SYM-AM-22-052

Excerpt from the Proceedings

of the

Nineteenth Annual
Acquisition Research Symposium

**Acquisition Research:
Creating Synergy for Informed Change**

May 11–12, 2022

Published: May 2, 2022

ACQUISITION RESEARCH PROGRAM
DEPARTMENT OF DEFENSE MANAGEMENT
NAVAL POSTGRADUATE SCHOOL

ACQUISITION RESEARCH PROGRAM
DEPARTMENT OF DEFENSE MANAGEMENT
NAVAL POSTGRADUATE SCHOOL

Resourcing Defense Innovation: The Role of Organizational Values

Dr. Jonathan P. Wong—is a policy researcher at the RAND Corporation. His research focuses on military force development issues such as the role of new technologies, processes, and concepts in shaping how militaries fight. Wong is a former management consultant and Marine Corps infantryman. [jonwong@rand.org]

Abstract

The U.S. Department of Defense (DoD) Planning, Programming, Budgeting, and Execution (PPBE) system aims to provide efficient and stable allocation of resources for defense needs that were first articulated in the 1960s. Today, the DoD continues to use this process even though its needs are changing. Namely, keeping pace with different adversaries and effectively capitalizing on fast-moving commercial technology developments are requiring the DoD to invest in new and different capabilities. To do so, it needs a resource allocation system with greater flexibility and agility to meet these demands. However, the DoD has only developed modest efforts to enable innovation that work within the current system. This paper will develop an evaluation framework for a resource allocation system to enable innovation and compare/contrast with the current system; explore levers the DoD currently enjoys for enabling innovation within the current system; assess several case studies of process, policy, and organizational change to bolster innovation; and develop lessons learned from past efforts, including insights related to the future promise and constraints of reform.

Background

Reforming the Department of Defense's (DoD) resource allocation process has been a subject of periodic interest to policymakers and the analytic community since its inception. The past several years has been one of those periods, as the Planning, Programming, Budgeting, and Execution (PPBE) process has been repeatedly cited as a critical impediment to the increased adoption of innovative commercial technologies with military utility, such as artificial intelligence (Spoehr & Bartels, 2022). The purpose of this paper is to examine the drivers of contemporary interest in PPBE reform, summarize the various reform proposals, and evaluate them using a framework to understand how they will affect fundamental *values* of resource allocation.

Importantly, the objective of this exploratory research is not to comment on the relative merits of any given reform proposal, but rather, to emphasize that different reform proposals reflect different sets of values and implementation of reforms will require explicit decisions about relative prioritization placed on a given set of values. Furthermore, the diverse stakeholders with critical responsibilities for aspects of PPBE will likely emphasize different values based on the nature of their responsibilities.

The New Context of PPBE

The PPBE implemented in the early 1960s was an attempt to inject more rationality into defense budget requests. The analyses required by the PPBE process compelled the DoD to link its budgets more explicitly with its strategy. Enthoven and Smith (1971) note that it also gave policymakers more ability to make choices and trade-offs between programs while considering ends and means together. Most significantly though, it enabled the Secretary of Defense to exert meaningful control over the budget process across the entire department, which was once the province of the military services.

Since the inception of PPBE in the 1960s, though, historical contexts have changed. As noted in Wong et al. (2022), four overarching trends have significantly altered the context that

affects DoD resource allocation. First, **geopolitical changes** have widened the threat landscape. Growing Chinese economic and military power poses new threats to U.S. interests, while a resurgent Russia remains a potent force in addition to transnational threats. **Globalization** has altered the economic and technological landscape, creating new opportunities, as well as challenges, for the DoD. Furthermore, the United States has **considerably different resourcing priorities**; defense issues remain important, but domestic policy issues compel policymakers to prioritize attention and resources. Lastly, **advancing commercial technologies** are creating new challenges and opportunities for an acquisition system that was not designed to import and adapt technologies developed outside the traditional defense industrial base.

These trends have affected the context under which previous DoD technology development has taken place. In particular, the DoD has struggled to integrate advancing commercial technologies with military utility using existing policies and practices. This has motivated the DoD to reform its acquisition processes over the past decade to address these shortcomings. New organizations such as the Defense Innovation Unit and AFWERX have improve the way the DoD identifies promising commercial technologies and firms and created new, streamlined processes that allowed firms to work more easily with the DoD on prototypes.[1] The DoD expanded use of flexible Other Transaction authorities, enabling further flexibility in getting firms on contract in ways that are beneficial to both firms and the government (Mayer et al., 2020). The DoD launched a new set of acquisition pathways that offer more specific oversight and monitoring requirements tailored for different kinds of programs instead of a one-size-fits-all approach.[2] The upshot of these and other reforms is that the DoD can now work more easily with many commercial firms on product development and prototyping.

