



ACQUISITION INNOVATION
RESEARCH CENTER

Portfolio Performance Analysis and Visualization

EXECUTIVE SUMMARY
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The objective of the research was to expand the use of portfolio-level data, analysis, and visualization of the data across Program Executive Offices (PEOs), Capabilities, and Missions to inform Integrated Acquisitions Portfolio Review (IAPR) and other portfolio decisions. The Department of Defense (DoD) needs more efficient data-driven approaches to improve analytic insights on performance and risk at program and portfolio levels. The research supports Sec. 913 (FY18 National Defense Authorization Act (NDAA)) and Sec. 801 & 836 (FY22 NDAA). Our initial efforts found significant fundamental data reporting gaps hampering multi-dimensional portfolio data management. These challenges are summarized below and detailed in the paper, "Portfolio Management Structures: System, Capability, and Mission Portfolios," published in the Naval Post Graduate School (NPS) Annual Acquisition Research Symposium (see Appendix B).

The first challenge included a lack of portfolio or program-level data fundamental for PEOs, Capabilities, and Missions. Additionally, what data are available often are classified. Because we did not have a classified contract, we were unable to review these data on this effort. Some of the authors were able to review these classified data on a different contract outside of the Acquisition Innovation Research Center (AIRC), so the lack of data sets became the focus of this research reported here.

The team collaborated with other AIRC university teams, including Virginia Tech, Georgia Tech, Purdue University, and the Steven Institute of Technology on the available data sets in an effort to ensure due diligence and collaborate effectively within the AIRC University-Affiliated Research Center (UARC). Our discovery revealed no existing standardized data structures at a portfolio or program level for capabilities or missions. Even within the existing governance structure, there is no identified standard for characterizing the programs within a PEO portfolio. The standard Office of the Secretary of Defense (OSD) Defense Acquisition Visualization Environment (DAVE) Program Number (PNO) schema is used for major programs only, and it does not give indication of what portfolio the programs are assigned. The lack of data structure across programs/research efforts within the DoD significantly inhibits analysis and visualization work. Additionally, the team found at the program level there was a lack of integrated quantitative programmatic data for cost, schedule, and performance risk. The data was created in many cases within the cost-estimating efforts for major acquisitions, but was not available for access through any database structure nor aligned to any portfolio.

The team explored with several current OSD and Service personnel what their goal was for portfolio analysis, which can be summarized as "are the services robustly funding the programs." The concept of "robustness" implies overcoming adverse conditions, which would be within the risk management domain in program management. The team looked at utilizing Research (R) and Procurement (P) budget documents with the classic Spruill chart but quickly identified that the critical piece of data in the Spruill chart is the requirement line. How can one assess the robustness of the requirement line? That led to a discussion on quantitative risk in cost and schedule considering performance risks. The challenge was risk/uncertainty quantitative data was not available in any of the standard data systems such as DAVE, Program Management Resource Tool (PMRT), or Advance Analytics (Advana).

The team reviewed the OSD approach to portfolio management and the ongoing revision effort for DoDD 7045.20, Capability Portfolio Management. The DoD policy was focusing on the secondary functions according to Michael Porter's Value Chain concept; including the Decision Support Systems which include Requirements, Acquisition and Sustainment oversight, and Planning, Programming, Budgeting, and Execution (PPBE). The research focused on the PEO building weapons, operational capability, and conducting missions. The research team saw these as the DoD's primary functions. Thus, the team worked to set up a structural schema for portfolios along these primary functions. This evolved into the multidimensional portfolio management structure (see Figure 1).

The Multidimensional Portfolio concept alignment became the research's key focus/output. The approach allows the portfolios to be managed to cover the range of Doctrine, Organization, Training, materiel, Leadership and Education, Personnel, Facilities and Policy (DOTmLPF-P) and thus not just the PEO materiel systems view, but also the operational unit and combatant commander mission view. These portfolios can be considered "capability" portfolios, but the focus is on a different type of capability.

