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The Acquisition Game:
Learning Through Play

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Abstract

The DCTC Acquisition Game immerses players into the basic processes of the defense acquisition system. It is composed of three phases: a technical solution phase, a contracting approach phase and a program management phase. Traversing these phases allows players, who may have limited to no experience in acquisition, to gain an understanding of the various decision points, the key information needed, the critical thinking required, and the challenges that can be experienced throughout the life cycle of a typical acquisition program. The various decision points include the selection of a technical solution (which emulates a design review), the approval of a contracting approach (which emulates a source selection), and a leadership review (which emulates the acquisition strategy approval process). As the game unfolds, detailed requirements and contract rules allow players a small glimpse into the complexities of the acquisition process. Players must demonstrate critical thinking during the technical solution phase process to ensure the operational user's minimum requirements are being satisfied. The game is configured so that no one solution can meet the criteria for a satisfactory solution. Instead, the players, who play as part of teams, must add technical enhancements (which emulate system modifications) to meet the necessary capability level. Players experience challenges through the program management phase of the game, selecting cards that represent both positive and negative developments that can occur through the life cycle of a typical acquisition program. These challenges serve not only to illuminate the complexity of the acquisition process but also to teach players about the specific challenges they will likely encounter throughout their acquisition career. The overall intent of exposing players to these various elements is to promote learning through fun. As part of the Defense Civilian Training Corps curriculum, scholars are expected to gain increasing familiarity and knowledge through repeated play, setting the foundation for higher-level learning objectives.

Introduction

The civilian defense acquisition career field currently faces a situation where, in less than five years, more than 31% of the current workforce will be retirement-eligible (Figure 1; DoD, 2021). This shift will precipitate the need to onboard an increasing number of new civilian employees to backfill the inevitable exodus. The Department of Defense (DoD) has already received new authorities, such as Direct Hiring Authority to recruit experienced members of the civilian population and help mitigate the challenge, **but these have proven inadequate**(DoD, 2024).

In 2020, Congress created the Defense Civilian Training Corps (DCTC) and subsequently directed the Under Secretary of Defense for Acquisition and Sustainment

(USD[A&S]) to lead the effort. The USD(A&S) has leveraged the Acquisition Innovation Research Center (AIRC) to design DCTC as a civilian talent pipeline that minimizes typical hiring frictions by facilitating summer internships and security clearances. In the inaugural DCTC cohort, 87 undergraduate scholars[1] at four pilot universities (North Carolina A&T, Purdue University, University of Arizona, and Virginia Tech) are engaged in a multidisciplinary, active-learning, and acquisition-oriented curriculum along with summer internship projects at DoD organizations to prepare them for an acquisition career.

Defense Acquisition Workforce Lifecycle Model (WLM)
by Years to Retirement Eligibility (YRE) - Civilian (FY2021Q4)
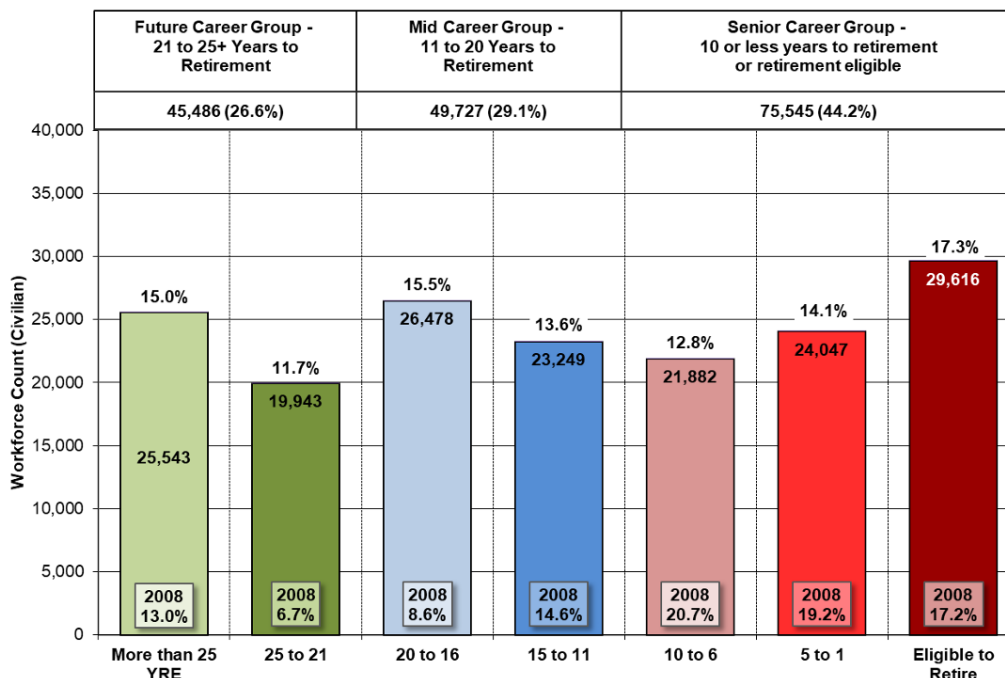
Figure 1. Acquisition Workforce—Years to Retirement Eligibility

