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TRAINING IN INNOVATION AND EMERGING TECHNOLOGY ADOPTION

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Table of Contents

List of Figures

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Executive Summary

Innovation is the development of a new or significantly changed service, product, process, structure, or policy. Adoption occurs when change agents have identified, developed or acquired, integrated, and leveraged the value of a new innovation. Change agents include innovators, facilitators, leaders, and users.

In response to Congressional tasking, the Defense Acquisition University (DAU) contracted with the Acquisition Innovation Research Center (AIRC) through the Systems Engineering Research Center (SERC), a Department of Defense sponsored University Affiliated Research Center, to conduct a study and report on the status of innovation and emerging technology adoption training programs available to Department employees (government civilians, contractors, and active duty). AIRC researchers from the Virginia Tech Applied Research Corporation (VT-ARC) prepared a comprehensive review of the topic through literature reviews, interviews, and surveys. Drawing from the broader study, this report presents the status of the Department, academia, and industry innovation and emerging technology adoption training programs while specifically addressing the five enumerated items requested by Congress.

Academic literature offers that innovation is an effort to recognize and implement ideas to "create something of value"[i] during a knowledge-centric process across multiple systems.[ii] To ensure this report is aligned with the literature, innovation is defined as the development of a new or significantly changed service, product, process, structure, or policy. Based on additional literature review findings, the team developed a study framework to identify and assess innovation and technology adoption training programs across the Department, academia, and industry. The team applied a three-part data collection approach: open-source search, targeted interviews, and survey. Analysis was then conducted on the following categorical variables: Training Type (DAU, DoD, non-government), Innovation Phase (identification, acquisition, integration), Functional Area

(the DAU taxonomy), and four of the five categories of Change Agent[1] (innovator, facilitator, leader, and user). VT-ARC then summarized this data to identify potential gaps in the curriculum identified as relevant to the study.

Results suggest that the three functional areas that have the fewest traditional learning opportunities include contracting, life-cycle logistics, and test and evaluation. Each of these functions play a critical role in the innovation and technology adoption journey. DoD staff performing these functions have limited opportunities to understand their role in the adoption process and the agility required to facilitate critical innovation and emerging technology integration and operationalization.

A detailed description of the types of training programs already underway that support innovation and emerging technology as well as a list of the Department and private sector organizations providing the training programs are included in Appendix A. Metrics are not collected regarding workforce performance following participation in any training program. Also, no data were identified that support the analysis of the relationship between the adoption and innovative contracting methods to a given training program.

One of the most interesting study findings is that there are no training opportunities that integrate the necessary interconnection between relevant career fields to provide a unified understanding of the overarching innovation in emerging technology pathway or process. This lack of knowledge impacts acquisition effectiveness and was identified during interviews as critical. Providing cross-organization and cross-functional learning opportunities will enhance the understanding of roles and responsibilities and will improve information flow across stovepipes, combating “cylindrical thinking”. In depth interviews also identified five other key points: processes and policies have great impact on adoption; tailored training to target specific gaps is necessary; workforce development is a critical enabler; culture has an outsized impact on adoption; and seams between organizations create boundaries to innovation and emerging technology adoption.

While two organizations are actively building new curriculum related to innovation and emerging technology adoption, neither is resourced to address additional gaps identified in this study. No data on other organizations’ program expansion was available to the study team. Based on the rolling nature of course development, it is likely that there will be additional traditional learning opportunities available. This also implies that some curriculum will no longer be offered with little to no warning.

The study concludes that the lack of an overarching Department emerging technology innovation training strategy encourages systemic cylinders of excellence. As a result, numerous independent organizations take isolated initiatives to develop their own distribution of training resources in alignment with Department operational challenges, some more effective than others. While important at the tactical edge, these cylinders of excellence do not translate into a Department-wide staff capability as the seams between organizations create barriers to critical knowledge transfer. It is recommended that a Department Training Strategy for Emerging Technology Transition be developed and championed by senior leaders with support across the Department at all echelons.

[1] The fifth change agent, organization, was not identified as a training target group.

Background

A review of the literature shows that defense-related innovation has existed since the dawn of humanity. Longitudinal studies identified wave patterns featuring innovation clusters[iii] which become particularly evident starting with the 18th century industrial revolution. Over time, the innovation waves developed higher peaks and became shorter in duration, implying a more rapid innovation development cycle. This increased pace reinvigorated an appreciation for the role innovation plays in our nation's defense, creating a "heightened consciousness to coalesce efforts to do new things using new tools and techniques of today in preparation for tomorrow"[iv].

The associated pressure to innovate at the pace of relevancy requires a clear understanding of the full meaning of innovation and challenges to adoption. Despite its common use across organizations and industries, individuals and organizations use the term innovation to mean different things, oftentimes equating it to a tangible product or technology. Academic literature offers that innovation is an effort to recognize and implement ideas to "create something of value"[v] during a knowledge-centric process across multiple systems.[vi] To ensure this report is aligned with academic research, we define innovation as the development of a new or significantly changed service, product, process, structure, or policy.[2] This definition integrates innovative shifts in technology.

Innovation may be incremental, architectural, radical, or disruptive.[vii] Although based in economic and business theories, these innovation types are relevant to our nation's defense. Incremental innovations create minor improvements to existing programs or products as occurs during standard weapon life cycle replacement. Architectural innovation combines existing innovation categories' components in a novel way, such as with the Joint Warfighting Concept. A disruptive innovation is a new service, product, process, structure, or policy that creates an outsized impact on an existing system as occurred with the invention and technology transition of digital cameras which increased intelligence cycle speed. A radical innovation is a new service, product, process, structure, or policy that changes the way we defend our nation. Examples include but are

Figure 1: Innovation Categories

[2]The innovation categories are defined as: service (an offering that does not involve manufacturing goods), product (manufactured or refined goods), process (a formalized series of actions or steps taken to achieve a particular end), structure (organizational system that determines roles, responsibilities, and information flow), and policy (an implemented procedure or protocol)

not limited to the submarine, airplane, and tank. Figure 2 shows an overview of modern Department innovation eras.

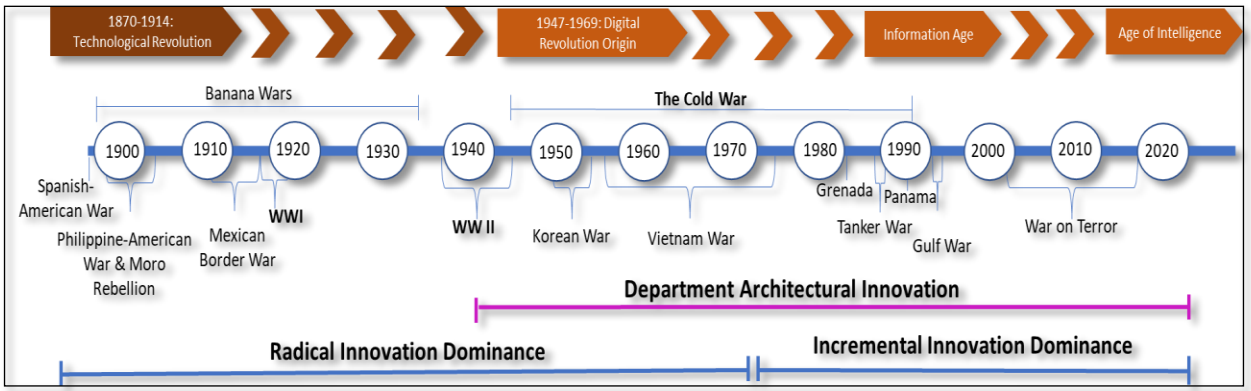


Figure 2: Department Innovation Eras

Legacy sectors are structured to resist or block innovations that radically change or disrupt their model. Without a forcing function, such as an impending high intensity peer/near-peer (P-NP) conflict, the services within the Department function as legacy sectors, innovating in ways that align with the perception of their role in our nation's defense and a vested interest in protecting their paradigm.[viii] Although there is a tendency to criticize the Department's recent innovation record, we should not imply that the Department fails at innovation. The system was designed to successfully integrate incremental and architectural innovations and features a long history of radical and disruptive innovation integration when under pressure. With the increased pace at which emergent technology inspires new innovations, the urgent need remains to identify ways to gain efficiencies through the innovation process without losing sight of the standards required for implementation.

Navigation of the innovation/technology adoption process requires innovation change agents (organizations, leaders, users, facilitators, and innovators) who, when combined, span all the requisite innovation systems and enable critical knowledge transfer.[3] Because innovation may occur outside an organization's domain, the innovation journey must include transfer or transition from external to internal. Therefore, the innovation and tech transition journey from inception to adoption occurs when innovation change agents identify, develop or acquire, integrate, and leverage the value of a new or significantly changed service, product, process, structure, or policy.

Successful completion of this innovation journey occurs when the innovation is adopted by the intended users. Innovation adoption, to include emergent technologies, has a rich history of study which identified five commonly accepted innovation attributes (relative advantage, compatibility, complexity, trialability, and observability) that impact rates of adoption.[ix] With these attributes, Rogers piloted the idea of diffusion of innovation theory. Other innovation theories include the technology acceptance model, theory of planned

[3] Innovation change agents are defined as: Organization(a structured entity comprised of a collection of people formed to achieve a particular purpose), leader (a person with a vested interest in, authority over, and responsibility for an organization's performance), user (an individual within an organization who uses or is directly impacted by an innovation), and facilitator (an individual who helps bring about an outcome by providing indirect or unobtrusive assistance, guidance, or supervision).

behavior, and the technology-organization-environment framework.[x] All four theories recognize that it is the end-user's perception of the innovation and the structural environment that either encourages or discourages innovation and makes the largest impact on rates of adoption.

ADOPTION OCCURS WHEN INNOVATION CHANGE AGENTS IDENTIFY, DEVELOP OR ACQUIRE, INTEGRATE, AND LEVERAGE THE VALUE OF A NEW OR SIGNIFICANTLY CHANGED SERVICE, PRODUCT, PROCESS, STRUCTURE, OR POLICY.

Of note, the attributes that motivate adoption are not applicable when trying to understand innovation resistance.[xi] This may be in part because resistance "is not the opposite of adoption. Rather, adoption comes only after removing resistance."[xii] Research into innovation resistance is nascent but there is some evidence that there are four key factors that influence innovation resistance: employee-management relationship, personality traits, employee participation in the decision-making process, and job security.[xiii]

Based on both the theories of innovation adoption and research into resistance, we can assume that human capital is the "key determinant underlying the innovation process".[xiv] Organizations use training and development to empower specific worker competencies ranging from hard to soft skills.[xv] Consistently, formal training demonstrates a positive impact on innovation adoption[xvi] and on-the-job training has been shown to be equally impactful.[xvii] Such trainings can affect individual creativity and "federate collective action" which is necessary for an organization to integrate radical and disruptive innovations. [xviii] We can therefore assert that formal training, when accompanied with on-the-job training, can generate the environment required to integrate innovations, including emergent technology, at the pace of relevancy.

