pubs/research_reports/RR3130.html
- https://www.rand.org/pubs/research_reports/RR4193.html
- https://www.rand.org/pubs/research_reports/RR4298.html
- https://www.rand.org/pubs/research_reports/RR880.html
- https://www.rand.org/pubs/research_reports/RRA1349-1.html
- https://www.rand.org/pubs/research_reports/RRA202-1.html
- https://www.rand.org/pubs/research_reports/RRA225-1.html
- https://www.rand.org/pubs/research_reports/RRA309-1.html
- https://www.rand.org/pubs/research_reports/RRA433-1.html
- https://www.rand.org/pubs/research_reports/RRA542-1.html
- https://www.sae.org/events/dod/attend/program/presentations/brown_kim.pdf
- https://www.spaceforce.mil/News/Article/2813059/ssc-data-management-software-plays-critical-role-in-sda-afghanistan-airlift/
- https://www.ssc.spaceforce.mil/Portals/3/ORG%20Charts/External%20SSC%20Org%20Chart_Jan2024.pdf?ver=KsxVbiRQ_Bfb91iKGMhQpQ%3D%3D
- https://www.youtube.com/watch?v=NpR3SK3h-Ok

DIRECTLY CITED REFERENCES

1. https://irp-cdn.multiscreensite.com/6e5efd05/files/uploaded/Leading%20Change.pdf
2. https://www.acq.osd.mil/asda/ae/ada/docs/211101-psa%20Draft%20PDAS%202020%20Excerpts%20FINAL.pdf
3. This research effort's full report is not published publicly; The Final Technical Report AIRC-2022-TR-012 is available upon request.
4. https://www.acq.osd.mil/asda/ai2/index.html
5. https://www.defense.gov/News/Releases/Release/Article/3736929/department-of-defense-enhances-technology-transitions-through-new-advisory-group/
6. https://acqirc.org/defense-data-grand-prix/
7. https://www.acq.osd.mil/asda/ae/ada/data-analytics.html
8. https://www.dau.edu/back-to-basics/resources
9. https://breakingdefense.com/2024/07/cdao-opens-advana-analytics-to-multiple-vendors-in-a-push-to-scale-up/
10. https://www.dmi-ida.org/news-details/pentagon-pauses-development-of-its-go-to-data-analytics-tool
11. https://irp-cdn.multiscreensite.com/6e5efd05/files/uploaded/Leading%20Change.pdf
12. https://irp-cdn.multiscreensite.com/6e5efd05/files/uploaded/Leading%20Change.pdf
13. https://acqirc.org/wp-content/uploads/2024/03/FY-2023-AIRC-Annual-Report-to-Congress-Sec.-4142.pdf
14. https://media.defense.gov/2020/Oct/08/2002514180/-1/-1/0/DOD-DATA-STRATEGY.PDF
15. https://media.defense.gov/2024/Mar/15/2003414274/-1/-1/1/dmra_paper.PDF
16. https://dbb.defense.gov/Portals/35/Documents/Reports/2024/FY24-03%20Digital%20Ecosystem%20-%20FINAL%20FOR%20PRINT%20with%20DOPSR%20Stamp%204-16-24.pdf
17. https://www.acq.osd.mil/asda/ae/ada/pd-ada.html
18. https://media.defense.gov/2024/Mar/15/2003414274/-1/-1/1/dmra_paper.PDF
19. https://api.army.mil/e2/c/downloads/2024/03/26/4b65a3b3/udra-v1-0-final.pdf
20. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN40932-ARMY_DIR_2024-03-000-WEB-1.pdf
21. https://federalnewsnetwork.com/defense-news/2023/11/army-to-set-up-digital-contracting-center-of-excellence/?readmore=1
22. https://www.army.mil/article/272677/peo_eis_helps_set_the_stage_for_agile_army_contracting
23. https://www.navwar.navy.mil/Portals/93/Images/Documents/NAVWAR_DE_Strategy_20230817%20(2).pdf?ver=zIDuebL6JRmgU9PRbNrfCQ%3d%3d
24. https://media.defense.gov/2023/Aug/15/2003281336/-1/-1/1/DEPARTMENT OF THE NAVY DECISION SUPERIORITY VISION.PDF
25. https://www.dvidshub.net/video/915129/don-conference-west-coast-2024-day-1-part-1