The development and integrated curriculum approach is a hallmark of the DCTC program, which is designed to provide scholars with the skills and experience needed to jump-start their professional careers and be productive members of the DoD acquisition community immediately upon graduation (OUSD[A&S], n.d.). However, as has been demonstrated through multiple studies, developing a competent acquisition workforce is a challenge (Levine, 2019).

In a 2016 study, 64% (of 250 government respondents) stated that it takes 10 years or more to become fully proficient in acquisition with 90% of that group relying on colleagues and references for their training—leaving only 10% of the respondents citing formal acquisition training as their primary avenue for learning and developing acquisition skills (Murphy & Bouffard, 2017). Admittedly, this study is now seven years old, and acquisition training organizations like the Defense Acquisition University have overhauled their approach to acquisition training with a "back to basics" model (DAU, n.d.). However, there is still good reason to believe that the generation graduating college now (Gen Z) and future generations will

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[1] Students who are competitively selected to join DCTC are referred to as "scholars." Scholars are held to the highest standards academically, professionally, and in the community.

demand different training models than exist today. One expert noted that Gen Z has a preference for "interactive and immersive learning experiences such as video games, virtual reality, and other digital tools" and often prefers a "more collaborative and peer-to-peer learning environment" (Ávila, 2023). Jeff Koses, Senior Procurement Executive at the General Services Administration (GSA), said that the government needs to be "rethinking [acquisition] training to match the way these digital natives are accustomed to receiving and consuming information" (McCabe & Laurent, 2015).

64% stated that it takes 10 years or more to become fully proficient in acquisition

90% of that group relying on colleagues and references for their training

The DCTC curriculum team has embraced interactive approaches in the classroom by blending traditional lecture/seminar-style learning with multiple in-class exercises that can be completed as a group. The reception thus far from the scholars and professors is that the interactive lessons evoke the most interest and maintain their attention for longer. In the most recent semester (a course designated "DCTC 302"), the team also introduced to The Acquisition Game, which emulates the acquisition process at a basic level.

Games and Acquisition

One notable author on acquisition-focused gaming, Dr. Dan Finkenstadt, defined gamification as "the means of acquiring new skills or knowledge infused and enhanced with game-like elements." His research and experiences in exploring gamification for defense training and education revealed three primary game modalities: (1) Serious/Simulation Gaming, (2) Exposure Gaming, and (3) Engagement Gaming. He observed serious games are more realistic and focused on "performing real-world tasks in a simulated operating environment with the intent to sharpen skills"; exposure games test and improve the "skills and abilities" of specific work roles less the environment realism; and engagement games are more focused on "introducing curriculum subject matter . . . in an alternate universe/setting to evoke a sense of increased interest and engagement." Summarily, Finkenstadt asserts that games primarily seek to make learning fun and that "gamified learning as augmentation may be the best approach for most situations and curricula."

This finding is consistent with another group of professors who teach political science at the University of Albany and whose research concluded that students found lectures difficult to understand and less effective compared to interactive approaches or active learning. According to one study cited, the "traditional lecture format should be used together with active learning to achieve specific . . . learning outcomes." Based on these findings, the professors devised "mini-games" to help students improve their understanding in a new and engaging way where active participation was required (Asal et al., 2018).

