

Recommendation 88: Use existing defense business system open-data requirements to improve strategic decision making on acquisition and workforce issues.

Problem

In recent decades, DoD and the rest of the U.S. government have spent tens of billions of dollars on software development, data architectures, and business processes to enable collection of vast amounts of acquisition and financial data. There has not been a similarly scoped effort to build up DoD's data analytics capabilities or use those capabilities for strategic decision making. DoD currently has access to a vast amount of acquisition and financial data, but in too many cases lacks the ability to do anything useful with the data.

Background

The U.S. government manages many systems for collecting and reporting information related to defense acquisition. Defense business systems contain enterprise data on regulations and laws, acquisition requirements, budgeting and appropriations, program management, contract solicitations, contract awards, contract vendors, and other parts of the broader acquisition process.¹

When these datasets are viewed at an aggregate level, analysts can perceive patterns and policy makers can form conclusions that might not be possible by looking at individual data points at the working level. Many stakeholders, however, have noted that DoD has limited abilities to engage in this type of aggregate information analysis. Inadequate data science training and recruitment is part of the reason for this problem.² Information siloes and the resulting unavailability of data across DoD are also key factors.³

This data silo phenomenon can lead to situations in which one office collects data that is highly applicable to the work of another office but unavailable to them. In some cases, the problem is that key personnel lack access to the data in question. In other cases, the problem is simply that personnel are unaware the data exist.

What is Data Analytics?

Terms such as *data science*, *data analysis*, and *data analytics* are frequently used interchangeably in informal conversation. For the purposes of this paper, *data science* is considered a more narrowly

¹ *Defense business systems* (DBSs) are defined in statute under 10 U.S.C. § 2222 and in DoD policy under DoDI 5000.75. For detailed recommendations on process improvements to DBS acquisition, see Section 809 Panel, *Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations: Volume 1 of 3*, 103-148 (2018).

² See, for example, the 2018 National Defense Strategy, which states that DoD will “emphasize new skills and complement our current workforce with information experts [and] data scientists” who are able “to use information, not simply manage it.” From Department of Defense, *Summary of the 2018 National Defense Strategy*, 8, accessed May 21, 2018, <https://www.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

³ See, for example, a statement from the DoD CIO in 2017: “The current approach of unique systems with stove-piped data sources is a high risk, high cost approach. It ensures long developmental lead times and fragile solutions that cannot be transferred to other operations.” “DoD’s Mission Partner Environment – Information System (MPE-IS),” DoD Chief Information Officer, accessed May 21, 2018, <http://dodcio.defense.gov/In-the-News/MPE>.

defined and rigorous field, which combines formal methods from academic disciplines such as statistics, computer science, and mathematics.

Data analysis and *data analytics* are used interchangeably here to describe a broader skill set that does not necessarily involve formal academic methods. Data analysts may work in an academic setting, but in DoD they are more likely to work in a policy setting, providing information as needed to support decision makers.

Data architecture is another term frequently used to refer to the way information is organized. The first section of this paper focuses on the role of data analytics in DoD's strategic decision making, and does not address the issue of data architecture.

Open Data Requirement Within DoD

Both DoD leadership and Congress have in recent years encouraged DoD to improve its ability to analyze and use its own acquisition data.⁴ In Section 911 of the FY 2018 NDAA, Congress mandated an open data policy within DoD, requiring that "except as otherwise provided by law or regulation," DoD business enterprise data "shall be made readily available" to military departments, combatant commands, and "all other offices, agencies, activities, and commands of the Department of Defense."⁵

Section 912 of the FY 2018 NDAA codified the requirements for departmentwide transparency in enterprise-level datasets.⁶ The section also specified the DoD CMO as the owner of "primary decision-making authority with respect to the development of common enterprise data."⁷ The section required the CMO to set up "a data analytics capability" in support of "enhanced oversight and management" and launch pilot programs "to develop data integration strategies... to address high-priority management challenges."⁸

As of mid-2018, the DoD CMO's office had begun work to implement the FY 2018 provisions, establishing information sharing systems such as the CMO Connect Portal website. The site is intended as a "resource and collaboration tool for DoD service members, civilian employees and contractors."⁹

Data as a Tool for Strategic Decision Making

Stakeholders within Congress and DoD have long pushed for greater use of existing data in strategic decision making. The Congressional Research Service has noted that DoD agencies "lag behind the

⁴ The Joint Staff, for example, publishes a guide to best practices on knowledge and information management, which advocates for "flat, transparent networks to share and retain information" instead of an "exclusive, stove-piped approach to information sharing and decision-making." See J7 Deputy Director for Joint Training, *Insights and Best Practices Focus Paper on Knowledge and Information Management*, May 2018, 13, accessed May 21, 2018, http://www.ics.mil/Portals/36/Documents/Doctrine/fp/knowledge_and_info_fp.pdf.

⁵ Section 911 of FY 2018 NDAA, Pub. L. No. 115-91 (2017).

⁶ Section 911 of FY 2018 NDAA, Pub. L. No. 115-91 codified the transparency requirements under 10 U.S.C. § 2222 (with conforming amendments to other sections of U.S. Code under Title 10).