P/N-P competitors successfully conduct "external technology and knowledge transfers" from both foreign and domestic sources and are rapidly closing the capability gap.[xix] Technical advances, particularly in the fields of machine learning and artificial intelligence, are "changing the knowledge structures from which military technological trajectories develop."[xx] The rise in P/N-P capabilities combined with a recognized domestic institutional resistance to radical and disruptive innovations presents a forcing function that requires a review of innovation adoption and tech transition related trainings available to and used by the Department.

Study Design

The study design centered around the completion of five tasks:

(1) Describe the types of training programs already underway on these subjects and the professional series of the participants;
(2) Report metrics collected on workforce performance following each program (to include the rate of adoption of emerging technologies and innovative contracting methods);
(3) Develop a list of the Department and private sector organizations providing the training programs;
(4) Describe of any plans to expand the training programs; and

(5) Discuss of any authorities or funding needed to support expanded trainings.

VT-ARC developed a framework, based on data life cycle stages, to identify and assess innovation and technology adoption training programs across the Department, academia, and industry. While the initial intent was to create a comprehensive list, it was immediately clear that any list would represent a snapshot in time as new industry and academic courses were continually emerging while others were removed. As a result, the team determined the most impactful method would to be create as comprehensive a list as possible within a specific time window and ensure that the selected programs encapsulated a representative sample of trainings upon which to conduct analysis.

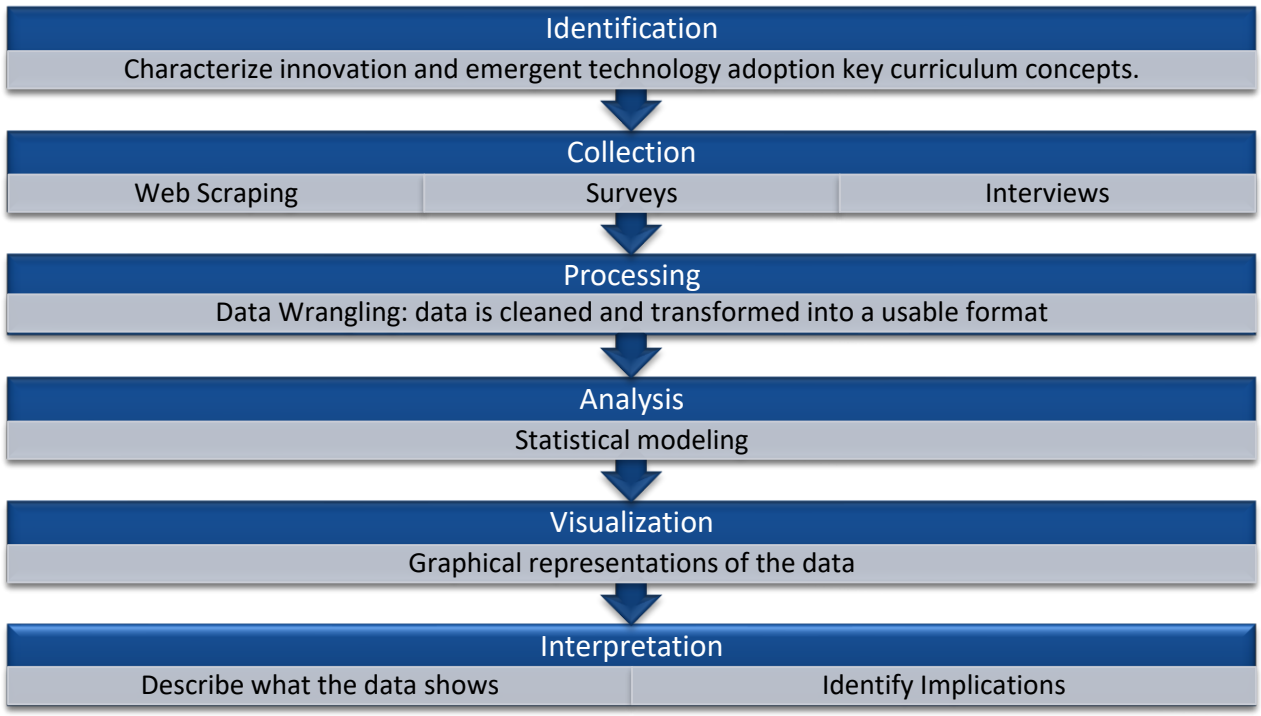


Figure 3: Study Framework

Study Findings

IDENTIFICATION

Following review of the literature, the VT-ARC team codified the innovation study definition as the development of a new or significantly changed service, product, process, structure, or policy. These innovation categories were further defined as:

- Service: an offering that does not involve manufacturing goods;
- Product: manufactured or refined goods;
- Process: a formalized series of actions or steps taken to achieve a particular end;
- Structure: organizational system that determines roles, responsibilities, and information flow; and
- Policy: an implemented procedure or protocol.

Innovation may be incremental, architectural, radical, or disruptive. Emerging technologies can be grouped into one of these innovation types. For the purposes of this report emerging technology is called out because of the phrasing of the research questions while in the academic literature it is nested in the innovation dialogue.

Innovation adoption, technological or otherwise, has five phases: inception, identification, acquisition and/or development, integration, and adoption. (See Figure 4.) Historically, the Department played a lead role in innovation generation because government employees served as thought leaders for emergent technology and groundbreaking innovation. While the Department still maintains staff who are focused on innovation, incubation, and development, most modern defense innovation originates in industry and, in some cases, academia. As a result, the phases of innovation adoption must be applicable to either internal or external generation. The adoption journey is considered complete once the innovation is accepted by the intended users following the integration into policy and procedures.

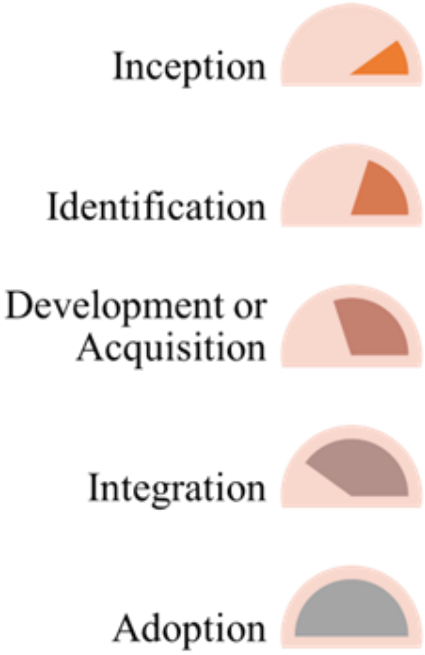


Figure 4: Innovation Adoption Phases

Each phase features change agents. The study identified five categories of change agents:

- Organization: A structured entity comprised of a collection of people formed to achieve a particular purpose.[4]
- Leader: A person with a vested interest in, authority over, and responsibility for an organization's performance.
- User: An individual within an organization who uses a service, product, or process and is directly impacted by structure or policy.
- Facilitator: An individual who helps bring about an innovation outcome by providing indirect or unobtrusive assistance, guidance, or supervision.
- Innovator: An individual or team who initiates the conceptualization and/or development of a new or significantly changed service, product, process, structure, or policy.

As most of the Department's efforts in relation to innovation are as facilitators,[5] and acquisition community leads the facilitation for a majority of the innovation and emerging technology adoption process, this category was further sub-divided to ensure accurate

[4] Organization was not identified as a training target group in the collected data.

[5] According to DoD Civilian Careers (https://www.dodciviliancareers.com/civiliancareers) there are over 675 different DoD occupations which fall into the following categories Business, Industry, Program Management and Analysis; Cyber and Information Technology; Environmental Management; Facilities Engineering; Human Resources; Intelligence; Logistics; Medical, Health, and Wellness; Military Community and Family; Public Health, Mental Health, and Social Sciences; and Quality Assurance.

analysis of key personnel. The facilitator sub-divisions included: auditing, business-financial management and cost estimating, contracting, engineering and technical management, life cycle logistics, program management, and test and evaluation.

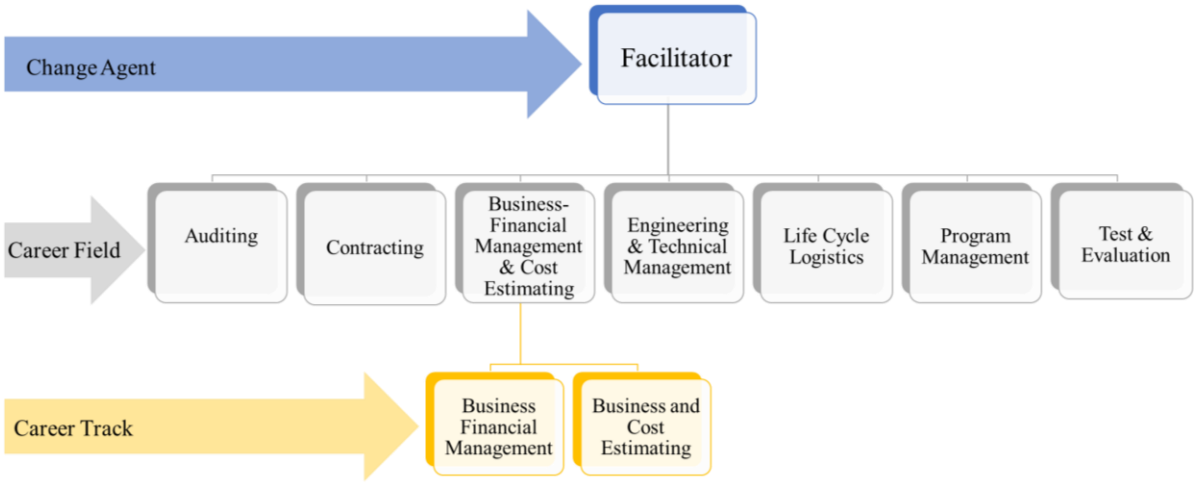


Figure 5: Facilitator Acquisition Functional Areas & Career Tracks

Using the innovation phases, change agents, and categories, VT-ARC began the identification process of appropriate resources to provide the data that would illuminate the innovation adoption phase, category, and change agents impacted by each training in the representative sample. The team targeted Government training programs, universities known to educate Department employees, and industry programs associated with Department efforts.