Those reforms have uncovered further challenges, with flexibility of resource allocation being the most prominent. The strict and deliberate process described in McGarry (2021) results in resources being allocated two years after they are first proposed. Greenwalt & Patt (2021) note that this deliberate pace prevents the adoption of the latest technologies, particularly ones originating from the commercial sector, where product development cycles are much faster. The process also stymies fast adaptation and iteration, as funds that are allocated for one purpose cannot easily be reprogrammed for another without congressional approval above a certain threshold, even when there is an opportunity to take advantage of an emerging development or an imperative to meet an unforeseen need (Wong, 2020).

Organization of This Paper

The rest of this paper examines these challenges. We will first examine recent ideas for PPBE reform, grouping them into five distinct proposals. We will then turn to business administration, public policy, and defense analysis literature to develop evaluation criteria by which we can compare the five groups of PPBE reform proposals. Finally, we will evaluate those ideas and offer observations about the potential consequences of each proposal.

Proposed Changes to Resource Allocation

To summarize the proposed changes to the PPBE process, we reviewed documents recommending tangible changes to DoD resource allocation to enable greater technological

---

[1] In particular, these organizations have built up business development teams that help commercial firms understand DoD problems, source selection processes inspired by venture capital firms that quickly identify the most promising ideas, and concierge-like services that help firms navigate the DoD acquisition bureaucracy.

[2] Six pathways now exist for acquisition programs: major capability, middle tier, software, business systems, services, and urgent capabilities acquisition. See https://aaf.dau.edu/ for more details.

innovation.[3] While many recommendations were general calls for change, 14 documents contained 22 distinct proposals for change that varied in detail, scope, and importantly, organization that would be responsible for acting to effect change.[4] From those recommendations, though, appeared five distinct types of groupings:

- More efficient execution of existing PPBE process
- Broader or different units of analysis
- Integrated portfolios
- Removal of RDT&E from the FYDP
- More powerful reprogramming

Importantly, these categories of recommendations are not mutually exclusive within a reform proposal, and indeed several call for a portfolio of reforms to achieve desired ends. We will now characterize each one in turn.

More Efficient Execution of Existing PPBE Process

This set of proposed changes envisions making marginal changes to the PPBE that aim to make it live up to its original purpose, empowering policymakers with clearer access to information that allows them to pick between alternatives. More efficient execution might reducing the number of stakeholders that must indicate approval to streamline the process, modernizing budget justification material to make the production of PPBE products faster, or other ideas to reduce the administrative burden needed to execute the process, thereby making it work faster (Hale, 2021). Other recommendations are to provide more incentives to ensure strategic documents are developed on time, enabling a tighter linkage between strategy and budgets; this would ostensibly create a system that is more responsive to changes dictated by policymakers. Such recommendations suggest that at least in the target areas, the PPBE process is fundamentally sound, but opportunities exist to improve implementation (Greenwalt & Patt, 2020).

Broader or Different Units of Analysis

This set of proposed changes would create different budget categories instead of the current Major Force Program (MFP) construct. The existing MFP construct reflects the threat environment and platform centric military capabilities which shaped it at its inception. These MFP bins were developed to reflect the units of analysis at which meaningful resource trades could be explored. As reform proposals, this category would reconsider those bins in light of the current threat environment, technological landscape, and nature of military capabilities. Most proposed changes in this vein would make the categories encompass more program elements (PEs) or PEs that are more aligned with current modernization priorities that traverse the seams and slip through the cracks of current MFPs, like networked communications or other information technology programs as suggested by Snyder (2022). For example, from a budgetary perspective, increased consolidation might be likened to the detailed PEs and programs contained in the procurement budget with the broader, more flexible categories in the operations and maintenance budget.

Another example of these kinds of proposals is an instantiation of these changes proposed in Lofgren (2021) that focuses on changes that enable greater technological

---

[3] We note that enabling greater technological innovation may not be the only goal for PPBE reform; other goals may exist.