26. Anecdotal from engagements as part of this research.
27. https://guide.dafdto.com/2023/01/04/digital-maturity-assessment/
28. https://guide.dafdto.com/wp-content/uploads/2023/01/Digital-Campaign-Acquisition-Guidance_25Oct_2021_PA-Request.pdf
29. https://guide.dafdto.com/wp-content/uploads/2023/01/Key_DE_Features_25Oct_2021.xlsx
30. https://guide.dafdto.com/industry-association-consortium-sharing-site/
31. https://www.acq.osd.mil/asda/ai2/index.html
32. https://www.defense.gov/News/Releases/Release/Article/3736929/department-of-defense-enhances-technology-transitions-through-new-advisory-group/
33. https://acqirc.org/defense-data-grand-prix/
34. https://www.acq.osd.mil/asda/ae/ada/data-analytics.html
35. https://dbb.defense.gov/Portals/35/Documents/Reports/2023/DBB%20FY23-01%20Business%20Health%20Metrics_30%20Nov%2022_FINAL.pdf

36. https://media.defense.gov/2023/Aug/15/2003281336/-1/-1/1/DEPARTMENT OF THE NAVY DECISION SUPERIORITY VISION.PDF
37. https://www.dvidshub.net/video/915129/don-conference-west-coast-2024-day-1-part-1
38. https://www.acq.osd.mil/asda/ae/ada/pd-ada.html
39. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN40932-ARMY_DIR_2024-03-000-WEB-1.pdf
40. https://federalnewsnetwork.com/defense-news/2023/11/army-to-set-up-digital-contracting-center-of-excellence/?readmore=1
41. https://www.army.mil/article/272677/peo_eis_helps_set_the_stage_for_agile_army_contracting
42. https://www.dau.edu/back-to-basics/resources
43. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN40932-ARMY_DIR_2024-03-000-WEB-1.pdf
44. https://federalnewsnetwork.com/defense-news/2023/11/army-to-set-up-digital-contracting-center-of-excellence/?readmore=1
45. https://www.army.mil/article/272677/peo_eis_helps_set_the_stage_for_agile_army_contracting
46. https://guide.dafdto.com/2023/01/04/digital-maturity-assessment/
47. https://guide.dafdto.com/wp-content/uploads/2023/01/Digital-Campaign-Acquisition-Guidance_25Oct_2021_PA-Request.pdf
48. https://guide.dafdto.com/wp-content/uploads/2023/01/Key_DE_Features_25Oct_2021.xlsx
49. https://guide.dafdto.com/industry-association-consortium-sharing-site/
50. https://breakingdefense.com/2024/07/cdao-opens-advana-analytics-to-multiple-vendors-in-a-push-to-scale-up/
51. https://www.dmi-ida.org/news-details/pentagon-pauses-development-of-its-go-to-data-analytics-tool
52. https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN40932-ARMY_DIR_2024-03-000-WEB-1.pdf
53. https://api.army.mil/e2/c/downloads/2024/03/26/4b65a3b3/udra-v1-0-final.pdf
54. https://www.army.mil/article/272677/peo_eis_helps_set_the_stage_for_agile_army_contracting ; https://federalnewsnetwork.com/defense-news/2023/11/army-to-set-up-digital-contracting-center-of-excellence/?readmore=1 ; https://acc.army.mil/contractingcenters/acc-apg/
55. https://apps.dtic.mil/sti/trecms/pdf/AD1126785.pdf
56. https://www.eis.army.mil/newsroom/news/peo-eis-wide-data/peo-eis-collaborates-dasades-turning-army-enterprise-data-mesh