Gamification research reinforces the DCTC curriculum philosophy as it relates to teaching complex and sometimes arcane acquisition topics and developing specific skills needed to be successful. The Acquisition Game is a combination of Finkenstadt's exposure and engagement gaming as it seeks to practice certain skills and abilities while also introducing curriculum subject matter in a more accessible way using what is essentially a mini game.

Game Development Approach

The AIRC fellows who served as DCTC game developers, admittedly game design novices, initially planned to design a video game that incorporates a host of complex acquisition factors with detailed personae representing typical program office roles. However, the team quickly realized, that the initial design would quickly outpace the curricular learning objectives and convey more complexity up-front than was desired.

We pivoted by taking a page from the agile software techniques that we have advocated and taught across DoD, and adopted an iterative approach to building a Minimum Viable Product. Under this approach, a game that conveys an appropriate level of acquisition knowledge while also providing an enterprise perspective could be quickly developed and provided to the DCTC scholars. Our overarching goal was to build a game that helps scholars understand, in a simple way, the experience of navigating the entire acquisition life cycle, thereby providing a foundation to make other curricular lessons easier to absorb and contextualize.

We strove to convey four learning objectives through the game. Although there are many acquisition functions that could be covered within those objectives, we deemed four primary elements—user needs, systems engineering, contracting, and program management—to be essential to understanding the acquisition process from a 10,000-foot view.

Table 1. Learning Objectives Supported by the Acquisition Game

Recognize the operational user's role in the DoD acquisition process.	Explain the general elements that go into an acquisition strategy.
Identify and discuss the major components and processes of contracting and criticality of market research.	Recognize the broader group of stakeholders who have equity in acquisition outcomes.

In developing the board game, we decided to compress the four primary elements into three phases: determining the technical solution, selecting a contracting approach, and managing the program scholars receive the requirement in the game instructions, but then immediately face the complex user engagement considerations of how to meet those requirements. As the game board turns to the contracting approach phase, scholars are introduced more directly to different elements of the contracting process. Details were written on the playing cards and incorporated into game play to support learning objectives and foster absorption of some of the more arcane aspects of government contracting.

The number of different scenarios in the typical execution of an acquisition program is vast, so we had to design the management phase of the board to reflect these complexities. We crafted a series of playing cards, each representing an event that could reasonably happen in execution. These included both positive and negative outcomes such as contractor management turnover or conversely having a successful testing event. Scholars select different cards at random introducing an element of chance into the game to simulate the reality that certain factors are outside the control of the acquisition professional.

The game also includes several decision points or major activities to simulate the reality of a typical acquisition program: a Leadership Review to emulate an Acquisition Strategy Review (or Panel); a Protest Status to emulate the potential for a contract to be protested; a Requirement Change to emulate the reality of an Engineering Change Proposal due to a shifting user need or a new threat; and finally a Fielding Decision to represent user acceptance of the system and satisfaction of criteria (i.e., Initial Operating Capability) to operationally field the capability as the culminating action of the game.

Figure 2. The Acquisition Game Phases

Game Play

The Acquisition Game is played in the context of a recent wildfire that has devastated the Arctic and Siberia, leaving many stranded without adequate resources (water, food, and shelter). The players represent a team supporting DoD operators who are coordinating a response and providing military situational awareness capabilities.

Scholars start the game with a set allocation of chips that represent individual units of cost, schedule, and user satisfaction (Figure 3). The goal of the game is to acquire the maximum number of user satisfaction chips without exhausting the cost or schedule chips. At the conclusion of the game, cost and schedule chips can be exchanged for user satisfaction chips at a 2:1 ratio. The player with the most chips wins. For more details on the game board, see Appendix A.

Starting Balance. Each player or team begins with:

10 Schedule Chips

10 Funding Chips

8 User Satisfaction chips

Exchanging Chips. If, during the course of the game, you are low on any particular chip, **the exchange rate is 2:1. *You must give up 2 of the same type*. *If you only have 1 chip, it cannot be used in an exchange.***

Figure 3. Allocation of Chips

Scholars begin gameplay by reviewing the provided set of user requirements (Figure 4). The complexity introduced here is that some requirements are mandatory and some are discretionary. It is up to each team to decipher, from the language, which are most important. The bolded text provides hints.

