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CALCULATING RETURN ON INVESTMENT IN A DEPARTMENT OF DEFENSE CONTEXT

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EXECUTIVE SUMMARY

Return on Investment (ROI) is a metric used by companies to measure the profit potential of future projects or acquisitions. This paper poses whether the Department of Defense (DoD) can apply an ROI model for its investments. The interviews in this research raised several key themes relating to DoD acquisitions. These themes compared how private sector companies work with other private sector companies versus the DoD.

Our research began with surveying how the DoD currently approaches acquisitions and what methods are used for creating RFP's, evaluating bids, and awarding contracts. We contrasted this with how the private sector applies ROI models in acquisitions and identified critical differences and challenges in applying these methods to the DoD. Most notably, private companies seek to maximize profit. The DoD does not generate revenue from its operations or acquisitions and is not a profit-maximizing organization. Instead, mission objectives such as enhancing operational capabilities or reducing life safety risks are the goal.

The team conducted interviews with DoD acquisitions personnel, private-sector vendors who have bid on DoD acquisitions, and commercial vendors. Our findings revealed pain points within the process preventing some contractors from offering the maximum possible value to DoD on their bids. Also, from the length of time it takes to get from acquisition requirements to bidding, technology may become obsolete. Additionally, private sector bidders identified an apprehension towards reopening acquisition requirements if a better solution was available to avoid lengthy renegotiation processes.

Private sector bidders on DoD acquisitions also named Lowest Price Technically Acceptable (LPTA), a method of analyzing bids and awarding contracts, as a potential deterrent from maximizing the value of their bids. Concerns over competitors undercutting them on price leads to bidders crafting proposals only to meet the minimum requirements and pass up delivering potential benefits to the DoD.

The team also found data to be a critical issue for all DoD acquisition stakeholders. The private sector uses first- and third-party data to inform ROI decision-making models. While the DoD has a new data management infrastructure that can be used to create a Single Source of Truth (SSoT) data lake, interviewees noted the data is not used or shared much. We believe that such SSoT data could be used to inform ROI decision-making for the DoD.

When assessing our findings in the context of ROI in DoD acquisitions, the team zeroed in on the problem of quantifying DoD 'returns' or the benefits offered by acquisitions. This assessment is necessary to perform an ROI calculation, as procurement dollars need to be compared to some return. This issue is an area of continued research for the team and will inform the eventual realistic deployment of a potential DoD acquisition model. This model will need to be replicable and consistent, relying on standardized parameters and historical contract performance data to ensure valid and equitable results. This issue is another potential application for a DoD SSoT data infrastructure.

The team believes that an ROI model can be built to encompass DoD objectives to enable the acquisition of superior systems and services and at the same time speed the contract process, better aligning bidders' interests with the DoD and addressing some of the acquisitions issues identified during our research. In short, when assessing the question of whether the DoD can benefit from an ROI acquisition model, the answer is yes, and our team is looking ahead to how this model will work and where it could apply within existing DoD processes.

1 BACKGROUND

1.1 Return on Investment in a Department of Defense Acquisition Context

Return on investment (ROI), a calculation of the expected financial return on a given financial investment, is helpful for businesses to maximize the value of their capital expenditures and measure the performance of their assets. A metric for the financial performance of assets is useful for companies because it allows them to make objective decisions between acquisition options and to evaluate whether a particular project or endeavor is worth pursuing. The DoD today applies some business analytics processes in its acquisition process, including market research studies, investigation of alternatives, and historical pricing analysis for existing contractors (Department of Defense, 2018). In some situations, the DoD does consider ROI through the cost savings from an acquisition to perform a specific function.

This practice would be true for some acquisitions of commodities for enterprise use, such as staples like toilet paper, and for complex but well-characterized enterprise software systems such as payroll or accounting software. This process is known as Value Engineering (Gluck, 1976) and is often evaluated in the contracting process as Lowest Price, Technically Acceptable

(LPTA). However, since many DoD acquisitions do not result in revenue or direct cost savings, conventional wisdom is that no return-on-investment analysis is possible for contract evaluation. We propose to create meaningful, actionable metrics for the DoD to calculate ROI, based on how the private sector calculates ROI, but using DoD-specific metrics for return.

1.2 How Private Sector Businesses Use ROI

Private sector companies use ROI calculations to model business outcomes and test potential acquisition outcome scenarios. ROI models depend on input costs, investment schedule, and resulting revenue or cost reduction to determine a return on capital invested over time. These inputs rely on assumptions from estimating total costs, projecting schedules forward, and predicting future profit streams. These inputs contain two components, a dollar cost or time and a risk or uncertainty coefficient. These inputs and risk estimates can be based on historical data with contextually specific accommodations. Each of these inputs can be varied to see its impact on the performance of the acquisition, such as stress testing the model in the event of reduced future revenue or project delays. This flexibility to test potential scenarios and outcomes is a powerful tool for businesses making acquisition decisions.