57. https://www.eis.army.mil/mission-areas/data
58. https://www.peodigital.navy.mil/Portals/96/Documents/2024_Engagement_Booklet/IE_Booklet_Web_June_2024.pdf?ver=d8RBx-yj06gwRsbFZwuo1g%3d%3d
59. https://www.peomlb.navy.mil/Portals/97/Documents/PEO%20MLB%20brochure%20Feb%202024%20(Online).pdf?ver=51CRB0nmwIUlynq-pC2OoA%3D%3D
60. https://www.doncio.navy.mil/ContentView.aspx?id=9475
61. https://www.navsea.navy.mil/Home/Warfare-Centers/NSWC-Corona/Who-We-Are/
62. https://www.dvidshub.net/image/8144411/nswc-corona-hosts-peo-ships-and-supship-bath-compass-program-review
63. https://www.dvidshub.net/video/915129/don-conference-west-coast-2024-day-1-part-1 ; https://media.defense.gov/2023/Aug/15/2003281336/-1/-1/1/DEPARTMENT%20OF%20THE%20NAVY%20DECISION%20SUPERIORITY%20VISION.PDF
64. https://apps.dtic.mil/sti/trecms/pdf/AD1204403.pdf
65. https://www.dvidshub.net/publication/issues/69517 ; https://www.dvidshub.net/video/915133/don-conference-west-coast-2024-day-1-part-3
66. https://defensescoop.com/2023/03/20/navys-new-project-openship-aims-to-swiftly-apply-ai-to-data-captured-by-vessels-at-sea/ ; https://fedscoop.com/ai-task-force-for-navy-surface-fleet-devising-comprehensive-data-catalog/
67. https://defensescoop.com/2023/03/20/navys-new-project-openship-aims-to-swiftly-apply-ai-to-data-captured-by-vessels-at-sea/

68. https://fedscoop.com/ai-task-force-for-navy-surface-fleet-devising-comprehensive-data-catalog/
69. https://guide.dafdto.com/
70. https://guide.dafdto.com/industry-association-consortium-sharing-site/
71. https://guide.dafdto.com/industry-association-consortium-sharing-site/
72. https://acqirc.org/events/airc-research-review-2024/
73. https://www.aetc.af.mil/News/Article-Display/Article/3357409/aetc-transforming-data-strategy-and-standards-to-enable-digital-age-training-ed/
74. https://www.ssc.spaceforce.mil/Portals/3/SSC%27s%20Unified%20Data%20Library%20participates%20in%20Army%27s%20Project%20Convergence%202_1.pdf
75. https://www.ssc.spaceforce.mil/Portals/3/ORG%20Charts/External%20SSC%20Org%20Chart_Jan2024.pdf?ver=KsxVbiRQ_Bfb91iKGMhQpQ%3D%3D
76. https://breakingdefense.com/2024/06/gdits-project-enigma-inches-toward-production-contract/ ; https://nstxl.org/enigma-awarded-to-gdit/
77. https://acqirc.org/events/airc-research-review-2024/
78. https://www.acq.osd.mil/asda/ae/ada/data-analytics.html
79. https://www.acq.osd.mil/asda/ae/ada/pd-ada.html
80. https://media.defense.gov/2024/Mar/15/2003414274/-1/-1/1/dmra_paper.PDF
81. https://federalnewsnetwork.com/defense-main/2024/03/alpha-1-dods-portfolio-of-services-will-accelerate-ai-adoption/
82. https://buildersummit.com/wp-content/uploads/2020/08/Advana-101-Briefing_JUL2021.pdf
83. https://www.defense.gov/News/Releases/Release/Article/3791829/cdao-announces-new-approach-to-scaling-data-analytics-and-ai-capabilities/
84. https://www.youtube.com/watch?v=2eG5_kxMsYk
85. https://www.acq.osd.mil/asda/ae/ada/data-analytics.html