[4] In reviewing the literature on PPBE reform, it was evident that many calls for reform focused on characterizing problems and encouraging change, but specific recommendations were uncommon. The 14 documents noted previously were the exception.

innovation. He envisions the consolidation of various RDT&E PEs organized by service into larger groupings by a responsible program executive officer.[5] This would create a seven-fold reduction in the number of PEs responsible for a greater dollar amount. This in turn would reduce the amount of analysis required for each set of PEs.

Finally, another proposal would be to set aside small parts of the DoD budget as a sort of contingency fund for the DoD that is not constrained by appropriation title. This "unspoken for" money could be spent on emerging priorities that become apparent after the original budget is programmed, enabling greater DoD budget flexibility (Hale, 2021). As a whole, these recommendations believe that changing the unit of analysis to better reflect contemporary needs will yield a better result.

Integrated Portfolios

These proposed changes are more radical versions of the proposed changes to the units of analyses. Instead of merely reconfiguring Major Force Programs, these recommendations suggest consolidating major portions of the defense budget around single missions, capability areas, or regions. These changes would make each consolidated portfolio responsible for multiple appropriation titles (or "colors of money" in DoD parlance) such as RDT&E, procurement, and O&M. Examples of these proposed changes exist; the Joint IED Defeat Organization (JIEDDO), the Joint Artificial Intelligence Center (JAIC), and the Strategic Capabilities Office (SCO) all exemplified some characteristics for specific mission or capability areas (Lofgren, 2021). Schmid et al. (2021) described a Joint Mission Office that consolidated acquisition authorities, appropriation titles, and a streamlined governance model to deliver capabilities faster and more efficiently for DARPA's Mosaic concept (itself a program that would fall between the seams of different MFPs). The common thread between all of these proposals is that a greater degree of agility and coherence can be achieved with a portfolio-based approach to resource allocation.

Removal of RDT&E From the FYDP

This proposal would maintain most of the PPBE status quo, but focus on bringing RDT&E resource allocation out of the PPBE process and its years-long process that is difficult to change. Instead, RDT&E budgeting would revert back to the pre-1961 practice of annual budgeting without longer-range projections as is done in the FYDP. This would ostensibly increase flexibility and the DoD's ability to harness commercial technologies with faster resourcing.

More Flexible Reprogramming Authority

Finally, the last group of proposals would focus on creating more flexibility after the PPBE enters execution phase by increasing the DoD's ability to move, or reprogram, funds between programs after they are programmed and budgeted (McGarry, 2021b). This would include increasing the amount of money that the DoD can reprogram without needing time-consuming Congressional intervention or devolving reprogramming authority to lower levels of an organization where it can be more responsive to newly identified needs. These recommendations would also increase the DoD's budget flexibility, but from a post-hoc, reactive point of view.

---

[5] It is important to note that the PEO is the organization most likely to have the authority to make resource trades.

A Proposed Evaluation Framework of Options to Meet the Strategic Goal of DoD Resource Allocation

How would we compare the proposed resource allocation changes? Having consistent evaluation criteria to compare alternatives against the status quo PPBE system and to each other is critical for identifying future steps to improve DoD resource allocation, and to develop a structured approach for exploring potential trade-offs between reform proposals. To find the right evaluation criteria, we drew from several sources:

- Management and business administration
- Public policy, administration, and analysis
- Previous analyses of the PPBE system with inferred values

Each body of literature offers useful insights that can inform the development of a framework to evaluate PPBE and its alternatives, but none is a perfect match for evaluating a public sector resource allocation process. Management literature such as Richard et al. (2009) is rich with ways of measuring success for an organization and examples of metrics, but all are aligned around measuring organizational changes meant to maximize profit. Unlike the management literature, the public policy literature has excellent examples of evaluation schemes that can hold many, sometimes competing values at once. However, the public policy evaluation literature such as Hatry (2009) is focused on measuring the performance of specific policy interventions meant to enable a societal good or value. Finally, various analyses of the PPBE process described in the previous sections often recommend changes, from which we can infer values that those changes seek to emphasize over the status quo. However, this body of literature did not intend to use those values as a neutral means of evaluating alternatives.

Taken together, though, four qualities emerge that can form a set of evaluation criteria. We will use these to explore evaluation of PPBE and its alternatives:[6]

- Consistency
- Agility
- Coherence
- Transparency

Importantly, these qualities are presented without discussion of how they will be prioritized, as such implementation considerations will vary across stakeholders and need to be tailored to address specific resource challenges.