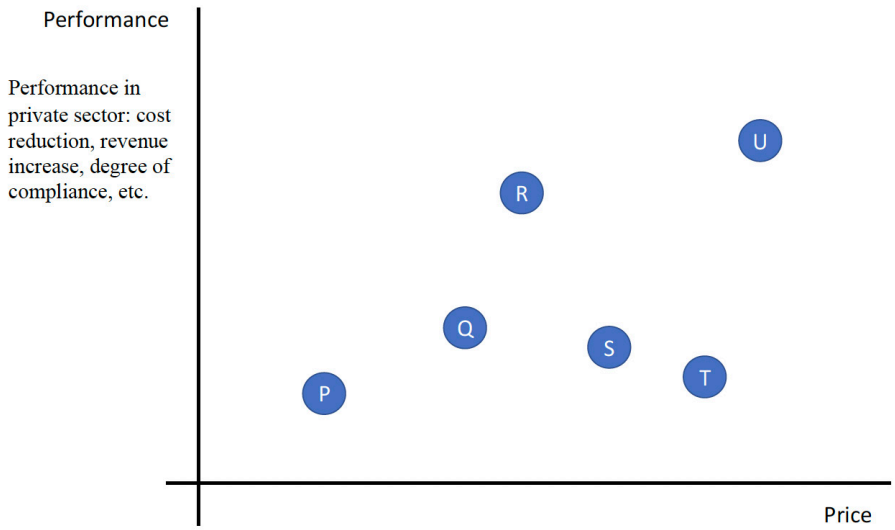

Figure 1 - ROI as a Private Sector Tool for Acquisition

Figure 1 shows a hypothetical acquisition scenario for the private sector. Each of the various vendors P-U are responding to the RFP with products or services at various price points, delivering different value to the private sector. For most acquisitions, the value to the private enterprise is usually calculated as an improvement to profitability by increasing revenue or reducing costs. Note that there are other measures of value for a private enterprise. For example, in regulated industries, an investment in compliance solutions may not directly increase revenue. Being in compliance means the enterprise can be in business and thus make profits.

The figure shows that U delivers the most performance but at the highest cost. P is the least expensive but does not deliver much performance. In this simplified example, the private enterprise is most likely to select vendor R. It has the best-realized performance for the total cost, maximizing value and resulting in the highest ROI.

ROI provides a comprehensive performance metric for any acquisition or investment. This allows a business to compare different potential acquisitions and choose the most significant return or profit potential. ROI can also measure passive investments, comparing proceeding with a risky project versus allowing the investment capital to incur interest instead. One of the main reasons ROI models work for businesses as a decision-making tool is the profit-maximizing goal of a company and a desire to maximize the potential profit from available capital to be invested. With the correct ROI models, businesses can always choose the profit-maximizing option available to them.

1.3 Current Department of Defense Acquisitions and Application of ROI

The DoD has used various simplified forms of ROI analysis to inform acquisition decisions for decades. However, much of the focus of the acquisition process is spent specifying the deliverable to alleviate the need to compare value between different bids. While the private sector can reduce virtually everything to profit, the 'return' in a DoD context uses a different set of goals – namely, the protection and promotion of U.S. interests on a global scale.

One challenge that arose from our research process was the broad nature of DoD acquisitions. There are many commodities and services acquired by the DoD that are handled well within the existing methods. For example, when acquiring something as simple as toilet paper, calculating the return on investment for this item is straightforward: buy the least expensive roll that wipes. Additional performance parameters are not a consideration.

Similarly, when acquiring something a little more complicated – like computer hardware – there is still a general understanding of what is needed to create acquisition requirements. Does the new hardware provide faster access? How much faster? Does it reduce maintenance costs, and by how much per year? These are still straightforward ROI calculations. If the value offered by an acquisition for the DoD can only be measured in operational performance or risk reduction, non-monetary metrics for value will be needed for the DoD to measure the ROI of these acquisitions.

Currently, there is no reliable framework for return on investment (ROI) calculations that consider the unique mission values for DoD acquisitions. This report addresses this need by proposing an ROI tool for the acquisition process that emulates private sector ROI analysis in DoD contexts. Moreover, we hypothesize that a standard framework for evaluating ROI will enable acquisition personnel to accelerate the development, letting, and award of contracts overall with higher functionality and lower total cost. The purpose of this research is to identify opportunities in the DoD acquisition process where ROI calculations can be used to improve the performance of defense acquisitions in cutting-edge technology. By adapting the best practices of the private sector and non-DoD public sector's ROI calculations to reflect the unique, non-monetary components the DoD considers as its 'return,' acquisitions can better achieve the goals that improve the DoD's return metrics.

2 RESEARCH METHODS

In sourcing and reviewing research and associated articles relevant to the project, the following questions were points of focus. First, how does the DoD currently approach the acquisition process? Second, how does the private sector approach acquisitions? How is this different from how they sell to the DoD? Third, noting the importance of data analytics to estimating costs, risks, and value, we asked which established and emerging data analysis methods are showing the most significant efficacy within the private industry that may be applied to the DoD contract procurement process?

To best understand the current status of the DoD acquisition process and how private industry acquisition practices can play a more effective role, we began by reviewing industry standards for defining return on investment. Then we conducted interviews with industry professionals and defense representatives to gain boots-on-the-ground insight into current best practices, areas of issues, and potential solutions.

We conducted seven interviews with ten individuals from various components of the Department of Defense, an independent agency, and GSA. From the private sector, we conducted 13 interviews with seven individuals from enterprise equipment companies, enterprise software companies, and defense contractors, including CRI Advantage, IBM, Oracle, Second Front Systems, an additional large enterprise systems manufacturer that services both the public and private sector, and one independent small business defense contractor.

3 FINDINGS

The interviews we conducted produced interesting insights into the world of technology acquisitions. Throughout the discussions, key themes were raised for private sector companies in the context of working with the DoD and how that compares to how private sector companies work with others in the private sector. It was interesting to see the intersection of the perspective from private industry and the concerns of the DoD acquisition representatives and key program personnel. In developing a solution to guide the acquisition process, these commonalities present a possible opportunity to create process improvement.

Before we review the results of the interviews, the following two sections discuss the results of our brief literature review on DoD contracting.