The requirement process includes tradeoffs that must be considered to deliver the most viable solution available. Relevant requirement information is below:

A typical operation is executed in 2 weeks with 24-hour coverage.

The typical coverage range **required** for a humanitarian mission from the main operations center to affected areas is 50 miles.

Roughly 60% of humanitarian operations occur in degraded weather conditions.

The budgeted cost of a typical humanitarian operation (excluding logistics) including all operational costs is $5 million.

A 10 sq/m resolution image or better is **required** to provide the information needed to generate viable courses of action. Image storage requires at least 1TB through a mission.

Statutorily **required** to maintain 85% availability or better of its sensing capability.

Figure 4. System Requirements

After reviewing the requirements, each team considers different technical solutions that could satisfy the user's needs (Figure 5). This process is not dissimilar to the Analysis of Alternatives that an acquisition program might support. Another complexity introduced here is that no solution will be able to fully satisfy the requirements. Instead, there will be a need for additional system capability, which we term Technical Solution Enhancements (Figure 6).

These additional features represent some typical tradeoffs that would occur during a Preliminary or Critical Design Review, where government, contracting teams, and users discuss the various options and the associated cost and schedule implications. To emulate reality, there are cost and schedule penalties (handing in chips to the banker) for adding enhancements (Figure 6). Another element of the Technical Solution Phase is to choose a development approach that encompasses decisions about how engaged the government plans to be throughout the engineering and design process (Figure 7).

Solution	Qty (100 sq/m)	Availability	Resolution	Range	Weather Tolerance
UAV Swarm	100	85%	10 sq/m	40 miles	High
UAV Fleet	10	80%	5 sq/m	100 miles	Moderate
Satellite	N/A	75%	20 sq/m	N/A *meets requirement*	Low

*NOTE: **No solution meets all the requirements, you will need to combine a technical solution with a solution enhancement(s) cards.**

Figure 5. Technical Solutions

Technical Solution Enhancements
(Front)

TECHNICAL SOLUTION ENHANCEMENT

INCREASE RANGE
TECHNICAL SOLUTION ENHANCEMENT

Modify commercial solution to increase range by **10 miles.**

⏱ -1 💲 -1 🙂 +1

IMPROVE AVAILABILITY
TECHNICAL SOLUTION ENHANCEMENT

Modify commercial solution to improve availability an **additional 5%.**

⏱ -1 💲 -1 🙂 +2

IMPROVE COVERAGE
TECHNICAL SOLUTION ENHANCEMENT

Modify commercial solution to improve coverage by **5 sq/m.**

⏱ -1 💲 -1 🙂 +1

Technical Solution Enhancements
(Back)

Figure 6. Technical Solution Enhancement Cards

Development Approaches
(Front)

DEVELOPMENT APPROACH

GOVERNMENT DEVELOPED
DEVELOPMENT APPROACH

Utilize organic (military and civilian) talent for development. Minimal to no outside support from industry.

⏱ -3 💲 -1 🙂 +2

HYBRID
DEVELOPMENT APPROACH

Government-led development. Government with significant support from industry (provides increased access to technical talent) develops solution.

⏱ -2 💲 -2 🙂 +1

COMMERCIAL
DEVELOPMENT APPROACH

To select, you must first roll: 1, 3, 5

Industry-led development with Government oversight only, no development support (i.e. no hands on keyboard).