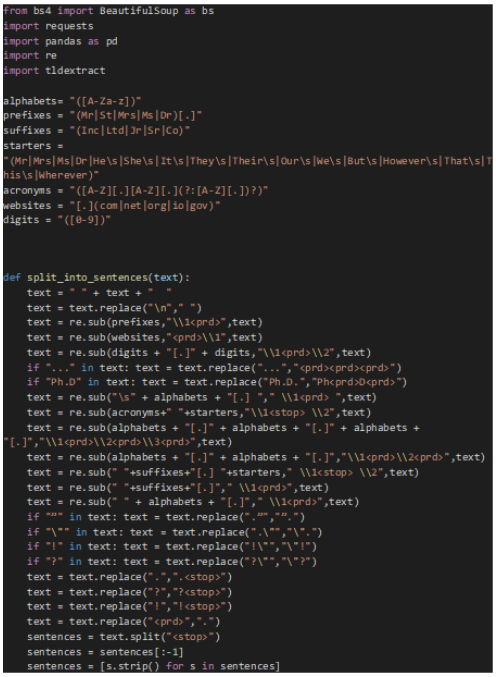
COLLECTION

The lack of an existing database for Department, academic, and/or industry trainings required VT-ARC create a three-part data collection plan: Web search, Interviews, and Survey.

Web search

To collect the various data points of interest, several methods were explored, including natural language processing. Due to constraints and irregularity of the data points, VT-ARC selected a manual approach combined with Python (see Figure 6).

The team determined institutions update courses on a rolling basis and shifted efforts from building a comprehensive list to creating a representative sample. The interim report representative sample features 131 courses from DAU, defense-focused graduate schools, defense-focused innovation centers, and the top 20 U.S. engineering schools. The final report included 127 formal training opportunities as several of the interim report courses did not have sufficient data to be included in the analysis.



```
from bs4 import BeautifulSoup as bs
import requests
import pandas as pd
import re
import tldextract

alphabets= "([A-Za-z])"
prefixes = "(Mr|St|Mrs|Ms|Dr)[.]"
suffixes = "(Inc|Ltd|Jr|Sr|Co)"
starters =
"(Mr|Mrs|Ms|Dr|He\s|She\s|It\s|They\s|Their\s|Our\s|We\s|But\s|However\s|That\s|T
his\s|Wherever)"
acronyms = "([A-Z][.][A-Z][.](?:[A-Z][.])?)"
websites = "[.](com|net|org|io|gov)"
digits = "([0-9])"



def split_into_sentences(text):
    text = " " + text + "  "
    text = text.replace("\n"," ")
    text = re.sub(prefixes,"\\1<prd>",text)
    text = re.sub(websites,"<prd>\\1",text)
    text = re.sub(digits + "[.]" + digits,"\\1<prd>\\2",text)
    if "..." in text: text = text.replace("...","<prd><prd><prd>")
    if "Ph.D" in text: text = text.replace("Ph.D.","Ph<prd>D<prd>")
    text = re.sub("\s" + alphabets + "[.] "," \\1<prd> ",text)
    text = re.sub(acronyms+" "+starters,"\\1<stop> \\2",text)
    text = re.sub(alphabets + "[.]" + alphabets + "[.]" + alphabets +
"[.]","\\1<prd>\\2<prd>\\3<prd>",text)
    text = re.sub(alphabets + "[.]" + alphabets + "[.]","\\1<prd>\\2<prd>",text)
    text = re.sub(" "+suffixes+"[.] "+starters," \\1<stop> \\2",text)
    text = re.sub(" "+suffixes+"[.]"," \\1<prd>",text)
    text = re.sub(" " + alphabets + "[.]"," \\1<prd>",text)
    if "”" in text: text = text.replace(".”","”.")
    if "\"" in text: text = text.replace(".\"","\".")
    if "!" in text: text = text.replace("!\"","\"!")
    if "?" in text: text = text.replace("?\"","\"?")
    text = text.replace(".",".<stop>")
    text = text.replace("?","?<stop>")
    text = text.replace("!","!<stop>")
    text = text.replace("<prd>",".")
    sentences = text.split("<stop>")
    sentences = sentences[:-1]
    sentences = [s.strip() for s in sentences]
```

Figure 6: Python Script

Interviews

Early in the study, VT-ARC completed interviews with two organizations: Office of Naval Research (ONR) and Naval Special Warfare Command (WARCOM). The purpose of these interviews was twofold, to develop a collaborative innovation/technology adoption community of interest and to gather information for how Department operational and research organizations are addressing innovation/technology adoption challenges.

To address data collection challenges the team adapted the study plan to expand the interview pool to get a representative Joint sample with organizations at different levels of leadership and individuals with varying management roles. Dr. Maegen Nix, the study principal investigator, conducted additional interviews with representatives from the Army Research Laboratory, the Air Force Research Laboratory, and the office of the Deputy Assistant Secretary of the Navy – Research, Development, Test & Evaluation (DASN RDT&E).

Details from each of the five interviews are provided in the following sections.

Initial Interviews

Office of Naval Research

The ONR interviews highlighted five lines of effort related to innovation/technology adoption training.

- Unmanned Task Force
    - The Unmanned Task Force is a U.S. Navy cross-functional team chartered to explore unmanned solutions to critical operational problems. While focused on technical solutions the organization is also embracing the innovation lens to achieve agile funding mechanisms to enable rapid

development in targeted, but dynamic, areas. Training to enhance innovation/technology adoption is integrated into the program and is offered via a contract with BMNT (BMNT | Rise above the status quo). In addition to multiple Department commands, BMNT supports National Institutes of Health, the Central Intelligence Agency, Federal Emergency Management Agency, and the Transportation Security Administration.

  - The Unmanned Task Force is chartered to "[c]o-lead & co-design the organizational constructs, incentive structures, and collaborative mechanisms to institutionalize Disruptive Innovation across the Dept. of Navy (DoN); synthesize & generalize lessons learned; and design experiments to address systemic DOD-wide barriers…[and] Provide technical and organizational leadership for the strategy and execution of DoN activities in the intersection of autonomy, artificial intelligence, and unmanned systems."[xxi]
  - No data was available for training effectiveness.

- SCOUT Program
  - The ONR SCOUT program is "an ongoing, multiagency experimentation campaign to identify new ways to bring unmanned technologies to warfighter problems, test them in realistic operating conditions and get them to the fleet and force. SCOUT is committed to partnering with industry to get nontraditional, commercial-off-the-shelf, government-developed and/or government-sponsored technologies to the fleet rapidly."[xxii] As with the Unmanned Task Force, BMNT provided training is integrated as part of SCOUT implementation.
  - No data was available for training effectiveness.
- Innovation Education
  - Dr. Jason Stack, ONR Division Director and Unmanned Task Force Deputy Director is leading a partnership with the Naval Post Graduate School to develop innovation adoption related curriculum. The timeline for implementation was not in place at the time of the interview.
  - ONR relies on DAU trainings for their civilian workforce.
  - ONR is currently investigating the U.S. Army's relationship with Carnegie Mellon University as a potential model for enlisted corps innovation adoption trainings.
- Science Communication Training
  - Science communication training addresses the critical challenge innovators face when attempting to explain the impact or value of the project. Learning how to communicate highly technical information in a way that is accessible to non-technical audiences ensures sponsors are

able to make informed decisions for programmatic investments. ONR offered training in strategic and risk communications upon request and has offered media training; however, currently ONR is not staffed to support these trainings due to staff reductions. Mr. Robert Freeman, ONR Corporate Strategic Communications Director, is currently conducting an evaluation of science communication trainings to provide a detailed analysis of options. These contracted trainings would be specifically targeted at the innovator change agent and intended to help them communicate complex concepts to decision makers to facilitate an appreciation for the innovation/emerging technology's potential operational impact. There is no reported timeline for the completion of the evaluation report.

    - Example Science Communication Training: Alan Alda Center for Communicating Science is conducting a study to evaluate the effectiveness of science communication training on scientists' attitudes toward communicating science with the public as well as the performance of specific behaviors that reflect effective public communication. Specifically, the study will evaluate the training program offered by the Alan Alda Center for Communicating Science (i.e., the Alda Method ® and its emphasis on audience engagement and improvisation-based communication training) in comparison to another science communication training programs and a control group that receives no training. Faculty, post-doc, and graduate student participants at universities will be assigned to 1 of 3 conditions (Alda workshop, non-Alda/comparison workshop, or control). Pre and post surveys on perceptions of effective science communication along with a post-workshop video recording task (where participants will be placed in a simulated science communication exercise) will be used to assess changes in science communication views and behavior among the three conditions. The study was designed based upon a preliminary analysis. The 3 conditions will have a total of 360 people (120 in each group). Sample is being drawn from 6 – 8 different R1 intuitions across the country. The research team is led by faculty at George Mason University with input from Michigan State.[6]

- Scientist to Sea Training
    - This ONR program provides innovators an opportunity to gain first-hand experience with how U.S. Navy Sailors use tactical oceanographic

[6] The Basic Research Office Vannevar Bush Faculty Fellows participated in the Alan Alda School of Communicating Science training in September 2022. A member of this research team attended the event and noted the steady improvement in fellow briefing performance over the course of the training.

information. Innovator opportunities include training at/in submarines, submarine training facilities, Anti-submarine warfare watchfloors, Naval Oceanography Operational Centers, and Undersea Warfighting Development Centers. Task Force Ocean, a Department research initiative expected to run from FY21-FY24, identifies "enhance ONR's Scientists to Sea program" as one of its near-term efforts.[xxiii] There are no data available to report programmatic measures of effectiveness.[7]

Key Interview Takeaways

- The Department is "not broken" there is an "antibody problem." The Department is a legacy sector and is therefore intended to resist change that has the potential to "break" the system.
- It is important to differentiate between types of innovation—incremental, architectural, radical, or disruptive. The current system is effective at certain aspects of innovation and struggles with others. Identifying the areas where the Department struggles and addressing those challenges is critical to maintaining our advantages over adversaries and competitors.

Naval Special Warfare Command

The interview with WARCOM staff from multiple directorates was intended to gain a foundational understanding of how the operational community was addressing innovation adoption challenges. Historically WARCOM sponsored Joint Special Operations University provided trainings for government civilians, contractors, and active duty. These trainings include topics related to policy, technical competency, and design thinking. While not necessarily directly innovation related, these training opportunities help WARCOM employees enable the Naval Special Warfare community's agility in all stages of innovation/technology adoption.

In recognition that innovation "without process is not repeatable, with a high likelihood of sideways energy"[xxiv], NSW's need to integrate innovation/technology at the speed of relevance, and innovative methods can work within existing policy, the WARCOM Resources and Requirements Directorate (N8) staff developed a strategy informed resourcing methodology, based on the Joint Innovation Enterprise Approach[xxv]. The methodology features a rapid requirements development process which integrates mission engineering as a critical enabler. This approach ensures innovation/technology initiatives are aligned to get the technologies in the warfighters' hands quicker, avoids data/innovation silos, and prevents the initiative from impacting funding for other critical programs. While not yet formally implemented as a policy, the WARCOM N8 contracts

[7] The Institute for Defense Analysis has a similar program, the (Vannevar) Bush Fellows Research Team. Fellows who participated in the BFRST program reported the experience was highly valuable in their FY24 Program Briefs.

Hard Yards (Hard Yards) as scrum master for the methodology execution and works with BMNT to facilitate one day stakeholder requirements events.