3.1 Contracting Process

The Department of Defense uses a variety of contract types for acquisitions. To properly apply any ROI tool, there needs to be an understanding of how each contract type works and the relevant information and stated goals. The first step in all acquisition types is to properly frame a request for proposal (RFP) and communicate it to private sector bidders. An RFP must contain an understanding of the requirements of the system or services required and criteria for measuring the performance and success of the acquisition. For technology service-based acquisitions like cybersecurity or cloud computing, this process poses some obstacles for success in ultimately calculating ROI because there is so much ambiguity in what is currently available from a solutions standpoint (Kendall & Long, 2018). To put it plainly – DoD acquisition officers do not know what they do not know, and this industry segment progresses very rapidly. This issue makes it challenging to create a set of requirements for an RFP that will lead to a straightforward ROI calculation process. Perhaps more importantly, the scope of work in the RFP may limit potential solutions because it creates a set of parameters to answer rather than explaining the problem the scope of work needs to fix. The scope is created in the DoD bubble, and there it remains through the source selection process because of the current acquisition process. Once the scope and requirements are defined, an RFP is released. Private industry responds to the RFP as written and creates proposals to address the requirements for the best chance of contract award.

3.2 Relevant Contract Types

When dealing with technology services and research and development acquisitions, many contract types are available. For this paper, we will focus on the general contract types associated with technology services acquisitions rather than the individual process for all subcategories of contract acquisitions. There are three contract types commonly used. The first is Firm-Fixed-Price, the second is Cost-Plus, and the third is Time-and-Materials. Firm-Fixed- Price (FFP) contracts provide a price that is, as the name suggests, fixed established on the object or service being acquired. Subcategories of FFP allow for price adjustments based on economic changes and other incentives. Cost-Plus is used in technology services acquisitions and is a variation of a cost-reimbursement contract. In these scenarios, there is typically a fixed base amount and an additional fee. That fee may be defined as a secondary fixed fee or a varied fee based on critical evaluation from the DoD. Time-and-Materials contracts are direct cost evaluations based on materials needed and time used based on hourly rates (FAR Part 16, 2021).

Expanding this analysis further, when considering new innovative products and services that may include significant research or development, FFP is typically not regarded as viable because this activity has considerable uncertainty as to effort and risk (FAR 35.006c). Cost-Plus contracts leave additional room for unforeseen costs to make the contracts fair to the DoD and financially viable for the contractor. Time-and-Materials can be a viable option; however, there is some debate whether the Time-and-Materials approach leaves room for contractors to “pad” their invoices and raise the overall price of the contract (Department of Defense, 2018).

3.3 Interview Analysis

Several themes arose from the research we conducted. One common theme was the identification of barriers to the practical application of an ROI model. Additionally, the application of Lowest Price Technically Acceptable (LPTA) was discussed frequently by interviewees. Finally, the role of data application in analyzing and awarding contracts was discussed by interviewees.

3.3.1 THEME: BARRIERS TO APPLYING ROI MODELS IN DoD ACQUISITIONS

The DoD is not a business. It does not seek revenue derived from its investments. It is not seeking to maximize profit or obtain any financial return on the investment made. Instead, the DoD has other goals, such as expanding operational capabilities, improving life safety, establishing deterrent positions, and reducing risk. To apply ROI analysis for DoD acquisitions, finding substitutes for profit is necessary. Our preliminary research has identified the following challenges.

The first challenge is the process of identifying the requirements for a potential acquisition, releasing a request for proposal, and ultimately reviewing and awarding a contract is a barrier to the DoD acquiring the best solution for the problem at hand. Technical scopes, especially for technology procurement, are written one or more years before the DoD can send requests for proposals to the market. Often, the best technological solution can become obsolete before it is acted upon, leaving the DoD with a solution that is not the most effective option for the requirement. By the time the DoD negotiates contracts, technology products involved in the scope may be several generations obsolete. A common practice is to generate a change order upon contract award to update the procurement specifications. However, this gives contractors significant pricing leverage, resulting in inefficient procurement and further delays as terms are continuously renegotiated.