⁷ Section 911 of FY 2018 NDAA, Pub. L. No. 115-91 (2017).

⁸ *Ibid.*

⁹ "Chief Management Officer," DoD, accessed July 27, 2018, <https://cmo.defense.gov>. As of July 2018, little departmentwide acquisition data had been made accessible via the site.

private sector in effectively incorporating data analyses into decisionmaking.”¹⁰ The Government Accountability Office (GAO) has reported that in some cases, despite being required by statute, DoD management data analysis “did not assess the reliability of the data used, define key terms, clearly state criteria used for analysis, or make recommendations.”¹¹ The GAO also publishes a best practices guide to support improved data-driven decision making in federal agencies.¹²

Section 913 of the FY 2018 NDAA mandated that DoD “establish a set of activities that use data analysis, measurement, and other evaluation-related methods to improve the acquisition outcomes.”¹³ Congress gave DoD broad discretion over what exactly these activities should entail.

The DoD Chief Information Officer (CIO) serves as a key maintainer of the IT systems in which much of DoD’s business data are housed. Once such systems have been built, it is critical to have an entity dedicated to maintenance, cybersecurity, and related software issues. The CIO serves in this role, and can also provide expertise on development of needed application program interfaces to provide departmentwide access to DoD management data.

Hiring and Financial Assistance Authorities

The difficulty of recruiting and training qualified talent is a key impediment to improving data analytics in DoD. The CMO’s 2018 report on DoD business operations specifically cited the need for “the skills and knowledge to analyze results and suggest improvements as needed” as a key focus area for using data to drive decisions.¹⁴

To enable DoD to bring in skilled technical ability, Congress has enacted many special hiring authorities targeting personnel with skills in science, engineering, management, and related disciplines. Many of these authorities are pilot programs; others are permanent.¹⁵ Several of the authorities may be applicable to recruitment and training of data science professionals.

Automation and Artificial Intelligence

Business process automation can greatly reduce the time and labor required to conduct data analysis. Increasing use of automated analytical tools, sometimes referred to under the umbrella label of *artificial intelligence* (AI), promises to increase the efficiency of DoD’s business data analysis in coming years.

Discussion

DoD has spent tens of billions of dollars in recent decades building up its data collection capabilities in the form of IT infrastructure, custom-built software, and policy documents to establish business

¹⁰ Moshe Schwartz, *Using Data to Improve Defense Acquisitions: Background, Analysis, and Questions for Congress*, Congressional Research Service, January 5, 2016, accessed November 7, 2018, <https://fas.org/sgp/crs/natsec/R44329.pdf>.

¹¹ GAO, *Defense Management: DOD Needs to Address Inefficiencies and Implement Reform across Its Defense Agencies and DOD Field Activities*, GAO-18-592, September 2018,10, accessed September 13, 2018, <https://www.gao.gov/assets/700/694333.pdf>.

¹² “Data-Driven Decision Making,” GAO, accessed July 27, 2018, https://www.gao.gov/key_issues/data-driven_decision_making.

¹³ Section 913 of FY 2018 NDAA, Pub. L. No. 115-91 (2017).

¹⁴ DoD Chief Management Officer, *FY 2018 – FY 2022 National Defense Business Operations Plan*, 36, accessed November 7, 2018, <https://cmo.defense.gov/Portals/47/Documents/Publications/NBDOP/TAB%20B%20FY18-22%20NDBOP%20Appendices.pdf?ver=2018-05-25-131454-683>.

¹⁵ See Section 809 Panel, *Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations: Volume 2 of 3*, 61-100 (2018) for analysis and lists of special hiring authorities available to DoD. Also see Appendix C of this *Volume 3 Report* for hiring and financial assistance authorities that may apply to data scientists.

processes. Thanks to massive investment of time and money, DoD now has access to a wealth of acquisition and financial data. Some policy and decision-making offices, however, lack the ability to properly use the data that DoD collects.

In the FY 2018 NDAA, Congress instructed DoD to embrace an open-data philosophy, providing defense business system data to analysts throughout the organization. This effort is a positive first step toward building a more effective data analytics culture within DoD. It will fall to the CMO and related offices to ensure open availability of data across DoD, and it will fall to individual offices to fully use those datasets in their day-to-day decision making.

In addition to congressional and DoD efforts to improve data analytics, the Office of Management and Budget (OMB) and related executive agencies promote a Federal Data Strategy.¹⁶ The strategy is intended to provide a broad, long-term framework for improving agencies’ data stewardship and leveraging data to create value. A late-2018 draft of the strategy includes 47 goals (practices), many of which overlap with the goals of data management provisions in the FY 2018 NDAA.