⏱ -2 💲 -2 🙂 +1

Development Approaches
(Back)

Figure 7. Development Approach Cards

In the contracting phase of the game, there are three primary sets of choices to be made. These include selecting a market research approach, a contracting methodology, and a contract type (Figures 8–10). These various decisions represent the process a contracting officer will engage with the broader program team. As with any acquisition program, there are certain benefits and negatives associated with each decision, which in real life leads to optimiz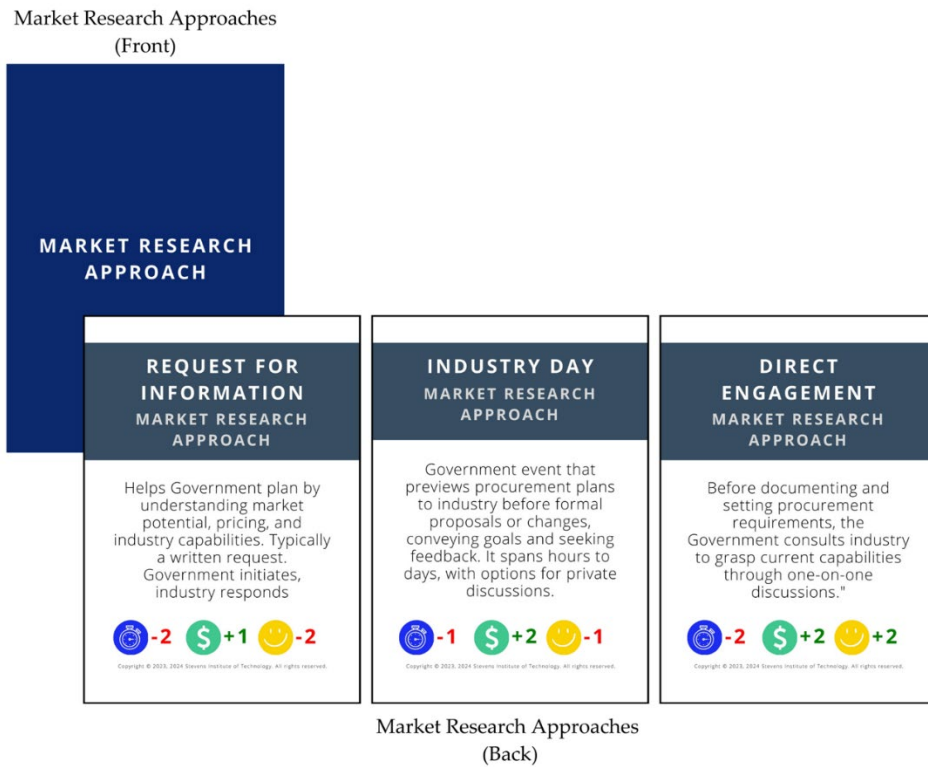ed and sub-optimized contracting strategies. The cards in this phase also represent the potential interdependencies between an earlier decision and a future one. For example, making the choice to use Federal Acquisition Regulation (FAR) Part 12 as the contract approach is predicated on the decision to select a commercially oriented development approach. While by no means comprehensive, this phase of the game provides scholars with an important overview of the steps and decisions involved.

Figure 8. Market Research Approach Cards

Contract Approaches
(Front)

CONTRACT APPROACH
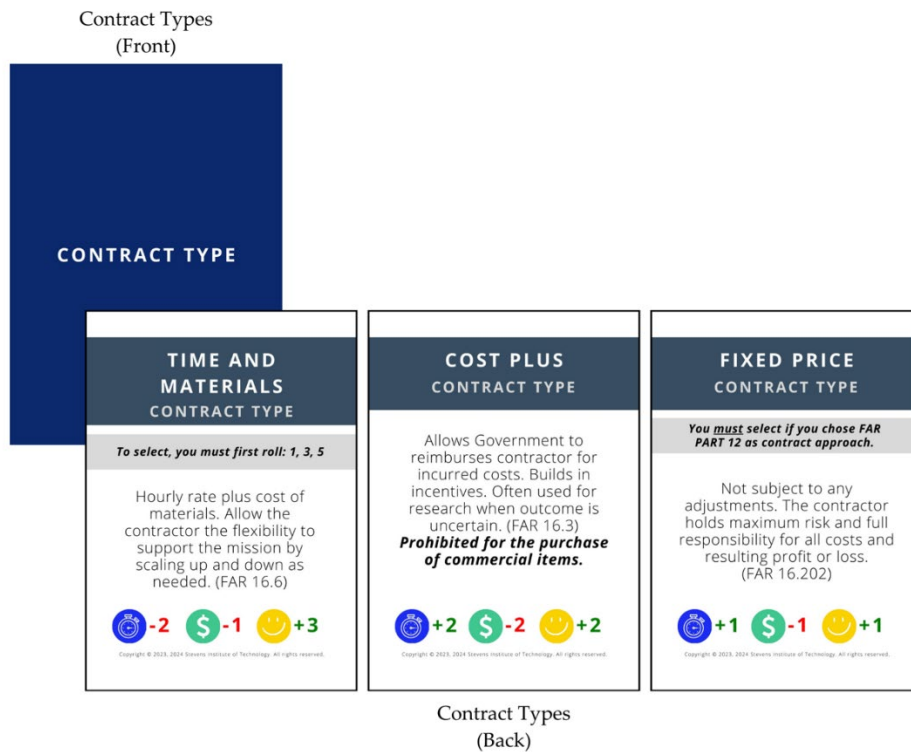
FAR PART 15
CONTRACT APPROACH