Consistency

Consistency is the ability of the process to allocate resources predictably and consistently over time. This quality is a hallmark of the PPBE system as it was designed, and remains useful for planning in certain modern contexts as well; planning and programming for multiple years lays the foundation for a predictable flow of resources. Consistency disciplines spending by keeping resources focused on programs for as long as they are needed. Wong et al. (2022) notes that this consistency was considered crucial during the Cold War, when a long term great power competition with the Soviet Union was believed to be indeterminate. Chu and Bernstein (2003) also observed that consistency has real benefits even at the program level: the ability to shift resources prized by senior leaders (even under the status quo PPBE process) can

---

[6] To identify these criteria, we identified all 39 relevant individual values from all four bodies of literature and used a pile sorting method to iterative group them until the four criteria emerged. For further reading on pile sorting and theme identification, see Ryan & Bernard (2003).

be disruptive to program managers, who must try to run programs under a cloud of uncertainty and instability in their funding.

Agility

Agility is the ability for the process to effectively respond to new needs and priorities. This quality, which might be in tension with the consistency criterion examined previously, is the most prized one in contemporary PPBE reform debate, especially focused on the unique challenge of enabling innovation.[7] Agility would allow DoD leaders to fund late-breaking programs by either moving resources from another program or finding new resources at a faster pace than the status quo PPBE process, which requires two or more years to do so. In the realm of technology development, it would also encourage more fluidity between RDT&E, procurement, and O&M funds that would enable greater feedback and iterative development. All of these benefits would ostensibly give the DoD a greater ability to bring promising new technologies incubated in the multitude of defense innovation organizations across the proverbial "valley of death" between a successful prototype and a more enduring program of record.

Coherence

Coherence means that the outcome of the process results in budget requests with a clear connection to defense strategy, reflected in clear priorities among programs. Assuming that the resource allocation process is synchronized with the defense planning process (ideally, the latter should precede the former), the resource allocation process should clearly use defense strategy to shape the overall budget. This would require the process to decisively adjudicate conflicts between programs during the process, for instance. Whatever the means, the budget request at the end of the process should reflect defense policymakers' priorities.

Transparency

Finally, the entire process should be trusted and open to inspection. Congressional authorizers and appropriators and stakeholders within the process should have trust in the process. The process itself should be clear and understandable. The products and analyses underpinning it should be accessible for inspection to an appropriate extent. Most importantly, outcomes in budget requests should be traceable to their source. Budgeting is an inherently political activity. The criteria of transparency ensures that the stakeholders within the DoD accede to its primacy and trust its outcomes and that Congressional overseers understand what is being requested and why. There should be no surprises or decisions that emerge from a proverbial 'black box.'

Using Evaluation Criteria to Compare Resource Allocation Alternatives

Having identified the criteria, we can now apply them to the five PPBE reform proposals identified earlier. Here, we encounter the challenge of relating these criteria to the alternatives themselves. How can we measure consistency, agility, coherence, or transparency in a process? What metrics are appropriate? Hatry (2009) argues that metrics should be relevant to the issue, understandable to users, able to be feasibly collected, and not manipulable by the process itself.

However, the five proposed PPBE reforms are not ready to be measured in such a thorough way. They are not fully developed processes; many features that can be measured have yet to be specified. The changes themselves have not yet been made, so many

---

[7] Serbu (2021) is an excellent example of the contemporary PPBE reform debate.

performance measurement schemes meant to be deployed after an initiative is running would not apply.

Therefore, we will evaluate the proposed PPBE changes holistically in this paper. Based on the descriptions of each group of changes, we will assess whether they are likely to lead to an increase or decrease across each of the four evaluation criteria compared to the status quo PPBE process. In the following sections, increases in a criteria will be denoted by a (↑); decreases will be denoted by a (↓); and no change to a criteria will be denoted by a (↔). These are relatively crude measures; future research can build out the proposed PPBE changes into more comprehensive policy prescriptions and explore the possibilities of identifying proxy quantitative values or other, more systematic metrics to represent the criteria.