Because the strategy informed resourcing approach to agile innovation/technology adoption is still in development, there is no implemented training and no information on plans for training programs was available at the time of the interview.

Key Interview Takeaways

- There is no one size fits all training—different organizations impact innovation adoption in different ways and therefore training should be targeted to each need.
- Innovation adoption is not just about technology—it includes processes and policies. Organizations and individuals who do not adopt innovative processes and policies create roadblocks to implementation.
- There is a general ignorance of the different acquisition processes and requirements despite the availability of DAU courses. Change agents need to understand the acquisition system to navigate it effectively. Attempts to expedite innovation are derailed due to lack of understanding of process requirements.
- Individuals in different roles need to develop empathy for each other's challenges—but without a common understanding of the mission this is difficult.
- Cultural risk aversion is a major factor hampering innovation/emergent technology adoption (or even the opportunities to innovate). Overall, the acquisition message appears to be "do not take risk".
    - The Middle-tier Acquisition (MTA) process creates gray areas, intended to allow decision makers some autonomy to enable faster innovation adoption; however, successful rapid implementation is reliant on personality and risk tolerance.
    - Contracts have a large impact on implementation. The Department needs talented contracting teams that understand commander's intent and can create flexible contract that enable requirement shifts due emergent technologies. This requires training in both contracting and their role in the warfighter mission.
- Innovation/technology adoption requires flexible processes-need to break the rigid mold without "throwing the baby out with the bathwater"

Additional Interviews

Army Research Lab

The interview with the Army Research Lab representative(s) identified multiple pathways for innovation and technology adoption-related education. Of note the learning opportunities were focused on the Inception and Development stages of the adoption journey.

The first highlighted pathway was through participation in Digital Engineering Workshops through Carnegie Mellon. While not traditional education, structured workshops are a form of non-traditional learning opportunities which have the added benefit of expanding a professional network. The Army Research Lab also has civilian/military learning cohorts focused on leveraging training opportunities associated with Department technical areas

of interest. The third educational pathway is via the DAU S&T Manager training curriculum. The fourth method is during on the job training opportunities during collaborative planning and offsite events. The final identified learning opportunity pathway was through employee identified learning opportunities, which align with senior leader priorities, not already offered through Carnegie Mellon or DAU. At the time of the interview there was no known data collection plan to assess the impact of learning opportunities on staff performance or innovation/technology adoption.

The Army Research Lab interview identified two gaps in innovation/technology adoption training. First, is the lack of the basic understanding of Acquisition process. While staff members attend government prescribed training related to their career field, they do not have awareness for the way in which each career field is a part of the greater whole of Acquisition. The second gap is the lack of a "go to" learning opportunity related to what it means to be innovative. As institutions and individuals often have a local definition for innovation, the result is wide diversity in understanding and application of the concepts.

Despite the identification of the gaps, the Army Research Lab staff suggested they were far less concerned with increasing traditional training opportunities and expressed a belief that increased funding for innovative opportunities would be beneficial. These could be classified as non-traditional learning opportunities.

Key Interview Takeaways

- A fundamental understanding of Acquisition basics is critical across career fields.
- Innovative opportunities are as, and potentially more, important than traditional training.
- Assessing training impact will depend on the ability to collect appropriate data.

Air Force Research Lab

The participating AFRL staff identified an alarming lack of mentoring and a resultant loss of valuable technical staff and risk for additional losses and therefore focused on professional development for both S&Es and non-S&Es. One of the areas of focus as part of this development is to educate the staff on transitions, patents, and IP intellectual property. While most formal training is managed at the local level, the interview identified formal trainings through the small business office, technology transfer and transition office, and transformational capabilities office. Staff are also encouraged to leverage DAU and Air Force higher education offerings. The interview also revealed that it is often difficult to get access to a small, specific piece of information and to do so requires formal training that does not necessarily provide additional value for the increased time commitment. There were no known outcomes or measures of training effectiveness.

The interview shifted focus to the seams between the labs and the life-cycle management organizations. The discussion centered around the idea that it would be beneficial to bring the two communities together through formal and/or informal learning opportunities to find the space for mutual wins and facilitate movement of ideas across organization boundaries and help identify (lower case r) requirements related to sustainment in a way that engineers could incorporate into their considerations. The funding for this and other learning opportunities is less of a concern and the need for a senior leader champion is critical to the successful implementation and ability to measure its effectiveness.

Key Interview Takeaways

- Workforce development is critical to Department innovation/technology adoption success.
- Building connections with organizations who manage other portions the innovation journey is critical to overcoming “valley of death” losses.
- Inter-organizational understanding will require senior leader ownership and direction.

The Office of DASN RDT&E

At the beginning of the interview the participant(s) made it clear that their role was to set policy, provide direction and leadership but they have no operational control over the Department’s roughly 55,000 scientists and engineers. The current practice is to push training decision-making down to the local level of SYSCOMS and warfare centers, majority of them are contracting the training out. The secretarial level is developing curriculum for the DEVSECOPS community, formerly the IT and acquisition fields and currently most are ETM. The DASN RDT&E office noted that they do review the DAU catalogue and create training recommendations. For the most part, the local supervisor defines the training requirements for each billet and is responsible for maintaining an individual development plan to identify, sharpen and develop skills. In some areas, such as quantum computing, the Department is hiring and not developing a majority of the expertise although some staff are being moved through graduate programs is such disciplines.

At the secretarial level, there are no known emerging technologies without a path into and through the innovation adoption journey. The challenge is understanding how to develop and execute a coordinated training strategy across the force and prevent unnecessary redundancies and expenditures and ensure appropriate distribution of training resources. The challenges appear to be based on perspective—looking very different from the secretariate level than the local level and are likely influenced by culture but are not lacking authorities.

Key Interview Takeaways

- Responsibility for training rests with the local supervisors with direction from senior leadership.
- There is not a cohesive force-wide training strategy implementation plan
- In some cases, it is more efficient to hire skills rather than conduct higher education expertise development with existing staff.

The Marine Corps Warfighting Lab

The service’s approach to training is to blend formal and informal learning opportunities. Innovation is an iterative process where learning naturally occurs. OJT facilitates innovation at the pace of relevancy. Experimentation, wargaming, technology research and integration all require OJT. Additionally, the Service is trying to build adaptive organizations that meet the needs of the fleet. Here the focus is not on the innovative technology, rather on what innovation needs to occur to create the future infantry battalion

(e.g., MCWL IBX30)[8] and what training will look like to prepare the Marine to execute a specific role. Instead of prioritizing emergent technology adoption, instead the focus is on identifying and training the required capabilities for each role. This is the difference between "arming the man" and "manning the arms". The premise is that the Marines already have the capability to execute their roles in the current operating environment and are looking for enhancement to be prepared for the future. Performance on basic infantry skills would be available through the Assessments director.

Key Interview Takeaways

- Critical innovation for the future fight is less about the technology and more about a future Marine's required capabilities and the training necessary to achieve those requirements.
- Technology is a capability enhancement and the center of the capability.
- Training the future force is critical, if emergent technologies enhance capabilities they will be integrated.

Survey

In addition to the web search market survey, the team created a form to request further information about the non-Department courses and organizations. The questions were designed to both confirm the existing data and to generate new variables. The survey is composed of four sections:

- Identifying Information: This section provides information about the respondent, to understand their level of engagement with the courses.
- Course Information: This section provides new information about course structure and outcomes.
    - Cost and time needed to take the course,
    - Whether accreditation or certification is provided by the course,
    - The professional series of the students taking the course, and
    - What workforce post-performance metrics have been collected from course participants.
- Course Content: This section provides information about the concepts covered in the course.
    - Functional areas covered, based on the functional areas defined by DAU,
    - Innovation phases covered, and
    - The pre-requisite knowledge needed to take this course, both in terms of education and work experience.
- Future plans: This section provides information about anticipated changes to the course in question or any future updates to the organization's course offerings. It

[8] The MCWL IBX30 after action report is classified CUI and unable to be integrated into this report.

will also allow the respondent to act as a subject matter expert and identify gaps and other coursework in innovation.

This survey was sent to the course point of contact, identified during the web search. A survey transcript is included in Appendix D of this report. Most survey questions were phrased in an open-ended manner so that respondents may give as much information as possible and allow the team to gain as much insight as possible, particularly in relation to post performance metrics.

The response rate was very low (less than 10%). This precluded any useful finding of the survey results; however, the data from the responses was integrated into the existing market survey data set and is included in the analysis.

PROCESSING, ANALYSIS, AND VISUALIZATION

Only the web search data was sufficiently rich to support analysis and visualization. The interview outcomes were analyzed separately (and discussed in the interview section of the report) and used as amplifying details for the web search data, where appropriate. The low survey response rate did not support separate analysis and any amplifying details were integrated into the web search data, as appropriate.

Processing

When designing the framework into which the web search data would be inputted, all necessary variables for future analysis were considered. The data was processed in such a way as to identify a set of primary variables: targeted change agents, targeted innovation phase, and the course objectives. Targeted change agents were broken down into the following options: organization, leader, user, innovator, and facilitator. The Facilitator was further divided into acquisition professionals (contracting officer, contracting officer representatives, program managers), contracting, sustainment, test & evaluation, and facilitator (other). Targeted innovation phases are identification, acquisition, and integration.

Furthermore Excel, the program used to input the data, permits the option to select more than one criterion, such as a course that covers material on both identification and

acquisition of an innovative technology. Processing was completed through the VBA code script, shown in figure 7.[9]

Other identified information was type of course, which was composed of the following options: DAU innovation training, other Department innovation trainings, non-government innovation trainings, and other government innovation trainings. This provided the locations from which the courses were sourced. The initial list of potential organizations expected to have relevant courses can be found in Appendix B.

The subjective nature of some variables presented additional challenges. The innovation phase variable was difficult to assess, due to the lack of consistency across course descriptions, despite the application of standardized evaluation criteria. The survey was designed to help provide clarification and enable objective analysis but the low response rate made little to no impact on the available data. The lack of objectivity in the conclusions precluded most of this analysis from being incorporated into the report.

```
Private Sub Worksheet_Change(ByVal Target As Range)
'Code by Sumit Bansal from https://trumpexcel.com
' To allow multiple selections in a Drop Down List in Excel (without repetition)
Dim Oldvalue As String
Dim Newvalue As String
Application.EnableEvents = True
On Error GoTo Exitsub
If Target.Column = 3 Or Target.Column = 4 Or Target.Column = 5 Then
 If Target.SpecialCells(xlCellTypeAllValidation) Is Nothing Then
  GoTo Exitsub
 Else: If Target.Value = "" Then GoTo Exitsub Else
  Application.EnableEvents = False
  Newvalue = Target.Value
  Application.Undo
  Oldvalue = Target.Value
   If Oldvalue = "" Then
    Target.Value = Newvalue
   Else
    If InStr(1, Oldvalue, Newvalue) = 0 Then
      Target.Value = Oldvalue & ", " & Newvalue
   Else:
    Target.Value = Oldvalue
   End If
  End If
 End If
End If
Application.EnableEvents = True
Exitsub:
Application.EnableEvents = True
```

Figure 7: Adapted VBA Code Script

Analysis and Visualization

Learning opportunities come in a wide variety of formats and modes of delivery, including informal web resources and job aids, workshops, on-the-job training (OJT), and formal structured courses offered online or in traditional settings. The open-source data collection and amplifying survey execution focused primarily on online and traditional learning opportunities. The interviews provided opportunities to build an understanding of

[9] Adapted from: https://www.extendoffice.com/documents/excel/5234-xcel-select-multiple-items-from-drop-down-ist.html#:~:text=Select%20multiple%20items%20from%20drop%20down%20list%20into,for%20all%20drop%20down%20lists%20in%20the%20sheet

informal learning opportunities in addition to formal training not already captured in the open-source data.