Table 9-1. Selected Federal Data Strategy Draft Practices¹⁷

Draft Practice	OMB Description
2: Inventory Data Assets	Maintain an inventory of data assets with sufficient completeness, quality, and metadata to facilitate planning, discovery, access, and use.
3: Identify High-Value and Authoritative Data Assets	Assign value and cost to data assets based on usefulness, applicable law, regulation, policy, and operational guidance to appropriately prioritize and document stewardship and resource decisions.
4: Align Resources to Value and Authority	Periodically review alignment of resources to the value and authority of datasets to promote consistency and fairness.
5: Manage High-Value and Authoritative Data Assets	Periodically review high-value and authoritative data assets to identify and document opportunities to improve data management systems and procedures and ensure quality and integrity.
13: Diversify Data Access Methods	Invest in the creation and usability of multiple tiers of access to federal data by committing federal resources to making data as open and accessible as possible while protecting confidentiality.
14: Innovate to Enable Safe Use	Explore and periodically review methods and technologies that enable tiered access to safeguard data and promote accessibility to relevant stakeholders.
19: Prepare to Share	Provide encouragement and incentives for agencies to develop a culture in which they are predisposed to share data within and across federal agencies, as well as with external partners, with proper protections and where relevant and appropriate.

¹⁶ The Office of Management and Budget, Office of Science and Technology Policy, Department of Commerce, Small Business Administration, and General Services Administration were all involved in the development of the Federal Data Strategy as of late 2018. See Federal Data Strategy introduction at: <https://strategy.data.gov>.

¹⁷ From Office of Management and Budget, “Federal Data Strategy: The Draft Practices,” <https://strategy.data.gov/practices>.

Draft Practice	OMB Description
20: Share Data Across Agencies	Facilitate data sharing across federal agencies to efficiently generate more comprehensive data for improved decision making.
34: Promote a Culture that Values Data as an Asset	Conduct routine assessments of current organizational practices to identify opportunities to improve the agency's ability to acquire, use, and disseminate data for program, statistical, and mission-support purposes to improve data use and value.
36: Incorporate Data into Decision-Making	As part of budget, operational, policy, and management processes, identify opportunities to effectively and routinely use data for decision making and to create a bridge between evaluation, performance, and other activities within agencies.
37: Communicate Insights from Data	Adopt a range of innovative communication tools and techniques to effectively transmit insights from data to a broad set of consumers, both internal and external to the agency.
38: Connect Federal Spending to Outcomes	Analyze spending data to align resources with strategic priorities and desired outcomes to enable the public to understand the results of federal investments and to support informed decision making regarding future investments.
39: Focus on End Uses of Data	Design new data collections with the end uses in mind to ensure that the data collected will be of appropriately high quality and meet internal and external stakeholder expectations and needs.
40: Assess the Needs of Stakeholders	Routinely engage both internal and external stakeholders throughout the data lifecycle to assess the needs of data consumers.

Conclusions

One of the impediments to DoD data analysis is the fact that many information systems are siloed off from senior decision makers. Even within DoD acquisition and financial circles, many of these systems are not widely understood and lack enough proficient users to provide useful analysis at the policy level. Congress has helped to correct this problem by enacting the open data requirements of the FY 2018 NDAA, but implementing it will likely be a long and technically challenging process.

The CMO should take the lead in this effort, in part by reminding DoD of the requirement and providing portals through which personnel can access defense business data collected by entities elsewhere in DoD.

The CMO should also take steps to ensure that Defense Agency leaders and data analysts are aware of what data exist outside of their offices. Senior leaders and analysts should be encouraged to think creatively about the ways they might use data from outside their areas of functional expertise.

The CMO should also encourage Defense Agencies to recruit more data science professionals and train current personnel in data analytics. Existing special hiring and education financial assistance authorities may, in some cases, be used for these purposes.

An Executive-Legislative Grand Bargain?

If DoD offices fully opened up their business system data to scrutiny by the rest of DoD and Congress, it could allow for side benefits in the form of a grand bargain on acquisition and financial data as used

by the oversight community. Open access to data systems would provide much deeper insight into individual transactions. With such insight, congressional committees might show greater confidence that effective oversight could be conducted reactively rather than proactively, on a case-by-case basis.

With that confidence, Congress might show a greater willingness to substantially reduce the degree of prescriptivism in acquisition law. This shift would allow Executive Branch personnel greater leeway to make decisions based on what makes sense at the moment, rather than basing decisions on preestablished policies written without transaction-specific context.

To promote confidence among congressional stakeholders, DoD would also need to empower working-level people, trust them to do good work, and provide for real consequences if they failed to do good work. Improved data analytics capabilities, in both DoD and Congress, would be a necessary but insufficient condition for this type of a grand bargain to be realized.

If DoD intends to improve its data analytics capabilities, it should (a) comply with congressional open-data requirements, (b) ensure defense agencies are aware of the data that is available, and (c) improve the quality of its data analytics workforce. The CMO is the logical entity to direct these changes, but ultimately, they will have to be carried out at the lower levels.

Implementation

Legislative Branch

- There are no statutory changes required for this recommendation.

Executive Branch

- Issue a memorandum implementing Sections 911–913 of the FY 2018 NDAA open-data mandate.
- Use existing hiring and scholarship authorities to bolster DoD agencies' data analytics workforce (see Appendix C).

Implications for Other Agencies

- If DoD's efforts to improve strategic data analytics are successful, they may serve as a template for similar future efforts by other agencies.