More Efficient Execution of Existing PPBE Process

Consistency	Agility	Coherence	Transparency
↔	↔	↑	↔

Compared to the status quo PPBE process, a more efficient execution of that same process is not likely to yield any changes in most evaluation criteria. Consistency and transparency will remain the same since the process remains the same. More efficient process execution could save time, but without changes to the process overall, the process cannot take less than two years to allocate resources to a program objective memorandum (POM); this effectively serves as a floor beyond which no further agility can be gained. However, coherence may increase. If PPBE is executed more efficiently, then strategic guidance will flow more naturally between process step and the link between strategy and budgets may increase.

Broader or Different Units of Analysis

Consistency	Agility	Coherence	Transparency
↓	↑	↔	↓

Compared to the status quo PPBE process, changing the unit of analysis from the existing PEs that aggregate up into MFPs to a hierarchy that reflects contemporary defense needs would certainly increase agility if the individual program elements are large enough to allow for meaningful trades to be made. However, this might increase turbulence between programs as resources are shifted around. Transparency is also likely to decrease, as different or larger units of analysis will make it harder for Congressional overseers to have the same detailed level of understanding as they do now with the status quo.

Integrated Portfolios

Consistency	Agility	Coherence	Transparency
↓	↑	↑	↓

Integrated portfolios that unify different appropriation types for specific missions, capabilities, or geographic areas have the potential to induce the most change to the status quo PPBE process out of all the proposed reforms. As is the case in broader or different units of analysis, agility will increase and consistency will decrease as managers of the integrated

portfolios shift resources internally and between portfolios. Coherence is likely to increase as the portfolios are likely to be constituted around the DoD's strategic priorities. However, transparency is likely to decrease, as the integrated portfolios will not be broken out and open to inspection as is the case in the status quo.

Removal of RDT&E From the FYDP

Consistency	Agility	Coherence	Transparency
↓	↑	↔	↔

Removing RDT&E from the FYDP is likely to increase agility, as the delay between allocating and receiving RDT&E resources will shrink from two years to one year. However, this would also likely result in a decrease of consistency, as priorities may shift from year to year. Since the remainder of the defense budget will remain in the status quo, no changes to coherence or transparency are likely.

More Powerful Reprogramming

Consistency	Agility	Coherence	Transparency
↓	↑	↓	↓

Like the previous proposals, more powerful reprogramming authority will increase agility and decrease consistency as the DoD makes post hoc adjustments to resource allocations. However, coherence will likely decrease as reprogramming lacks any mechanism to enforce a linkage between strategies and budgets. Transparency will also decrease if more powerful reprogramming comes at the cost of Congress relinquishing or delegating some of its reprogramming authority to the DoD.

Conclusion

Missing from the current and encouraging discussion about PPBE reform to create increased agility is an explicit conversation about the values that the DoD and Congress seeks in resource allocation (both today and in the future) and how reforms will affect all of those values. In this paper, we consider both specific reforms and specific values (in the form of evaluation criteria) to understand the total effect of any proposed PPBE reform on the DoD.

Reform proposal	Consistency	Agility	Coherence	Transparency
More efficient execution of existing PPBE process	↔	↔	↑	↔
Broader or different units of analysis	↓	↑	↔	↓
Integrated portfolios	↓	↑	↑	↓
Removal of RDT&E from the FYDP	↓	↑	↔	↔
More powerful reprogramming	↓	↑	↓	↓

After evaluating the five PPBE reform proposals, we see that all of them are likely to increase agility while decreasing consistency. This is not surprising; the contemporary policy debate around PPBE is largely centered around the contention that PPBE is not agile enough to enable commercial technologies to be adopted at speeds the commercial sector expects. We should expect that most proposals seek to increase agility; since this evaluation criteria exists in tension with the criteria of consistency, we should also expect to see consistency decreasing in most, if not all proposals. If this is the case, we might see less value in the proposal for more efficient execution of the existing PPBE process since it is not likely to increase agility.

What does this mean for the remaining two evaluation criteria, coherence and transparency? Assuming that all PPBE stakeholders (including Congress) are seeking to maximize agility above all, then perhaps policymakers should be most interested in proposals that increase coherence and transparency, or at least those that minimize likely decreases to those evaluation criteria.

But there is no clear choice among the four options until we determine which value is more important. If coherence is more important than transparency, then integrated portfolios would be the most preferable reform choice, followed by broader units of analysis and removing RDT&E from the FYDP. If transparency is more important, removing RDT&E from the FYDP would be most preferable. Among the remaining choices, integrated portfolios would then be more preferable since it increases coherence, followed by broader or different units of analysis. More powerful reprogramming would be the least preferred reform option.