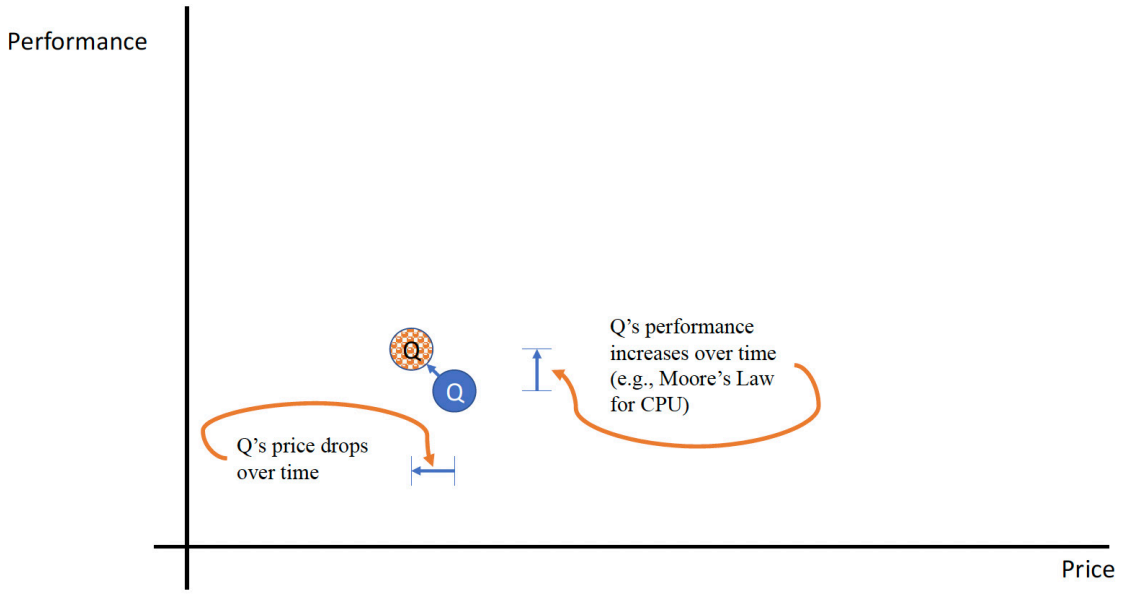

Figure 2 - Impact of Long Contracting Cycles on Price / Performance

Figure 2 shows this scenario schematically. Assume the DoD selects vendor Q. We note the performance of Q's bid and pricing as the solid blue circle. However, in the intervening months or years since the RFP was written, released, and the contract was awarded, technology has progressed, and higher performance is available for a lower cost. This is typical for computer purchases. The DoD will want to use the more modern hardware. We note the performance of Q's system at award time by the hashed orange circle. The DoD will want the higher performance, so it will issue a change order to the contract. However, as a change order, vendor Q has little incentive to give the DoD the full reduction in cost – if it gives any of the reduction to DoD. Thus, the DoD leaves the potential value "on the table" by the delays from a long RFP cycle.

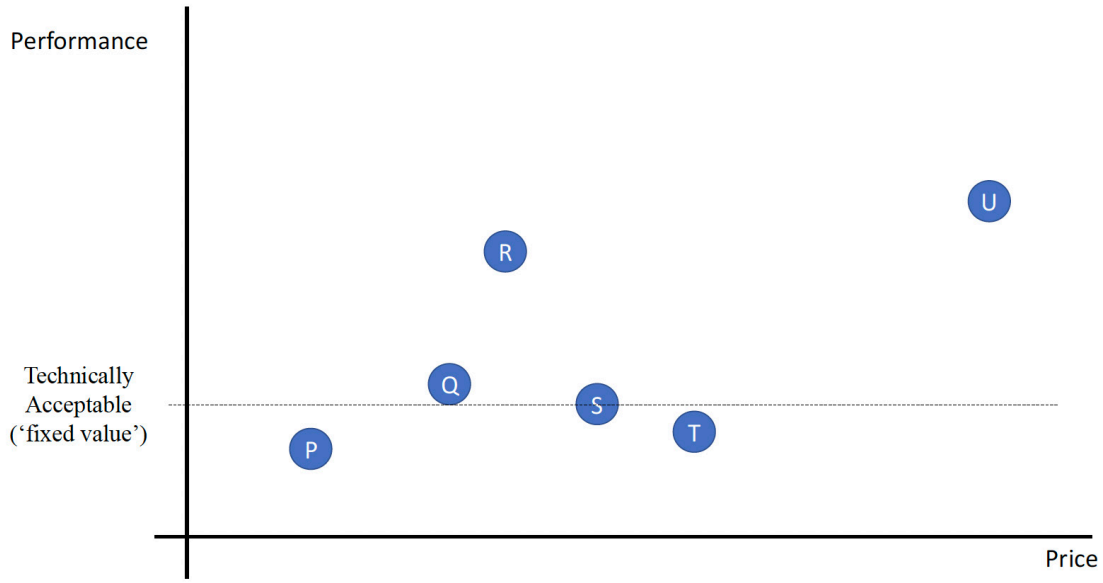

Figure 3 - Impact of LPTA vs. ROI

Now consider LPTA operation, as depicted in Figure 3. DoD would select Q at contract time and reject the other bidders based on either not being technically acceptable (P and T) or not being the lowest price (R, S, and U). Note this leaves the far superior value at a modest cost increment provided by R. However, the impact of LPTA truly comes to light if the RFP process is protracted. In the hypothetical example depicted in Figure 4, we keep the value/cost improvement shown by vendor Q from Figure 3. We also put out the hypothetical that vendor P's price does not change, but now it meets the basic requirements. Vendor R's price increases incrementally, but its value to DoD has significantly improved. Finally, Vendor U's performance holds, but its price drops dramatically. By eliminating all but Q in the LPTA process, the DoD forfeits access to these far superior alternatives.

The second challenge is a lack of clarity in scope and the ability to enumerate the actual needs of a contract. This creates issues within the acquisition process. Because an RFP specifies the minimum performance required by the DoD, companies may choose to bid the lowest cost technically acceptable solution, even though a significantly higher performance option may exist for a slight increment in cost. By focusing on minimum requirements and minimum price, the DoD contractors will deliver minimum performance that meets the requirements. That is fine for toilet paper or a bolt, but most likely a less than ideal goal for a complex weapons system.