Contracting by Negotiation.
The process for awards over $7.5 million (Simplified Acquisition Procedures Threshold) for competitive and sole source (non-competitive) acquisitions.

⏱ -2   💲 +1   🙂 -2

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FAR PART 12
CONTRACT APPROACH

Option to select only if chose commercial development.

Acquisition of Commercial Products and Services.
Preferred method for acquiring commercial products & services aligns with commercial marketplace. Drives contract type: *Firm-fixed price contracts required.*

⏱ -1   💲 +1   🙂 -1

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OTHER TRANSACTION (OT)
CONTRACT APPROACH

To select, you must first roll: 1, 3, 5

Non-FAR vehicle, offering flexible acquisition options to attract both new & established defense contractors by employing commercial industry business strategies.

⏱ -1   💲 +1   🙂 +2

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Contract Approaches
(Back)

Figure 9. Contract Approach Cards

Contract Types
(Front)

CONTRACT TYPE

TIME AND MATERIALS
CONTRACT TYPE

To select, you must first roll: 1, 3, 5

Hourly rate plus cost of materials. Allow the contractor the flexibility to support the mission by scaling up and down as needed. (FAR 16.6)

⏱ -2   💲 -1   🙂 +3

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COST PLUS
CONTRACT TYPE

Allows Government to reimburses contractor for incurred costs. Builds in incentives. Often used for research when outcome is uncertain. (FAR 16.3)
Prohibited for the purchase of commercial items.

⏱ +2   💲 -2   🙂 +2

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FIXED PRICE
CONTRACT TYPE

You must select if you chose FAR PART 12 as contract approach.

Not subject to any adjustments. The contractor holds maximum risk and full responsibility for all costs and resulting profit or loss. (FAR 16.202)

⏱ +1   💲 -1   🙂 +1

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Contract Types
(Back)