The open-source data revealed training that focused on four of the five change agents: innovator, facilitator, leader, and user. (See Figure 8.) Most of the available traditional formal learning opportunities targeted the innovator and facilitator change agents with the fewest trainings offered to the user. It is important to note that user training on new systems is integrated at the program office level and would be identified as OJT. The low formal learning opportunities geared towards users should not be interpreted as a gap until new system training programs OJT data can be collected and assessed. At the time of this study such data was not available.

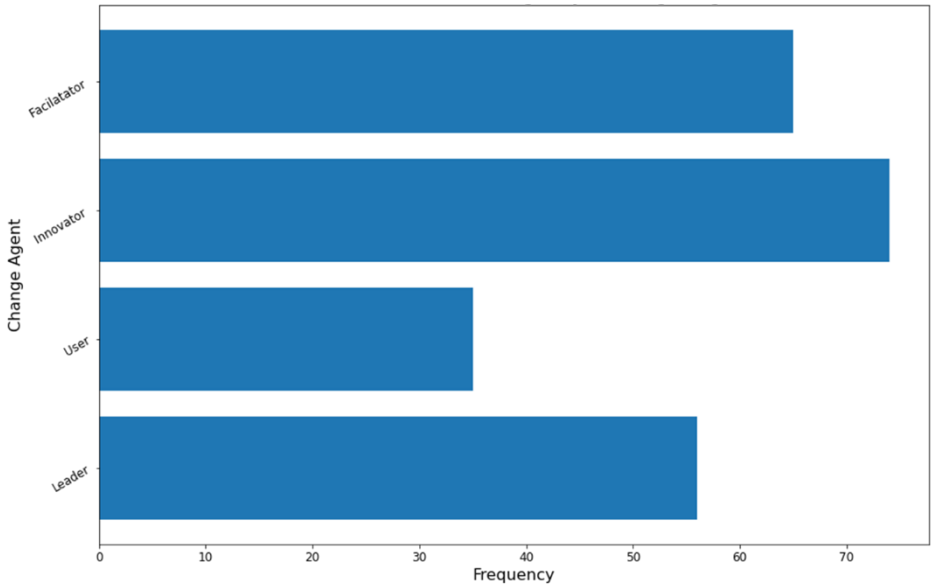


Figure 8: Distributions of Trainings by Change Agent

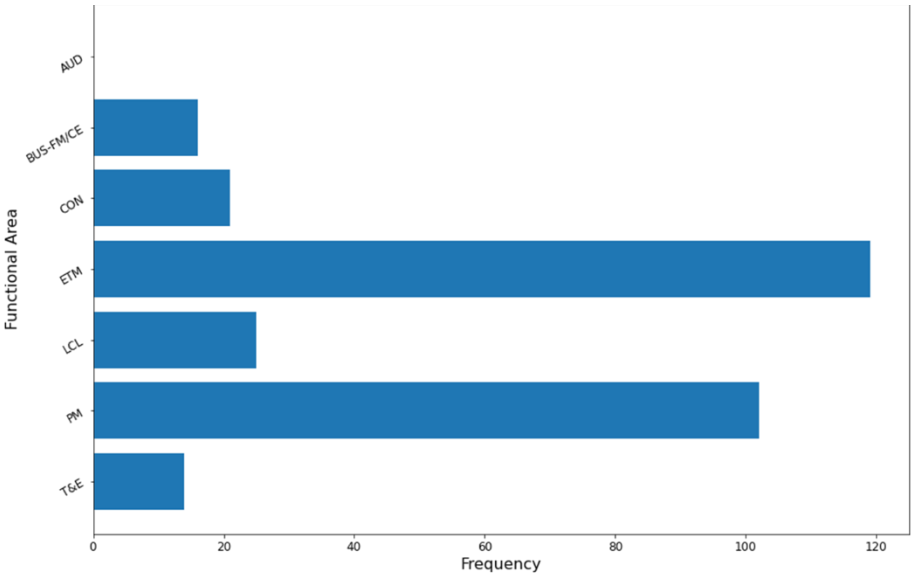


Figure 9: Distribution of Trainings by Functional Area

As most Department employes are in a facilitator role and critical to the adoption process, the overarching facilitator category is too broad to evaluate a training impact for specific career fields.[10] The team broke down the facilitator category by acquisition functional area as a majority of the innovation and emerging technology adoption journey occurs within the acquisition system.

[10] According to DoD Civilian Careers (https://www.dodciviliancareers.com/civiliancareers) there are over 675 different DoD occupations which fall into the following categories Business, Industry, Program Management and Analysis; Cyber and Information Technology; Environmental Management; Facilities Engineering; Human Resources; Intelligence; Logistics; Medical, Health, and Wellness; Military Community and Family; Public Health, Mental Health, and Social Sciences; and Quality Assurance.

Upon completion of the interviews, the team identified several key themes. First, innovation and technology adoption are not just about the technology—it is affected by processes and policies. Organizations and individuals who do not adopt innovative processes and policies create roadblocks to implementation which in turn effects innovation and emerging technology adoption.

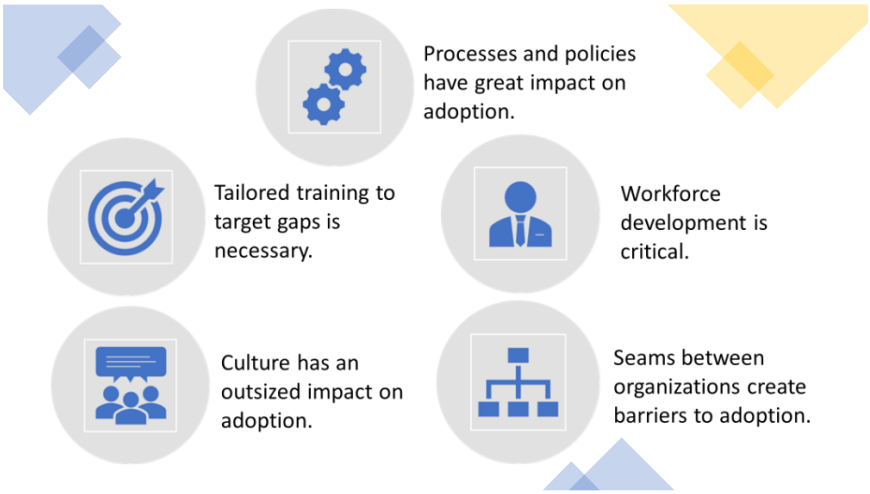


Figure 10: Interview Themes

Second, workforce development is critical to Department innovation/technology adoption success. Because training decisions are made at the local level there is significant variation in skills related to innovation and technology adoption across the Department. The lack of an overarching training strategy implementation plan generates redundant expenditures, creates knowledge gaps, and may result in inequitable distribution of training resources. Any such strategy should include the option to either hire or internally develop expertise in emerging technology skills as well access to both formal and informal learning opportunities. There are no reported plans to assess innovation and emerging technology training impacts. To do so would require a data collection plan and clear metrics against which to measure which could be included in the overarching strategy.

Third, training should be tailored to knowledge gaps and therefore training programs need to be flexible. One important gap is a shared understanding of the acquisition process. Department staff whose career field is a part of the innovation adoption journey require a foundational understanding of the entire acquisition process not just knowledge directly related to their career field or functional area. Understanding the complex system of systems involved in acquisition should generate efficiencies for the innovation adoption journey. Currently, staff are not required or resourced to engage in such training.

Fourth, the seams between organizations and communities are often barriers to adoption. Providing cross-organization learning opportunities will enhance understanding of roles and responsibilities and improve information flow across stovepipes, combating “cylindrical thinking”. Interorganizational training opportunities also allow for peer mentoring as a part of the learning experience. Interorganizational training participation will require a senior leader to “own” and champion the problem and solution to ensure cross-organizational support and participation.

Finally, culture has an outsized impact on innovation/emergent technology adoption. Attitude toward and understanding of innovation can enhance or create barriers to successful navigation of the adoption journey at all staff levels and access to innovation opportunities. This can lead to extreme variance in adoption success. For example, The Middle Tier Acquisition (MTA) process creates gray areas, intended to allow decision makers some autonomy to enable faster adoption; however, successful rapid

implementation is reliant on personality and risk tolerance. Additionally, organizations have differing perceptions of the role of emerging technology often referred to as the difference between “manning the arms” and “arming the warfighter(man)”. In one case the innovation or emerging technology is the primary focus and in the other it is the warfighter.

Metrics on Workforce Performance

At the time of this study, none of the training programs or organizations reported the collection of post learning workforce performance metrics. Because training is handled locally, there is no database with information related to which Department employees are attending what (if any) innovation and emerging technology adoption related trainings. Without access to information related to staff training participation it is impossible to accurately report training effectiveness. Understanding impact is further compounded as OJT is also not uniformly tracked but is known to potentially be as effective as traditional training. Other learning opportunities including workshops, seminars, and professional events, which could have a measurable impact on performance, are also not centrally tracked or reported. Key adoption enablers include the program’s acquisition and contracting strategies. The selection and application of the appropriate acquisition and contracting strategies are essential to emerging technology adoption. Further, training on acquisition pathway selection and the proper use of innovative contracting approaches could impact the likelihood that the most appropriate strategies are applied to programs. Using the correct acquisition pathway and contracting strategy enables innovation and emerging technology adoption. The VT-ARC team explored if any of the available data could support analysis to determine a relationship between a learning opportunity and a change in performance. One course related to other transaction authorities (OTA) appeared to align with open-source data from Sam.gov stored on the pilot Defense Acquisitions Research Collaboration & Innovation Environment known as DARCIE. The available data included quarterly totals for obligations toward OTAs from Q1 2016 through Q3 2022 and is visualized in Figure 11. Based on the total dollars obligated, the team concluded that it was likely the open-source data set was incomplete and could not be used to identify trends. Additionally, any relationship between the training and OTA use could not be determined because the DAU credential was not launched until FY23 which did not provide sufficient overlap with the available data set.