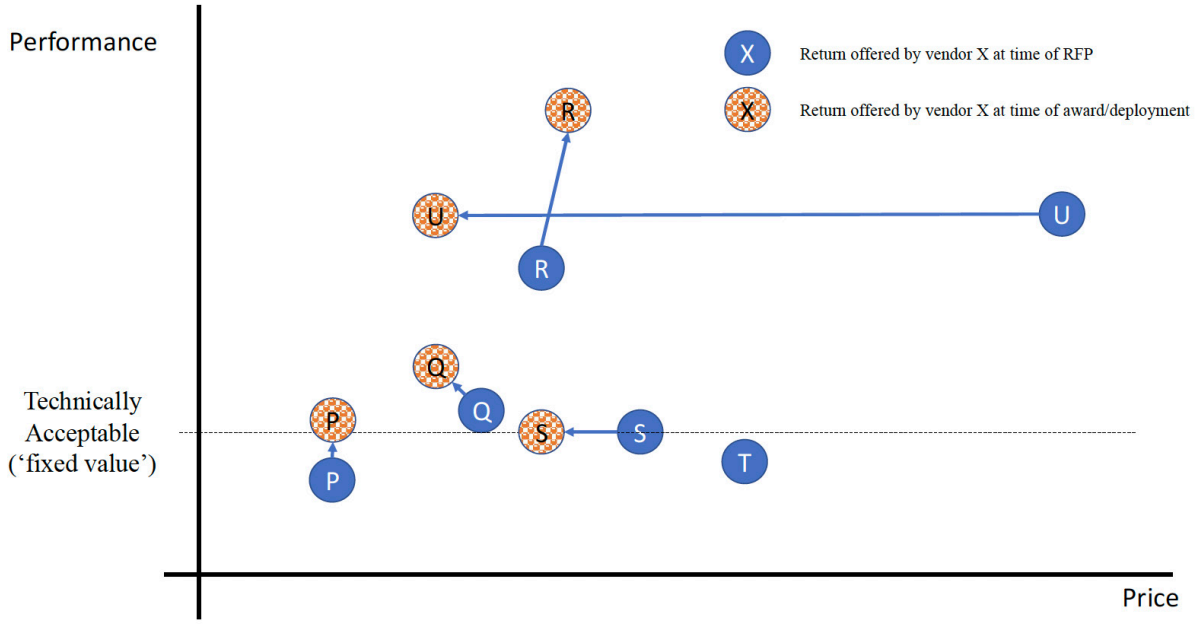

Figure 4 - LPTA and Contract Delay

3.3.2 THEME: DATA APPLICATION IN THE ACQUISITION PROCESS CREATES BARRIERS TO EFFECTIVE ROI CALCULATIONS

A consistent message from our interviews with DoD personnel and private industry contractors was that applying existing data to current acquisition analysis was an issue. The DoD collects substantial data from internal resources regarding the performance of contracts, issues arising from established processes, and input from personnel on future needs. There are limited established processes to categorize and review the data efficiently regularly. Much of the data – historically – has lived in silos. As a result, applying past performance data to new technology or technology services acquisitions has been virtually impossible. While the DoD has invested in addressing the issue of data management, the application within the acquisition process has not been fully realized.

It is important to note that the DoD is a unique entity. It does not operate in the same fashion as a private enterprise because the DoD is not attempting to maximize profit over time. Instead, the DoD measures its success in less quantifiable areas such as promoting national defense, improving the life safety of service members, and reducing the costs and risks of its operations. Where private industry measures success in the fixed context of profit, the DoD measures success in the perpetually ambiguous goal of ensuring that U.S. interests are protected and promoted across the globe. So, the question becomes: Which data is necessary to make appropriate recommendations on return on investment?

The private industry has the flexibility to be very fluid and agile in the efforts to adapt to data best practices to help calculate value and total cost to determine the return on investment. DoD is, by nature, an extensive, multifaceted organization that requires more touchpoints for the same goal. Therefore, it is an important contribution to the DoD acquisition process (beyond very basic acquisitions) to find an appropriate solution for establishing and implementing ROI calculation processes based on insight from the private sector.

When considering the role of data in the contract award process, a critical difference between private industry and the DoD is the tendency of unsuccessful bidders to contest the buyer's decisions. When a private company purchases a cloud computing services contract, for example, the companies that did not win the business of the purchasing company have little to no recourse after the decision. So, private companies have a degree of autonomy in purchasing decisions. If a private company submits a proposal to the DoD and loses the bid, by contrast, they can contest the decision and

require the DoD to justify why the contract was awarded to the successful bidder. In this manner, the DoD is subject to legal disputes that can last months or even years. During this time, none of the contracts in dispute can progress - so the requirement is not filled. As a result, the decisions must be backed by clear data. In many cases, a list of clear requirements and the lowest offered price is easy to defend, so LPTA tends to prevail. Where private industry can award contracts based on which company they believe will provide the best long-term performance, the DoD must have a provable decision-making process to justify every award.

While these differences between private industry and the DoD are important considerations, there were certain aspects of data management from the private sector that hold exciting possibilities for the Department of Defense with the overall goal of deploying an ROI model in the acquisition process. In conducting our research, the comments we received from interviewees consistently noted the complexity of the DoD as an organization. Therefore, we believe that it would be helpful to take a closer look at complex private industries to provide examples of possible improvements moving forward. Many companies find success with a streamlined data flow in their acquisitions processes, creating applicable formulas and strategies for collecting acquisition data, disseminating that data, and creating practical tools for computing return on investment on any given project. It should be noted that many of these companies - like Amazon, Netflix, Airbnb, Equifax, and more - leverage data obtained from third parties, or "big data," to make business decisions and forecast potential value on supply chain needs and marketing endeavors (Bozic, et al., 2019). This applies to DoD acquisitions in new technology because the business intelligence data application necessary to properly identify the actual retrospective cost of a contract in this sector is similar in many ways to the process needed for determining the actual lifetime cost of an acquisition. The DoD can use this information to improve the accuracy of ROI calculations.