Figure 10. Contract Types Cards

In the management phase of the game, there are no decisions or choices to make. While this is not a direct emulation of the execution of an acquisition program, it does introduce scholars to scenarios they are likely to encounter. The number of events that teams face in the game is dependent on their roll of the dice and what spaces they land on, which have mandatory card selections ranging from zero to two.
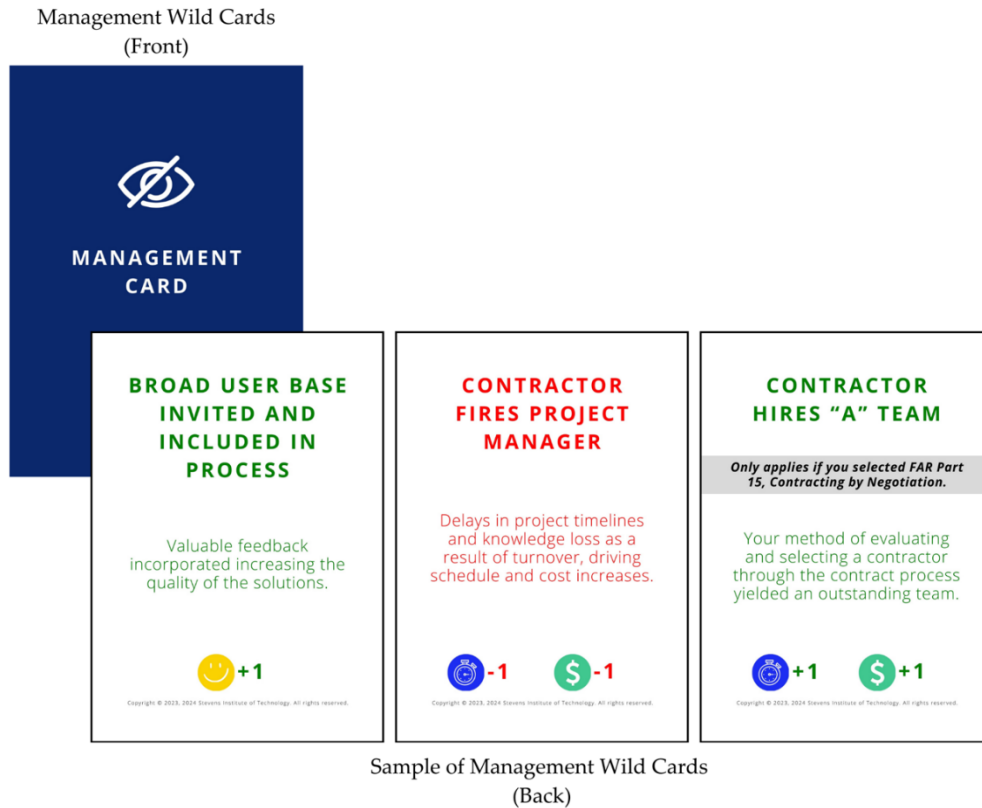
Figure 11. Management Card Example

In the game's final move, each team encounters a Fielding Status event that is decided by the dice roll. The roll of certain numbers will indicate success, other numbers will result in a penalty. This game play directly represents the process that acquisition professionals face when attempting to operationally field a capability. When the user imposes subjective criteria, initial success is not always guaranteed at the end of the process (Figure 12).

Figure 12. Fielding Status

Feedback

The Acquisition Game has been played in multiple venues, including with a broad range of senior acquisition professionals from across the Services. Their feedback was positive but came with serious suggestions for improving the fidelity of the game. The sponsoring officials from the Office of the Undersecretary for Acquisition and Sustainment (OUSD/A&S), have also played the game and observed that game play can meaningfully serve the DCTC curriculum.

Recently, the DCTC team attended Nexus, an event co-sponsored by the National Contract Management Association (NCMA) and the Defense Acquisition University, to play the Acquisition Game with conference participants from across government and industry and invite their feedback. Twelve participants responded to the survey after playing the game more than once. The feedback (five responses from industry and seven from government) was overwhelmingly positive, with the large majority finding it to be helpful across different measures. When asked what they liked most about the game, the general response was that it was realistic, fun, and interactive. This demonstrates some level of success in achieving our initial goals.

Table 2. Survey Results from the NEXUS Conference

Survey Question	Result
The game accurately portrays the DoD acquisition process.	11 Agreed or Strongly Agreed
Indicate the level of benefit you believe the game offers for new hires.	6 chose Very Beneficial with 3 choosing Beneficial
Playing the game helped me understand some terms and concepts that I need to explore further.	10 Agreed or Strongly Agreed
Overall, the game was an instructive experience.	10 Agreed or Strongly Agreed

The most important feedback has come from the DCTC scholars. After playing the game multiple times as part of classroom learning, the feedback has been highly positive. Some of the statements (see below) we received from scholars reaffirmed the importance of interactive learning in the DCTC experience.

"With the Acquisition Game, learning the acquisition process is not only educational but also enjoyable. Working through the procurement process can be daunting but with the acquisition game's realistic scenarios, we were able to use critical thinking, strategic decision-making, and teamwork to create strategies and learn hands-on."—**Faith Jones, DCTC Scholar at Virginia Tech.**

"The Acquisition Game is an engaging board game that transforms the complex world of government acquisitions into an accessible and enjoyable learning experience. It cleverly combines strategy and education, allowing players to immerse themselves in a realistic scenario and acquisitions in a playful yet informative way."—**Sangmuk Kang, DCTC Scholar at Virginia Tech.**