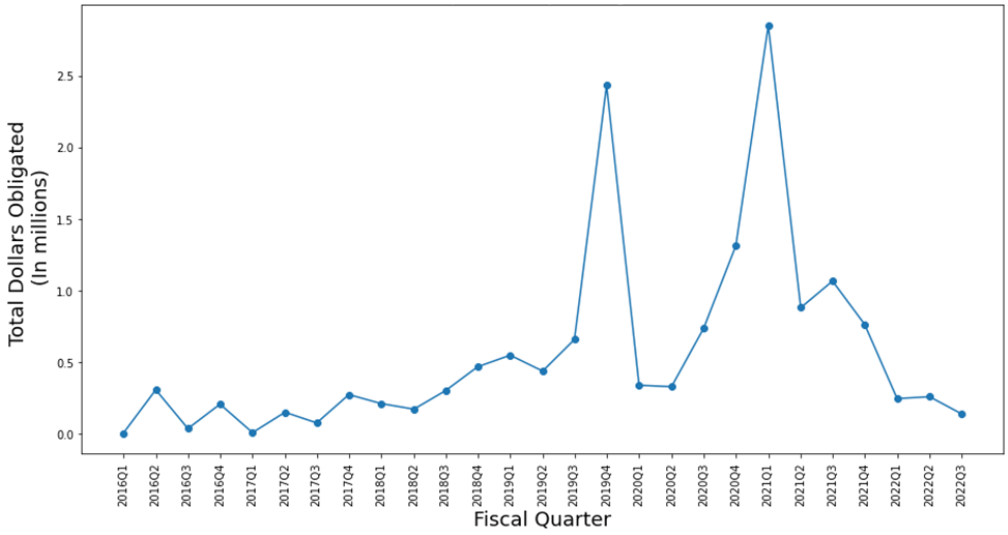


Figure 11: OTA Analysis

No MTA data was available to the study team to conduct analysis of MTA-related training; however, the Audit of Department of Defense Middle Tier of Acquisition Rapid Prototyping and Rapid Fielding Programs report (DODIG-2021-131) found that "DoD acquisition personnel effectively leveraged the MTA pathway for 11 programs we reviewed to rapidly develop prototypes and field proven technologies to the warfighter." Additionally, the reviewed programs demonstrated increased efficiencies and effectiveness. The report also recognized that this acquisition reform is a "work in progress" which requires appropriate oversight and management. As the DAU is a ready resource for MTA-related training, access to data related to MTA employment could result in an understanding of training impact and effectiveness for emergent technology adoption.

The Department's challenges associated with data access are not new and are well documented. AIRC was contracted to develop the Innovative, Data-Enabled Acquisition Strategy (IDEAS) proposal to help drive digital transformation and address such challenges. Additionally, the Deputy Secretary of Defense's "Creating Data Advantage" memorandum (DSD, 2021) calls for the Department to:

1. *Maximize data sharing and rights for data use: all DoD data [are] enterprise resource[s].*
2. *Publish data assets in the DoD federated data catalog along with common interface specifications, and a set of [application programming interfaces (APIs)]/services to allow industry to adapt data models for consumption.*
3. *Use automated data interfaces[11] that are externally accessible and machine-readable; ensure interfaces use industry-standard, non-proprietary, preferably open-source technologies, protocols, and payloads.*
4. *Store data in a manner that is platform and environment-agnostic, uncoupled from hardware or software dependencies.*
5. *Implement industry best practices for secure authentication, access management, encryption, monitoring, and protection of data at rest, in transit, and in use.*

As the Department initiates a data strategy that addresses such data-related challenges, the ability to accurately assess training impact should improve significantly.

[11] e.g., application programming interfaces (APIs)

DoD and Private Sector Organizations Providing the Training Programs

The study collected data from three sets of innovation and emerging technology-related training institutional categories: DAU, other DoD, and non-government. The non-government learning opportunities were limited to institutions that had existing relationships with the Department. A complete list of the learning opportunities and their associated institutions can be found in Appendix A.

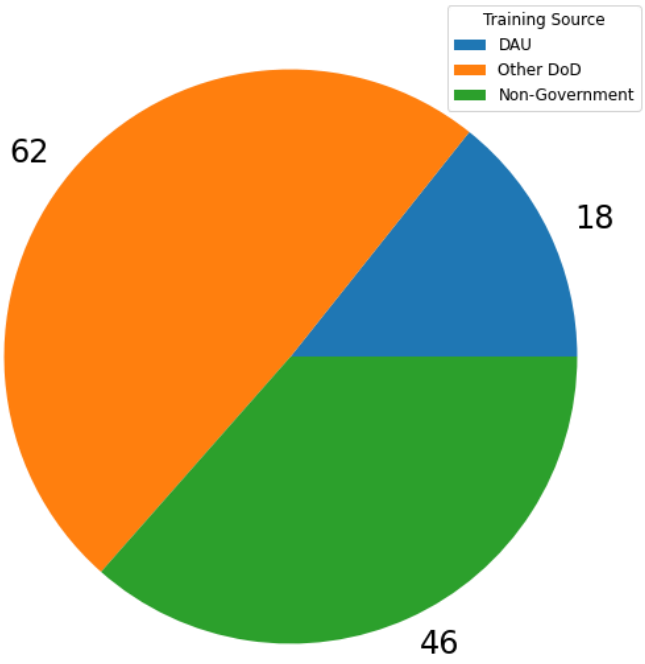


Figure 12: Training Source Distribution

Overall, the learning opportunities were distributed across the three institutional categories, DAU, Other DoD, and Non-government.[12] DoD (DAU and Other) provide the majority of training opportunities within this data set. It should be noted that there are likely significantly more non-government programs available without the limitation of an existing relationship with the DoD.

Additional analysis of the three institutional categories' trainings across the four innovation change agents reported in an earlier section (innovator, facilitator, leader, and user) revealed that DAU's innovation and emerging technology adoption-related trainings were primarily geared toward facilitators, which is their target audience. The other DoD offerings were fairly

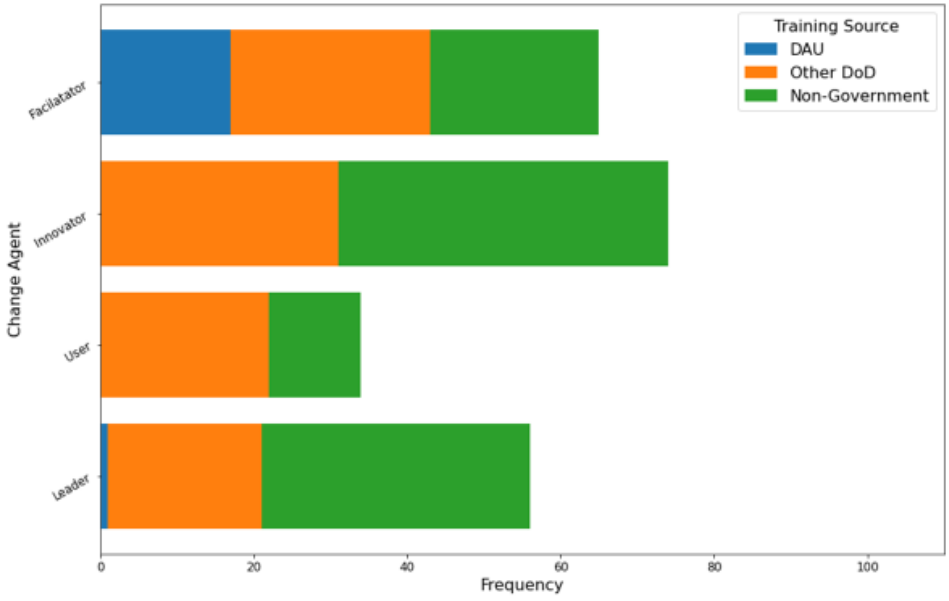


Figure 13: Distribution of Training Source by Change Agent

[12] There was a single non-DoD government course included in the original data set which is not included in this analysis.

evenly distributed across all four change agents while the non-government learning opportunities are primarily focused on the innovator, leader, and facilitator.

It was already identified that there were no innovation and emerging technology adoption training for the auditing functional area (AU). Program managers (PM) have the most DAU offered courses, followed by engineering and technical management (ETM), and contracting (CON). Business-finance management and cost estimating (BUS-FM/CE), life cycle logistics (LCL), and test and evaluation (T&E) had the fewest DAU offerings. ETM had the most other DoD and non-government learning opportunities closely followed by PM. LCL had significantly fewer than either PM or ETM and BUS-FM/CM, CON, and T&E had even fewer.

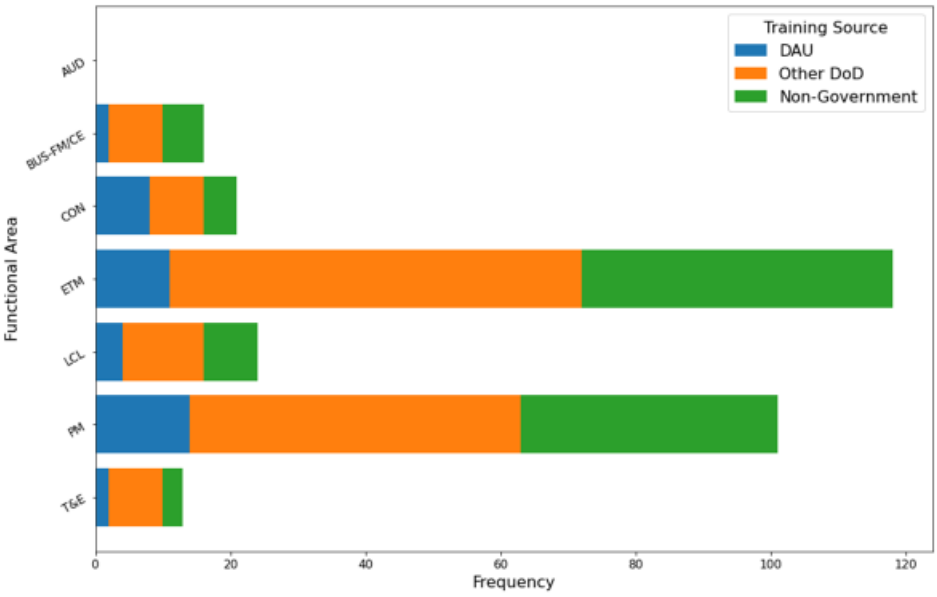


Figure 14: Distribution of Training Source by Functional Area

Training Program Expansion Plans and Future Training Expansion

The web search and survey did not provide any data on training expansion. Interviews revealed two Department organizations are currently working to expand innovation and emerging technology adoption-related trainings. In addition to examining the Army's enlisted training and education relationship with Carnegie Mellon University for applicability to the Naval force, Dr. Jason Stack, ONR Division Director and Unmanned Task Force Deputy Director is leading a partnership with the Naval Post Graduate School to develop innovation adoption related graduate curriculum. The timeline for implementation was not in place at the time of the interview. Additionally, Mr. Robert Freeman, ONR Corporate Strategic Communications Director, is conducting an evaluation of science communication trainings to provide a detailed analysis of options. These contracted trainings would be specifically targeted at the innovator change agent and intended to help them communicate complex concepts to decision makers to facilitate an appreciation for the innovation/emerging technology's potential operational impact. There is no reported timeline for the completion of the evaluation report.

