Appendix B.4: Data and Metrics Subgroup Report
v0.3, 14 Jan 2019

> This is a sample appendix that we are considering for inclusion as supporting information in the final report. The information in this appendix was developed based on feedback and analysis performed by members of a working group that included subject matter experts (SMEs) within the Department who provided input for consideration to the SWAP study. The working group was asked to: (1) distill the feedback received from case studies, interviews, literature reviews, and feedback from the Board members into main issue points; (2) as SMEs identify the statutory, regulatory, and cultural obstacles to achieving the Board's vision for a desired end state; and (3) provide suggested language to remove the barriers.

The Department of Defense (DoD) has long standing methods for capturing data, developing metrics, and reporting program progress, however these practices do more to obfuscate than provide insight when it comes to software and stand in the way of more effective methods. The DoD's approach to data and metrics is fundamentally intertwined with its governance and compliance culture, which centers around reporting on individual programs to inform specific decisions by senior leaders and the Congress. Attempts to change DoD's data and metrics methods must therefore also address this culture and, critically, link with other reform efforts including policy, tools for the software development environment, and overall approaches to governance and investment.

Note: in the context of this appendix, data refers to` information associated with the development, maintenance, enhancement, and performance of software systems, not the substantive data that they process or generate.

Pain points

Multiple, competing, and sometimes conflicting types of data and metrics are used for divergent purposes in the assessment of software in DoD. DOD has long standing practices to collect data on programs: primarily cost, schedule, and performance. These data are imperfect and do not necessarily reflect the health of software in any way but are important, particularly for satisfying existing reporting requirements. These data must be improved and linked with data and metrics focused on assessing the health of software activities. Doing so will potentially cause bureaucratic confusion and competition.

Challenges collecting meaningful data, in a low cost manner, at scale. To the extent that DoD currently collects data on its software activities, it does so through the manual entry of reporting data in separate and disparate reporting/management systems. This approach is prone to errors and incredibly time-consuming and burdensome to program offices. DoD components responsible for developing and maintaining the systems reporting information have few incentives to share such data, as they are often used against them, meaning that the data are hard to capture, include mistakes, and no constituency wants to invest in systems to automate data collection.

Inability to turn data into meaningful analysis and inability to implement decisions or changes to software activities. Even if DoD had clarity on its use of data and the ability to collect those data passively and at scale, it may not be able to meaningfully change the outcomes of its software activities and could become caught in a Cassandra predicament. The culture of decision making, acquisition policy, contracting, formality of requirements, appropriations rules and oversight mean that data driven insights do not naturally translate into improved decision making on DoD software activities.

Desired state

An operational system and culture that makes policy, investment, and program decisions based on insight and analysis developed in a transparent manner from standardized data collected automatically from software development tools.

Obstacles

The Department, in most but not all instances, does not possess the tools or analysts to achieve the desired state. Those are addressable challenges. The bigger obstacle is the culture of high level reporting, driven from Congress and OSD, on individual programs on a period basis, for example congressionally mandated annual Selected Acquisition Reports (SARs), and in turn, Defense Acquisition Executive Summary (DAES) reports that inform OSD quarterly of the same information. This approach means that data are not strategically collected at the level that allows for real insight and longitudinal analysis, instead they are developed at a summary level to minimally meet requirements and avoid further scrutiny. Most importantly, they do not provide the real-time tools to enable a software program manager to manage her program.

While there are few legislative barriers to implementing the desired state, Congressional action may be required to create the right incentives for the DoD to generate, capture, and use data in useful ways. Congress should also address its own oversight culture, which can sometimes drive much of the behavior the Congress dislikes.

Ideas for change

- Congress could establish, via an NDAA provision, new data-driven methods for governance of software development, maintenance, and performance.[1] The new approach should require on-demand access to standard data with reviews occurring on a standard calendar, rather than the current approach of manually developed, periodic reports.

- DoD must establish the data sources, methods, and metrics required for better analysis, insight, and subsequent management of software development activities. This action does not require Congressional action but will likely stall without external intervention and may require explicit and specific Congressional requirements to strategically collect, access, and share data for analysis and decision making.

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[1] Congress could build on Secs 911-913 of FY2018 NDAA

- Key steps for implementation:
  - Identification of existing definitive data sources (e.g. DAVE, FPDS[2]);
  - Establishment of robust data crosswalks to analyze data across systems and use cases;
  - Identification and mitigation of any significant gaps in existing data, with priority placed on building out functionality from existing applications where possible;
  - Establishment of mechanisms to ensure data sharing and transparency (i.e. require all components to share their data);
  - Disambiguation of roles and responsibilities, e.g. OSD = policy/governance ≠ program review. Components = execution;
  - Linking data and metrics to governance and policy analysis and decision making.

Potential DRAFT Legislative/Regulatory Language

Sec [???]. Development Tools and Data

- Policy Required:
  - o The Secretary of Defense, acting through the Under Secretary of Defense for Acquisition and Sustainment and the Chief Information Officer shall establish a policy for the capture and use of data associated with software development activities. The purpose of this policy is primarily to support the Department's management activities rather than program reporting requirements.

- Access to Tools:
  - o The Department shall establish standards for the Defense-wide use of tools required to support the assessment of *development, test, and continued integration and deployment of capability*[3] for software activities.
  - o The Under Secretary of Defense for Acquisition and Sustainment and the Chief Information Officer shall develop an acquisition strategy and contracting strategy for the purchase and provision of a continually updateable set of tools in line with established standards and at the speed of relevance. These strategies must allow for the immediate use of the set of tools by software development activities.
  - o The Under Secretary of Defense for Acquisition and Sustainment and the Chief Information Officer shall provide the authority to operate tools identified in the contracting methodology. This authority to operate must be extended across the Department and the determination of the Chief Information Officer must be accepted by all Military Departments and Defense Agencies and Field Activities within the Department.

- Capture, Use, and Governance of Data:

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[2] Defense Acquisition Visibility Environment (DAVE) https://dave.acq.osd.mil/ ; Federal Procurement Data System (FPDS) https://www.fp_ds.gov/

[3] Some refinement of these terms will be required

- o The [Chief Information Officer], with concurrence of Under Secretary of Defense for Acquisition and Sustainment, shall establish policies and procedures necessary to make the collection of automatic metrics the default standard for all software development programs.
- o The Chief Information Officer, in coordination with the Under Secretary of Defense for Acquisition and Sustainment, shall govern and maintain the data collected by these tools in a centrally-managed data system.
- o The tools set forth above shall allow for the automated, latent collection of data that can be aggregated in an automated fashion.
- o All data collected shall be considered a corporate asset and made available to the Department for analysis and management.

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