In our research, one process for acquisition data collection we identified is a "Single Source of Truth" approach, or a data strategy designed to centralize the flow of information into a funnel that supports a clear definition of contract goals, requirements, and pricing parameters (DalleMule & Davenport, 2017). One key element that is a focal point for private industry ROI calculations is applying existing data to support critical business decisions. Streamlining the flow of data would greatly support creating a comprehensive tool that will help establish a clear return on investment calculation for the DoD acquisition process. While the development and application of an ROI calculation process is not dependent upon a Single Source of Truth (SSoT) data management approach, it would make a more efficient ROI analytics process by ensuring easy access to data about prior acquisitions – thereby allowing acquisitions analysts to make more realistic forecasts in calculating ROI.

Speaking specifically toward acquisitions, the Truth in Negotiations Act (TINA) requires contractors performing government contracts to submit cost data that is truthful, accurate, and complete. TINA was enacted to prevent the DoD from becoming overly reliant on industry cost or pricing data (Tharp, 2020). While helpful in avoiding concerns of profiteering, TINA does not necessarily have the necessary data to help calculate the return of an investment. Further analysis of the utility of TINA data for ROI calculation can be a topic of further analysis.

The Department of Defense has implemented data analytics platforms to help with data management. Advana (Deputy Secretary of Defense, 2021) was designed in collaboration with Booz Allen Hamilton to organize data from financial, medical, human resources, logistics, and other parts of the DoD to drive decisions based on advanced analytics. The DoD has placed a strong focus on a "Single Source of Truth" data strategy for its organizational goals for 2020 and beyond (Department of Defense, 2020). The application for this data strategy in reference to acquisitions could potentially open doors for more effective ROI calculations in technology acquisitions (Defense Business Board, 2020). We explore this in the proposed research section of this report.

3.3.3 ADDITIONAL INSIGHTS

In addition to our findings regarding developing and implementing an ROI model into the DoD acquisitions process, we identified additional areas of interest. Our interviews opened the door to additional commentary on the acquisition process from private sector contractors and DoD personnel. While the following insights may not directly speak to ROI, they present interesting opportunities for future research.

Interviewees noted that if a contract's budget and scope are publicly available through Congress, companies have little incentive to underbid the publicized budget regardless of the true cost. We think that an ROI model can help in this situation. Given most bids will cluster around the published budget, an ROI model can help the DoD select the best system

for that price. This is a potential area of additional research.

DoD interviewees noted a struggle with defining knowable outcomes to obtain funding for vital projects like cloud computing initiatives from Congress. While not specific to return on investment, the issues identified demonstrate a possible barrier to efficiency in the acquisition for the DoD. This issue would be an excellent opportunity for future research.

Another issue raised from interviewees within the DoD is the potential implications of ROI calculations for internal processes and purchases in addition to outside acquisitions. Specifically, key infrastructure investments like the Test and Training Enabling Architecture (TENA) with the Test Resources and Management Center (TRMC) can assist the DoD in fiscal efficiency and improve outcomes in the justification of funding needs. One interviewee within the DoD used the example of a change of testing standards. This can potentially create a situation where the DoD needs the equipment and infrastructure to update the testing environment. However, key personnel in this process struggle at times with how to effectively quantify the return for these updates. They are needed improvements, but there is a need for a cost analysis that will effectively articulate all the important factors that must be considered to an audience that may not have full understanding of the internal need. We explore this and similar internal use case examples in the Proposed Research, Section 4.3, of this report.

4 PROPOSED RESEARCH

4.1 Potential Applications of an ROI Informed Decision-Making Model: Does ROI Make Sense for DoD?

The concept of applying an ROI model to DoD acquisitions is not new. For example, as early as 1976, Gluck proposed using economic analysis, or value engineering, to help reduce costs for DoD acquisitions. However, value engineering focuses on cost reduction for the same result, not on the tradeoff of costs and benefits to any given mission. Likewise, a buy decision for diagnostic tools can use classical ROI calculations (Feldman et al., 2009), and another study identified DoD-centric returns (Oswalt et al., 2011). Still, the focus of these studies was on the limited domain of modeling and simulation. However, it is important to note that a scientific framework to calculate return on investment in the DoD context does not currently exist. Our initial research expanded on these past studies learned, from private industry, and examined current issues between private sector contractors and the Department of Defense. It has been our goal in this initial discovery phase to determine if an ROI model can be designed and practically deployed in the DoD acquisition process in a reasonably efficient manner. We have determined that the development and implementation of this model is possible.

Throughout our research, we posed whether an ROI model could be employed in DoD acquisitions to improve decision-making and acquisition performance. However, as discussed, some critical elements of an ROI calculation as the private industry uses it do not have direct DoD equivalents. Primarily, profit measured by the private sector is not a quantifiable metric for the DoD. Contributions to improved operational efficiency and capability, reduction of life safety risks, and political and tactical deterrent value are challenging to quantify in specific dollar amounts. Yet, each costs the DoD significant dollar investments. That said, private industry formulates a dollar amount for complex acquisitions like technology services, cloud computing, cyber security, and research and development. With further research, we believe we can adapt those methods to the DoD for evaluating similar acquisitions.

For the DoD to make meaningful ROI calculations, metrics will need to be applied to these concepts through a scoring or classification system that can compare different proposals. This system would need to be repeatable and consistent to reduce contract adjudication and reduce the time taken by the protest cycle. One way to demonstrate repeatability and consistency is to collect historical contract performance data and then combine that with assumptions of what new research and technology can deliver. To thoroughly analyze this component of a functional DoD ROI acquisitions model would require more research to assess its feasibility and best approach. This is an area of continued interest for our team.