The DAU is actively developing a Mission Engineering fundamental credential. Mission Engineering represents a relatively recent innovation that is a part of the systems engineering hierarchy. Its effective application would likely have an impact on the innovation and emerging technology adoption journey. The intention is to complete three

credentials (fundamental, intermediate, and advanced) to ensure the Department change agents have the access and ability to apply this innovation.

While the availability of training expansion data is limited, the near continual updates to training opportunities listed on the internet implies that innovation and technology adoption-related trainings are regularly being updated to ensure the curriculum remains relevant.

Authorities/Funding Needed to Support Expanded Training

While all organizations reported that they had the authorities to expand learning opportunities, funding was a different story. The lack of an overarching Department Training Strategy for Emerging Technology Transition likely impacts training funds distribution and therefore available funds for training expansion. Organizations, other than those discussed in the previous section, report they are not funded to expand offerings at this time. ONR and DAU are not currently resourced to add programs other than what was discussed. Based on the Mission Engineering credential development project plan, a well-designed, traditional or online learning opportunity could be developed for approximately $600,000.

Three very important categories appear to be poorly represented in the data. These include the areas of contracting, testing & evaluation, and life-cycle logistics, which includes the potentially complex arena of new system integration into a system of systems construct. The DoD has been pursuing renewed efforts in recent years to find alternative contracting methods through vehicles such as Other Transaction Authorities (OTAs), streamlined purchasing vehicles that help bring innovative research findings and state-of-the-art prototypes from industry to the federal government, as well as a variety of specific research and development initiatives that will execute contract actions more quickly and ease the burden on industry partners who experience challenges with the traditional contracting methods. These OTAs are not subject to some of the regulations that apply to the Federal Acquisition Regulations (FAR)-based acquisitions. OTAs can help enable faster acquisition of critically needed technologies in areas as diverse as shipbuilding, armaments, satellites, medical devices, and electro-magnetic spectrum technologies. One of the goals beyond accelerating the contracting timeline with alternative processes is to seek partnership with non-traditional industry partners. The approach aims to foster inclusion of companies, who have not historically been under government contract, which produce innovations including innovative technology, processes, and software. The path to reach these companies is often challenging and fraught with obstacles under the FAR, particularly when attempting to quickly establish the relationship. Small, non-traditional businesses can face even more significant challenges as they often have less ability to invest the resources required to complete FAR-based processes normally required to gain entry to government contracting. Future training, in addition to the recently identified DAU OT credential, could focus on both the non-traditional future industry partners as well as the government contract teams and audit agencies to find best practices and efforts to streamline processes. Clearly the depth

and reach of such training could vary widely and would ultimately determine the funding authorities and total cost for such training.

The T&E community is actively evaluating testing considerations for system performance and reliability characterization as well as process considerations to address testing in a rapid, and potentially prototyping environment of new systems, often without predecessor system baseline Key Performance Parameters, and need to be addressed in lethality, sustainability, etc., with Urgent Operational Needs (UONs) as well as products developed in the Middle-Tier Acquisition (2-5 year) category under the Adaptive Acquisition Framework (AAF). This highly dynamic and important competency will undoubtedly be a strong candidate for future innovation training and expansion of existing curriculum. DOT&E contracted with AIRC to develop a Joint Test Concept where the training and education requirements in alignment with T&E best practices, with particular attention to rapid prototyping and rapid fielding, could be both be identified.

Sustainment, or life cycle logistics, resides at the core of every acquisition program, and training across this critical area are vital in both ensuring our war fighters are provided with effective systems as well as ensuring the total life cycle costs are affordable for the government agencies. It is noteworthy that so little training appears to exist in this genre which includes such important items as integrated logistics services (ILS), obsolescence management, maintenance planning, cybersecurity, modernization, software support activities, facilities, depot-level repair, among others. Training in support of sustainment areas, and the associated development of items included in a product's life-cycle sustainment plan will be key to establishing the framework to think systematically through emerging technologies, the planning factors associated with more rapid technology deployment, and communicating the integration and key performance factors for satisfactory sustainment results. Each of these areas have many associated tasks which will result in fiscal requirements, and training in this competency would undoubtedly help Product Support Managers (PSMs) identify and properly plan and submit their budget requests and ultimately execute more effectively.

Training expansion for the integration of systems into potential system of systems environments could also be a critical need and will be reviewed by the research team as survey results are received. In short, insertion of a system into an existing platform or environment without due consideration for the impact on conjunctive components and cyber enclave management can be detrimental to the overall warfighting performance across the larger system. Additionally, it can create operator training challenges where operators might be assigned to systems which differ in design and maintenance than those for which they were trained. The insertion of new technologies into existing systems presents a strong need for a thorough review of every sustainment area to ensure the new technology has not altered the overall system's life cycle management requirements, and PSMs will need to be trained to identify this potential and address any needs appropriately during any phase of the acquisition process.

Study Recommendations

The lack of an overarching Department training strategy allows for cylinders of excellence, organizations who take initiative to develop an effective distribution of training resources in alignment with Department operational challenges. These cylinders of excellence do not translate into a Department-wide staff capability as the seams between organizations create barriers to expansion. It is recommended that a Department Training Strategy for Emerging Technology Transition be developed and for a senior leader to own and champion this strategy with support across the Department at all echelons.
This strategy should include considerations for:

- Democratized data collection and analysis to ensure leaders at all levels can make data driven decisions in alignment with the strategy.
- The development of a Department data base of formal and informal learning opportunities offered by Department, industry, and academic institutions.
- Metric design and data collection strategy to assess impact of formal and informal learning participation.
- Implementation of cross-organizational and cross-functional training to bridge inter-organizational seams and increase understanding of the systems of systems required to ensure our Nation's defense. Providing cross-organization learning opportunities will enhance understanding of roles and responsibilities and improve information flow across stovepipes, combating "cylindrical thinking".
- Development of targeted training for the three areas underrepresented in the data: T&E, LCL, and CON.
- Joint and force-specific learning needs to allow for customized learning opportunities.
- Maintaining decision authority at the command level.
- Appropriate training and education budget distribution.
- Streamlined reporting requirements to reduce unplanned data calls.

Appendix A: Web Search Training Data[13]

Type	Name	Objectives/Description	Functional Areas
Other DOD Innovation Trainings	AFIT Avolve: Foundations of Creativity and Innovation	Avolve is a content sharing platform for all Air, Space, and military professionals to explore and view videos, documents, websites, and learning paths for their training, education, and self-improvement. Content can be contributed by anyone who wishes to share their expertise or interests with other Air, Space, and military professionals, all behind a secure CAC authenticated firewall. Individuals and organizations, enlisted, officers and civilians, are all able to share their knowledge and messages across services, commands, career paths, and geography. AFIT has recently released a learning path within the Avolve platform entitled "Foundations of Creativity and Innovation"	PM, CON, ETM
Other DOD Innovation Trainings	AFIT: Education With Industry (EWI) Program	The EWI Program is a highly selective, competitive, career development program designed to improve the technical, professional, and management competencies of participating students by partnering with top tier public and private sector companies. During the ten-month tour, students embed with an industry team to meet their specific career desired learning objectives. Through hands on exposure to industry best practices, students develop the necessary competencies, skills, knowledge, and abilities to build, sustain and retain a mission-ready workforce, as well as learn how to better partner with industry in the future. The Program is sponsored by SAF/AQ and managed by the Air Force Institute of Technology (AFIT). The ultimate goal of the program is to develop Air Force leaders with greater business acumen and empathy with the expertise to implement innovative practices when they return to the Air Force. Upon completion, graduates are assigned to Air Force duty consistent with their EWI experience.	ETM
Other DOD Innovation Trainings	AFIT: Innovator, Leader, Organization, Acquisition professionals (CO, CORs, PMs), Facilitator	Evolution, revolution, and innovation have defined human existence for millennia. Innovation is pervasive and resident in everything we do. Since the dawn of history, nations have engrossed themselves in developing new tools, techniques, and methodologies to protect their geographical boundaries. From the crude implements used by prehistorical people to the very modern technologies, the end game has been the same. That is, for national defense. Even in times of peace, efforts must be made to develop new machinery, equipment, processes, and devices targeted for the protection of the nation. The emergence of organized nations and structured communities facilitated even more innovative techniques of national defense. The drive to achieve new national defense tools led to better underlying science and technology, which most often end up having other beneficial societal applications that are outside the bounds of national defense. It is through the efforts of industry that those societal benefits are manifested as practical consumer products. It is important to recognize, document, and demonstrate the paths of converting defense science and technology developments into general applications through deliberate transfer actions. From the ice age to the stone age, the bronze age, the iron age, and to the modern age, innovation, rudimentary as it may be in many cases, has determined how humans move from one stage to the next. The innovation pursuits of The Wright Brothers led to the fast-tracking of aviation. This course presents a variety of topics related to how to innovate, how to use innovation, how to build innovation teams, how to lead innovation efforts, and how to teach innovation	PM, ETM
Other DOD Innovation Trainings	AFIT: RDMT 541 Operational Technology and Innovation	This course has three components. Part one is the theory on innovation and technology ranging from the dynamics of innovation and technology S-curves, to disruptive technologies through dominate designs, and from lead users to corporate regeneration. Part two is an overview of the current state of technology in our fielded systems from fighters to satellites to communication systems. Part three is a look at the technologies developed or being developed in our laboratories, universities, and commercial firms and how these technologies may be applied in current and future defense and commercial systems. Some lectures will be held at the secret level	ETM
Other DOD Innovation Trainings	AFIT: RDMT 554 Management in R&D Organizations	Technological change and innovation have impacted the socio-political economic systems in our society in a variety of ways. These changes often play a dual role –they disrupt the existing order and create new opportunities. Although most innovations and technological changes fail, companies that do not pursue innovation often fail too. Therefore, managing innovation is often considered one of the most difficult challenges a manager faces. The focus of the course is on the management of product and process innovation; both sustaining and disruptive innovations will be discussed	ETM, PM

[13] The contents in the *Objectives* column are taken directly from the on-line information and not edited.