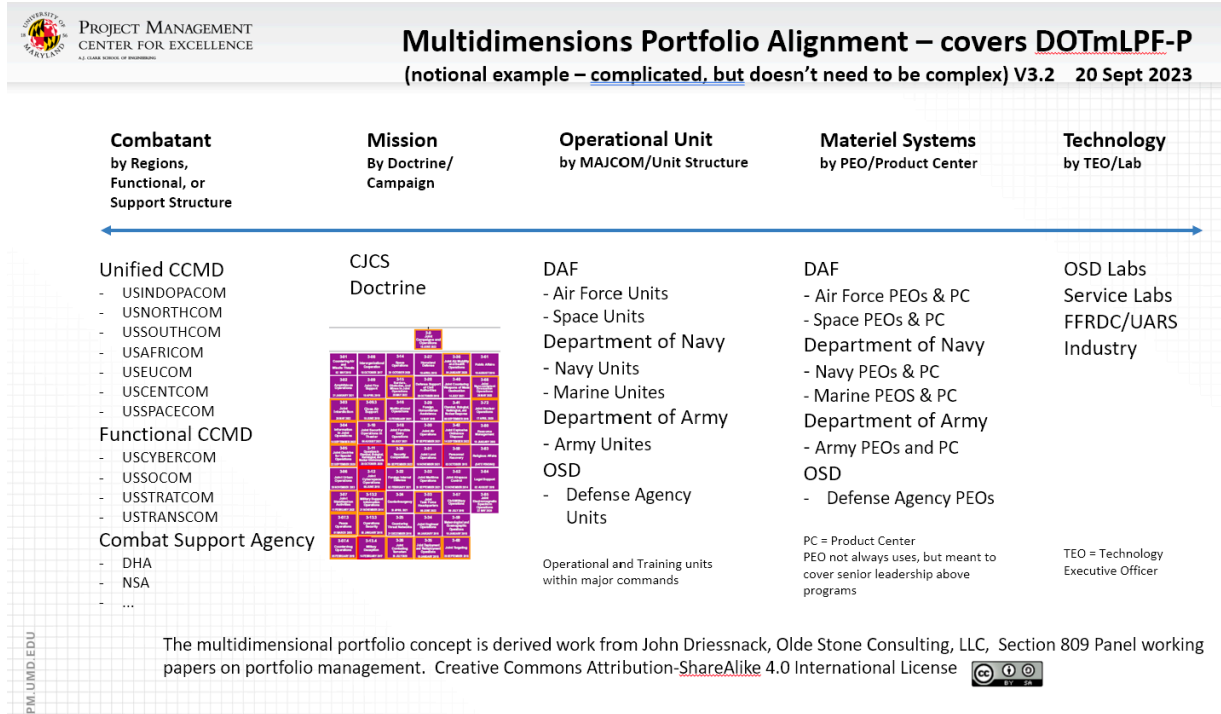


Figure 1. Multidimensional Portfolio Alignment

The predominant thought on portfolios within the industry and the federal government is on picking a portfolio structure. The DoD has arguably the largest project/program structure of portfolios in terms of PEOs within any federal government agency or industry organization. The DoD's annual expenditure is over one quarter of a trillion dollars. Therefore, the concept proposed for the DoD necessitates a structure within an overall enterprise portfolio concept.

In terms of industry best practice, it was clear that the DoD lacked the programmatic tools that could then flow data up to the portfolio level. These tools at minimum include schedule and risk management data systems from the lower-level project and program offices that can be rolled up and summarized. The summarization of data today from the original equipment manufacturer (OEM)/Prime contractors through the government program office focuses on qualitative data, making using quantitative decision tools within any portfolio structure virtually impossible. There is also no standardization in modeling missions, unit capabilities, PEOs materiel systems.

Therefore, the current systems are simply incapable of providing the needed data for portfolio-level analysis that could answer the OSD portfolio managers question: "are the services robustly funding the programs?"

As a result, the research team focused on creating a pilot program within the Department of the Air Force (DAF) Operational Imperative (OI) initiative to further explore the creation of the needed structures and utilization of project and program best and emerging practices to create data that flows into a portfolio structure. The initial tool development is focused on creating a programmatic model, what we would call model based programmatic (MBProg) using network schedule models that is challenge-informed, with challenges representing constraints, assumptions, issues, risks, and opportunities (CAIRO). The pilot effort started in September 2023 and will continue with the University of Maryland research team working under the Applied Research Laboratory for Intelligence and Security (ARLIS) in collaboration with the University of Maryland Project Management Center of Excellence.

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