We recognize that to accommodate different contract types, additional research would be needed to provide insight into how to adapt the ROI model to the contract type for the requirement. As discussed earlier in this report, Fixed-Price, Time-and-Materials, and Cost-Plus contract types are all used for different acquisition needs. Each of these contract types has a different framework for assessing costs associated with a procurement. As a result, an effective ROI model would need to adjust for these unique parameters.

In addition, to be maximally effective, the use of the ROI model should not be limited to post-RFP proposal analysis. It has been noted in our research that the DoD acquisition process has many touchpoints. There are several personnel and considerations involved in establishing a scope of work, creating a request for proposal, analyzing contracts, and managing an awarded contract. A DoD-specific ROI model might vary from the perspective of DoD personnel in different phases of the acquisition. One area of research is to examine these different phases of the acquisition process and how the deployment of the ROI model would improve that phase.

Equally as important, if the ROI calculation model were to be used to establish the best possible value in awarding a contract, that model would need to be backed with enough traceable data to justify the decision in the case of an unsuccessful bidder contesting the decision. In the interviews we conducted, multiple DoD representatives noted that contract awards could be contested. The length of time these legal reviews take can range from a few months to over a year. One of the reasons for choosing LPTA for proposal review is that LPTA provides clear reasoning for rejecting the other proposals, which protects the DoD from lengthy legal delays in disputes. To be truly effective in a DoD context, an ROI model must be based on provable data to make contract awards based on long-term performance outcome justifiable. To address this, we discuss additional opportunities for combining existing DoD data strategy initiatives and the proposed ROI model in Section 4.2 of this report.

Finally, it is not uncommon for the DoD to seek out new technologies and innovative systems to promote the interests and protection of the United States. The challenge presented by these acquisitions is there is little comparable data to leverage in an ROI calculator because the technology in question may not have existed up to that point. Therefore, the ROI model for such acquisitions will need to accommodate forecasting based on similar technologies or the data from allied endeavors.

As we have noted, the DoD has different goals, objectives, and measures compared to private industry. As such, it is no surprise that ROI models for the DoD would factor dramatically different metrics for 'value' in the ROI calculation. While the research and results from private industry can provide a foundation for the framework of an ROI model, additional testing would be required to see how standard practices would respond to real-life DoD acquisition scenarios. Armed with this information, a more comprehensive and tangible model could be produced to improve the acquisition process within the DoD.

4.2 ROI and Application with Single Source of Truth Initiatives

Complementary to an ROI model, the process could benefit from a new data-driven DoD acquisitions process, using a single source of truth data validation process. The following assertions associated with applying Advana's Single Source of Truth (SSoT) platform to improve the efficacy of an ROI calculator are based on publicly available resources on the Advana platform, interviews with DoD personnel, and industry resources. Therefore, we assume that the Advana platform has the capabilities we mention in this paper. Our team has not had access to the Advana platform during this discovery phase of our research. To fully identify and create a comprehensive solution that could be an added value for the DoD's Data Strategy Initiatives, access to this acquisition data would be highly beneficial for the project's next phase.

As noted in this paper, one issue uncovered in the interviews was the challenge of establishing what "return" looks like for more ambiguous acquisition needs, like cybersecurity or cloud computing. These are more challenging than standard transactional acquisitions like hardware or office supplies because the technological opportunities and best practices often change within the timeframe of the standard DoD acquisition process. We found that the time it takes for information to make its way through an RFP, bidding and analysis process can be long enough to cause specifications or acquisition objectives to become obsolete, often with better alternatives emerging. To counteract this issue, we propose leveraging existing DoD initiatives for a "Single Source of Truth" data management architecture in the Advana platform to provide a benchmark to measure future acquisitions and performance. By analyzing data on performance from previous, similar acquisitions, we can compare the results of an ROI calculation for a new acquisition. Since the DoD has voiced a focus on improved organizational data strategy, we contend that applying the Single Source of Truth data goal (Deputy Secretary of Defense, 2021) to the development of an ROI calculator would serve to improve the value of both efforts for the Department of Defense.

Our understanding is that the ROI input parameters available in Advana within the Single Source of Truth model fall into two categories: the programmatic data of costs, scope, and schedule of the acquisition itself, and the resulting capabilities offered by the contract. The costs encompass upfront and future costs in a normalized manner. The total cost of ownership models will vary depending on the type of procurement, and different timelines and future maintenance cost structures will need to be considered. Bidders input the scope of their proposals to demonstrate alignment with RFP requirements. The DoD can use these to identify whether bids fall short of, meet, or exceed RFP requirements. Bidders also enter schedule parameters

to identify contract milestone delivery dates and assign a schedule risk factor (that may be openly negotiated in the contract term) that capture areas of potential delay ahead of contracting.

We believe that combining these sets of data can provide insight into how much value DoD is getting out of a particular bid. If the capabilities can be meaningfully converted into dollars, then true ROI can be calculated. However, it may be more helpful or practical to consider the capabilities as a 'score' or scalar value rather than a specific dollar amount. As new contracts are awarded in emerging technologies, continual collection and application of data within Advana will continue to support the efficiency of an ROI calculator that adapts to the changes within the DoD and the technology industry. While not a perfect science, the two practices of data application and forward-looking ROI calculations will help make the DoD more efficient in its acquisition process.

4.3 ROI and Application to Internal Infrastructure Investments

The efficiency of designing, implementing, and improving key infrastructure technologies within the DoD is a mission critical endeavor. A vital component of this efficacy is determining the cost and return of these technologies. This process goes well beyond the initial acquisitions process to a more cradle-to-grave approach to technology investments. Such an approach is often seen as an industry best practice in private corporations. In addition, once technology infrastructure has been established, the return can be increased through process improvement and analytics.