"The Acquisition Game is a riveting board game which highlights the intricacies of the DoD acquisition process and delivers it to players in a fun, competitive, and never before seen format as they traverse various acquisition pathways to accomplish the mission at hand. Every choice matters, and by the end of the process you'll have not only had fun, but also attained a deeper understanding of the U.S. Department of Defense."—**Marco Antonio Cortes Esparza, DCTC Scholar at University of Arizona.**

"The Acquisition Game merged teamwork, realistic challenges, and government complexities seamlessly."—**Katlind Michele Nearing, DCTC Scholar at University of Arizona.**

"The Acquisition Game was very insightful and fun once we got the hang of things. It was a struggle to figure out what was the objective, but when we did it all came together and made sense. It helped me understand how satisfaction, time, and money play a part in the real world."—**Tamara Daye, DCTC Scholar at North Carolina A&T**

"Participating in The Acquisition Game gave me a better understanding of the addition and procurement process regarding acquisition. The game allowed me to collaborate with my fellow scholars and learn how to balance competing priorities and navigate difficulties effectively. Engaging with peers showed me the importance of teamwork

when addressing challenges in a DoD perspective."—**Justin Reid, DCTC Scholar at North Carolina A&T**

Next Steps / Potential Future States

The DCTC curriculum team has accumulated a list of improvements from the various feedback sources and we will continue iterating on The Acquisition Game to refine aspects and build in additional layers of complexity for more advanced players. Additionally, we are working with the Army Gaming Studio to build out a video game version, which will provide options for injecting additional acquisition considerations including personae, role-playing different functions, and making risk management a greater focus point.

The DCTC curriculum team has also begun designing related games such as an Industry Game that emulates the decisions a company makes when deciding to work with the government and/or bid on a request for proposal. There are also plans to build a PPBE (Planning, Programming, Budgeting and Execution) Game that emulates the defense resourcing process for DCTC scholars to play in the final semester of their curriculum.

The Acquisition Game experience has given those involved in the DCTC curriculum a better sense of the potential for gaming in defense acquisition training and we expect it to become a core part of the DCTC curriculum to prepare scholars to enter the acquisition workforce and begin contributing to the many challenges that require solutions.

References

Asal, V., Jahanbani, N., Lee, D., & Ren, J. (2018, October). *Mini-games for teaching political science methodology*. Cambridge University Press. https://www.cambridge.org/core/services/aop-cambridge-core/content/view/2CB21D4F2FAC326F9FE0B663D23F5393/S1049096518000902a.pdf/minigames_for_teaching_political_science_methodology.pdf

Ávila, P. M. (2023, January 27). *From baby boomers to generation Z: Understanding the learning styles of different age groups.* LinkedIn. https://www.linkedin.com/pulse/from-baby-boomers-generation-z-understanding-learning-m%25C3%25A9ndez-%25C3%25A1vila/

DAU. (n.d.). About. https://www.dau.edu/back-to-basics

Department of Defense. (2021, September 30). *Defense acquisition workforce key information.* https://www.hci.mil/docs/Workforce_Metrics/FY21Q4/FY21(Q4)OVERALLDefenseAcquisitionWorkforce(DAW)InformationSummary.pdf

Department of Defense. (2024). *DoD acquisition workforce hiring authorities as of 1 February 2024*. https://www.hci.mil/docs/DoD%20Acquisition%20Workforce%20Hiring%20Authorities%20as%20of%20February%202024.pdf

Levine, P. (2019, May 6). Building a 21st century defense acquisition workforce. *War on the Rocks.* https://warontherocks.com/2019/05/building-a-21st-century-defense-acquisition-workforce/

McCabe, K., & Laurent, A. (2015, April 3). *The real problem with acquisition training*. Government Executive. http://www.govexec.com/contracting/2015/04/real-problem-acquisition training/109138/

Murphy, C. & Bouffard, A. (2017, April 26). *Understanding defense acquisition workforce challenges*. Mitre. https://www.mitre.org/sites/default/files/publications/17-1585-understanding-defense-acquisition-workforce-challenges.pdf

Office of the Under Secretary of Defense for Acquisition and Sustainment. (n.d.). *Defense civilian training corps*. https://dctc.mil