However, it is not the goal of this paper to make definitive policy recommendations about which PPBE reform proposals to pursue. The proposals reviewed and summarized in this paper require more development to understand the totality of their proposed changes and how they might affect the evaluation criteria. Moreover, other proposals likely exist. In this paper, we chose to focus on ones that attempt to enable greater technological innovation in the DoD. Other PPBE reform goals may exist; this is not an attempt to create a comprehensive list of ideas for PPBE reform.

Nor is it the goal of this paper to say with certainty what the right evaluation criteria are. The criteria are relatively crude. They require further refinement, possibly through structured elicitation of stakeholders, to truly understand which evaluation criteria are worth including and how they are prioritized. The criteria also require more detailed metrics and measures to enable systematic measurement of the reform proposals. Finally, even if all of these improvements were made, PPBE reform is an inherently political endeavor and systemic evaluation can only inform the eventual direction of reform, not determine it.

Nevertheless, the analytical exercise described in this paper offers some insight into the contours of the PPBE reform debate. In connecting reform proposals to the underlying values (in the form of evaluation criteria) that they emphasize or de-emphasize, we can bring those values into explicit view. This gives policymakers a more complete picture of the potential positive *and* negative impacts of any PPBE policy reform proposal.

References

Chu, D. S. C, & Bernstein, N. (2003). Decision-making for defense (Eds. S. E. Johnson, M. C. Libicki, & G. F. Treverton). RAND.

Enthoven, A. C., & Smith K. W. (1971). *How much is enough? Shaping the defense program, 1961–1969.* Harper & Row.

Greenwalt, W., & Patt, D. (2021). *Competing in time: Ensuring capability advantage and mission success through adaptable resource allocation.* Hudson Institute.

Hale, R. F. (2021). *Financing the fight: A history and assessment of Department of Defense budget formulation processes.* Brookings.

Hatry, H. P. (2006). *Performance measurement: Getting results.* Urban Institute Press.

Lofgren, E. M. (2021). The DoD budget process: The next frontier of acquisition reform. George Mason University Center for Government Contracting. https://business.gmu.edu/news/2021-10/no-5-dod-budget-process-next-frontier-acquisition-reform

Mayer, L. A., Arena M. V., Camm, F., Wong, J. P., Lesnick, G., Lovell, S., Fernandez, E., Carter, P. & Lee, G. T. (2020). *Prototyping using other transactions: Case studies for the acquisition community.* RAND.

McGarry, B.W. (2021). Defense primer: DoD transfer and reprogramming authorities. Congressional Research Service. https://sgp.fas.org/crs/natsec/IF11243.pdf

McGarry, B.W. (2021). Defense primer: Planning, programming, budgeting, and execution (PPBE) process. Congressional Research Service. https://sgp.fas.org/crs/natsec/IF10429.pdf

Richard, P. J., Devinney, T. M., Yip, G. M., & Johnson, G. (2009). Measuring organizational performance: Towards methodological best practice. *Journal of Management, 35*(3). https://doi.org/10.1177/0149206308330560

Ryan, G. W., & Bernard, H. R. (2003). Techniques to identify themes. *Field Methods, 15*(1), 85–109. https://doi.org/10.1177/1525822X02239569

Serbu, J. (2021, December 29). Pentagon's ponderous budget process is next target for Congressional reform. Federal News Network. https://federalnewsnetwork.com/defense-main/2021/12/pentagons-ponderous-budget-process-is-next-target-for-congressional-reform/

Snyder, D. (2022). *Funding technology-related business initiatives in the Department of the Air Force.* RAND.

Spoehr, T., & Bartels, F. (2022, January 13). Reforming the Defense Department's planning, programming, budgeting, and execution process. War on the Rocks. https://warontherocks.com/2022/01/now-the-hard-work-begins-five-principles-to-guide-the-planning-programming-budgeting-and-execution-commission/

Wong, J. P., Younossi, O., Kistler LaCoste, C., Anton, P. S., Vick, A. J., Weichenberg, G., & Whitmore, T. C. (2022). *Improving defense acquisition: Insights from three decades of RAND research.* RAND.

Wong, J. P. (2020, December 15). Bad idea: Overly focusing on speed in development and acquisition. Center for Strategic and International Studies. https://defense360.csis.org/bad-idea-overly-focusing-on-speed-in-development-and-acquisition/