We've noted several infrastructure technologies that could benefit either directly or indirectly by the implementation of an ROI calculation and an improved data management process. The Advana database and the TENA middleware program have both been identified as potential examples that could benefit from our discussions in the process of creating this report. Beyond this, the long-term benefits of cyber security platforms, software, and cloud infrastructure could benefit from an ROI calculation model that effectively applies the output data already being mined by the DoD.

Armed with this information, the DoD could better identify areas for process improvement and cost efficiency. Application of an ROI model in this area could also make communication with different actors within the DoD funding clearer and easier to translate to a layperson. Finally, the benefits of applying an ROI model to existing technology infrastructure within the DoD would potentially play a powerful role when process improvement requires additional acquisitions. After all, the data gathered is only as effective as its application. An ROI model would create a clear and provable case study with which DoD personnel could seek the right technology or contractor for future acquisitions.

5 CONCLUSION

In conducting this research, the team set out to find aspects of the private sector ROI-driven acquisition model that could apply to DoD acquisitions and whether such a model makes sense for the DoD. Although private companies have quantifiable goals and performance metrics that usually translate into dollars, the DoD will need a substitute for profit when making ROI calculations. In our interviews, literature review, and analysis, such a substitute can exist. This issue is an area of the proposed research for the team moving forward.

Of the types of acquisition analysis the DoD currently performs, Lowest Price Technically Acceptable has the most significant potential to benefit from ROI analysis, allowing for analysis and selection of acquisition bids that exceed minimum requirements justifying slightly higher costs or offering lower total lifetime costs. By setting only minimum acceptable requirements, the DoD incurs additional burdens because it must spend inordinate effort to ensure that acquisition specifications cover all contingencies and provide the required performance. This process adds months or years to the RFP generation effort, meaning RFPs will be obsolete by the time they are eventually awarded. Moreover, by specifying minimum performance and asking for the lowest price, the DoD effectively limits private sector bidders from offering innovative or higher value solutions that could cost more than competitors bidding the minimum requirements.

One key difference between how ROI is applied in the private sector versus how it could be at the DoD is how to quantify value. Private companies seek to maximize profit, easily measured in dollars. However, the DoD's objectives are not always quantifiable. Finding a substitute method to measure acquisition performance is necessary to calculate an ROI. This issue is an area of continued research for the team and will be critical to successfully implementing an ROI model for DoD acquisitions.

In the private sector, the data used to make ROI calculations often includes the historical performance of comparable acquisitions to assess risk and evaluate potential benefits. In the DoD context, existing data sources, such as Advana, can serve this purpose and contain the necessary information for ROI evaluations.

In summary, the team believes the DoD can significantly improve acquisition value and performance by employing an ROI-driven decision-making model through improved information transparency, aligning private sector bidders' interests with the DoD's interests, and greater ability to assess solutions that do not need to be precisely specified. In the next phase of our research, we propose to explore how to build this model and quickly deploy it into the existing acquisition process. We also learned that DoD itself can derive value from performing ROI calculations on its current and potential internal tooling acquisitions. We propose to explore the ROI of a select project or program to prove whether ROI calculations can improve internal investment decisions.

6 PROJECT TIMELINE & CONTINUED AREAS OF RESEARCH

1. What is the long-term transition goal for the research if continued?

The long-term goal of this research is to improve decision-making in procurement in terms of performance in terms of efficiency for the acquisition process by deploying an ROI model for acquisition support. The team intends to continue gathering information and experience from DoD personnel and private sector vendors with firsthand expertise in defense acquisitions. Emphasis will be placed on identifying process pain points and conceptualizing how an ROI model can be applied to address them. Before building a DoD-specific ROI model, we believe that understanding where within the existing acquisition process such a tool could best be used is critical.

While we see this as our long-term transition goal, we have identified three interim steps to develop, test, and deploy such a toolset incrementally:

- Identify and develop a beta, DoD-specific ROI model
- Test this ROI model with sample cases
- Transition the model to the DoD for deployment and integration

2. List the potential tools, guides, educational units, or other artifacts that resulted from this research that might be used by external sponsors if the long-term transition goals are met?

The artifact from this phase of the research is the present paper. By showing the potential for a DoD-specific ROI model, the paper justifies the continuation of the research to create the following deliverables.

- Papers expanding on the theory of the mapping from the private sector to the DoD for calculating performance (or 'return') in the DoD context
- Papers describing a DoD ROI calculation protocol
- Tools, such as spreadsheets, that implement DoD ROI calculation protocols
- User guides for the spreadsheets

We note that other government agencies besides the DoD struggle with inefficient acquisition and would benefit from additional tools and guides to help estimate ROI. In particular, the Department of Homeland Security's (DHS) Procurement Innovation Lab (PIL) is interested in similar research. While their definition of performance is not necessarily the same as DoD's, they also have the issue that performance is not ever measured by profit. We believe that this would be complementary to the efforts of this project.

3. Which of these might be or are planned to be incrementally delivered in a future research task?

The theory paper(s) and a pilot Beta model would be delivered in the next phase of the research.

4. Did you identify any transition partners? Are there other advocates or potential adopters of this research?

An important goal is to identify transition partners. We have some in mind, such as DDR&E AC, DD, ENG and DASD MR. The identification process would begin in phase 2 with subject- matter experts interviewed for the Beta model development.

5. Was the research piloted with a potential transition partner? Are there others who would conduct pilot use of the research if fully funded?

No - it is much too early in the TRL.

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