Other DOD Innovation Trainings	AFIT: RDMT 654 Seminar in Research and Development 4 Management	As the capstone course for the S&T focus sequence, this course builds on material presented in previous courses. The purpose of the course is to help students think strategically about technological innovation in an R&D environment. The text will be augmented with additional readings and case studies. Topics include entrepreneurship, managing innovation, the technology life-cycle, management of R&D personnel and projects, and integrating technology strategy with business strategy. The course will be taught in seminar fashion with substantial class discussion. This is a writing-intensive course in which assignments include case analyses and research papers.	PM, ETM, BUS-CE/FM
Other DOD Innovation Trainings	AFWERX - SPARK	Intensive and immersive training for innovators; students solve real Department of Air Force (DAF) problems (1-week and 1-month options offered) Development Branch (RGST) specializes in training and developing Airmen & Guardian Innovators as a warfighting capability through curriculum and experiential learning.	PM, ETM
Other DOD Innovation Trainings	Air Force: Acquisition innovation pilot program Base Camp	The 60-hour training program is designed to integrate into participants' daily work and to help build a DOD-wide network of innovators.	PM, LCL, ETM, BUS-FM/CE
Other DOD Innovation Trainings	Air University: BH5011 Field Study 1	The class will go on a week-long field study early in the course to gain insight into how organizations innovate, both within and (especially) without the Air Force. Examples of sites the group might visit are Kirtland AFB in Albuquerque NM, Sandia National Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Google, Space-X, and others dependent on the topic for the year and individual student research interests. The students will then utilize the insights gained from these visits to inform their own approaches to prototyping and, potentially, to partner with one or more of the organizations with which they interact. Just as crucially, these visits provide the core of the innovation networks each student will develop over the course of the 10 months and take with them when they leave.	PM, ETM
Other DOD Innovation Trainings	Air University: EL6944 Innovation Research Task Force	Accelerate change or lose! The term innovation seems to be a top priority for most organizations today. The CJCS and CSAF make remarks concerning how the DoD must innovative, but what does it mean to innovate and how do we make it happen? Through readings, class discussions, and lectures, the AU innovation research task force (iRTF) explores frameworks to discover how different kinds of thinkers and leaders can create constructive conflict, channel it, and develop something completely new. Students spend the first semester working through historic innovators, methodologies, and concepts while working towards a project pitch. Second semester, students spend time in research, prototyping, visiting local labs, and diving into innovation topics to include war gaming, virtual reality, artificial intelligence, machine learning, quantum, energy, naming only a few. Meetings will occur at MGMWERX in downtown Montgomery	PM, ETM
Other DOD Innovation Trainings	Air University: RE 5327 Innovation by Design	This course examines a framework to explain how different kinds of thinkers and leaders can create constructive conflict, channel it, and develop something completely new.	PM, ETM
Other DOD Innovation Trainings	Air University: RE 5823 Innovation	This course seeks to inform officers about the purpose, nature, and process of this thing called "innovation." What is it, why is it difficult, how do you do it, who does it, when, and where does it happen?	PM, ETM
Other DOD Innovation Trainings	Air University: WF6501 Air, Space, and Cyber Power in the Future	This core course focuses on assessing issues associated with the innovation and the future employment of joint airpower. The rapid pace of change occurring throughout the world compounds the uncertainty and complexity of the future operating environment. If the Air Force is to continue to succeed, we must consider both the challenges and opportunities we will face in air, space, and cyberspace. Once students have learned to anticipate challenges to future Air Force core missions, the course focuses on the integration of airpower into future joint operating concepts	PM, ETM
Other DOD Innovation Trainings	Air University: EL6209 Creative Thinking: From Imagination to Innovation	Students will compare creative thinking strategies with critical thinking strategies, explore multiple opportunities to think "outside the box," will write extensively about their experiences, and how to translate what they learn about creative thinking into their leadership and mentoring philosophies. This course is designed to show students how to move from imagination through creative thinking to innovation, to be ready to recognize innovation, and to nurture innovation. The written and oral deliverables of this course will also enable students to practice communication with multiple audiences	PM, ETM
Other DOD Innovation Trainings	Army University: CES Advanced 1-250-C62	The CES Advanced Course offers leadership development and education to upper-level leaders, who by necessity are required to be more agile, innovative, and self-aware to effectively lead and care for personnel and manage assigned resources (AR 350-1, Aug 2014). The course focuses on educating the competencies and attributes for individuals serving in Enterprise or Strategic leader roles or as those who work on those persons' staffs who are called upon to usually work with more complexity, more individuals, greater uncertainty and unintended consequences Phase 2, the Resident Phase, consists of four weeks. The course is focused around three (3) main themes or modules across 4 weeks. Weeks 1 and 2 are building Foundational Skills and Application, Week 3 focuses on Strategic Leadership and developing an Enterprise Wide Perspective and Week 4 focuses on How the Army Runs. Students will participate in Executive Coaching sessions with their instructors twice during the course and on the 19th day of the course provide a 15 minute leader development plan brief to the seminar on what you learned and how you will apply it when you return to work.	PM, ETM, LCL

Other DOD Innovation Trainings	Army University: CES Continuing Education for Senior Leaders Course Number:1-250-C63 (CP)	The CES Continuing Education for Senior Leaders Course offers leadership development and education to senior-level leaders, who by necessity are required to be more agile, innovative, self-aware, and enterprise thinkers who can effectively lead and manage assigned resources. CES CESL resident training consists of both small and large group activities. The course structure is a combination of senior leader guest speakers and interactive exercises on subjects presented by university graduate-level instructors. This resident phase of the CES CESL Course has several general outcomes: 1. Develop a leadership reading program. 2. Improve student understanding of Army doctrine, policy and strategies. 3. Develop a leadership development plan.	PM, ETM, BUS-FM/CE
Other DOD Innovation Trainings	Army University: Innovative Leader Course Number: 9E-F102/920-F-99	The purpose of the Innovative Leader Course is to further develop leadership attributes and competencies and provide proficiency in the functional role of leading, shepherding, facilitating, and encouraging the innovation process and innovative thought within an Army organization. The purpose of the Innovative Leader Course is to further develop leadership attributes and competencies and provide proficiency in the functional role of leading, shepherding, facilitating, and encouraging the innovation process and innovative thought within an Army organization.	ETM, PM, T&E
Non-Government Innovation Trainings	Carnegie Mellon: Special Topics: Corporate Venturing & Innovation	Startups aren't the only career destination for aspiring and experienced entrepreneurs - large, established companies need entrepreneurs more than ever to help them avoid the risk of being disrupted. The future survival of many large companies is in the hands of entrepreneurs who understand both technology and business - learn the skills you will need to engage corporate executives on the topic of corporate venturing. This course is created to help entrepreneurs design corporate venturing programs for large companies who want to avoid being disrupted by innovative and more nimble startups *How can you convince corporate executives to invest in corporate venturing capabilities? *How can you be successful as an entrepreneur inside a large company that is set on its ways? *How can a large company compete with faster and more nimble startups by building their own?	PM, LCL, ETM
Non-Government Innovation Trainings	Carnegie Mellon: Commercialization and Innovation: Strategy	Commercialization and Innovation, Strategy (45-807) focuses on innovation (transformational or disruptive innovations and by sustained innovations) and on the development of open innovation business models and market strategies required to introduce these innovations into the market, grow thru market share capture, and to establish dominant market positions. Students will gain a perspective of various current theories and models of innovation, how innovations are brought to the market and positioned for successful launch and subsequent growth. Students study and discuss both successful and unsuccessful attempts to bring innovations to the market via a series of lectures, readings, and case discussions. The first mini course focuses on the upfront strategic market thinking that must be the basis of a proactive and potent business plan to introduce innovations to the marketplace. It is the result of intense understanding of the SET factors (social, economic, and technology) and industry dynamics into which the opportunity will be introduced. It is strategic because of rapid changes in the marketplace and the competitive set which the opportunity must confront for execution in the emerging marketplace (emergent strategy or agile approach). Student teams are expected to take on a project determined by the team (with faculty approval) or framed by an outside organization (within or external to CMU). The goal of the project in Mini 1 is to understand the industry dynamics and competitive set, to identify a market based on use of an agile needs-driven innovation methodology (job + job executor + context defines the market), and to segment the market based on identification of jobs to be done by the job executors. These are the drivers for identification of a successful Minimum Viable Product (MVP), a market entry point, and development of a differentiating strategy and self-sustained growth strategy.	PM, ETM
Non-Government Innovation Trainings	Carnegie Mellon: Economics of Innovation Strategy	This course will introduce students to the economic models that underpin innovation strategy. We will emphasize the application of frameworks from the economics of technical change to understand how technology markets evolve and what strategies allow firms to capture value from innovation. The aim of the course is to develop a rigorous foundation in economics that students can use in professional roles such as: a manager in a technology-intensive firm an engineer or scientist interested in new product development/RD an analyst or investor in technology markets a management consultant specializing in technology-intensive industries	PM, LCL, CON, ETM
Non-Government Innovation Trainings	Carnegie Mellon: Change Management for Innovation	How do companies avoid going the way of Kodak, Nokia, Blockbuster and Borders? In each of these cases, the companies enjoyed early success and grew quickly to positions of market dominance. But that growth came at a cost - they became overly focused on the internal control systems required to manage growth while seeking to shape their market to perpetuate their dominance. All in cases, they were failed to detect fundamental shifts in both competitor behaviors and market preferences. These shifts were driven by changes in technology. Today there is a different set of dominant players that are very aware of the reasons for the failure of their predecessors. How are they looking to avoid going the same way? This is a new course which looks at strategies being used by companies such as Microsoft, Amazon, Google/Android and Apple to grow their businesses in ways which do not rely on control but on the two constants for success - change and continuous innovation. Particular attention is paid to two critical success factors - leadership and knowledge management. The course focuses largely on case studies, looking at them through some theoretical lenses.	PM, ETM, CON
Non-Government Innovation Trainings	Carnegie Mellon: Engineering and Technology Innovation Management in Practice	Innovation takes place inside organizations, whether it's a small company, a large corporation, a university or a government laboratory or agency. In this course, we will focus on the people who lead innovative organizations, what they do to promote and sustain innovation, and the skills and	PM, ETM

		attributes they need to be successful. The instructors experience as President of Carnegie Mellon, guest lecturers from industry and the literature will be the sources from which the course will draw. Students will gain insight into the roles they may play in contributing to and leading innovative organizations, and the skills and attributes they will need for success. 19684 is part of the Engineering and Technology Innovation Management (ETIM) Master's Program. ETIM students should register for the 6-unit course, reflecting the supplemental course requirements for ETIM. Other students are welcome to enroll for the 3-unit course.	
Non-Government Innovation Trainings	Carnegie Mellon: Innovation Management in Practice	Innovation has been described as the intersection of invention and insight leading to the creation of social and economic value. Companies increasingly rely on innovation to establish and drive their success. Public policy makers see innovation as a critical driver for economic development. This course is an opportunity to learn about innovation management from those in the front lines. How are innovation opportunities identified? What are the challenges to realizing these opportunities and how can the challenges be addressed? What roles are played by processes technologies and the business environment as well as by individuals in organizations? This course will feature speakers who drive innovation in a variety of settings paired with readings from the innovation literature that will help frame the presentations and discussion	PM, ETM
Other DOD Innovation Trainings	CNAS Defense Program	The CNAS Mission Brief speaker series, hosted by Defense Fellow Becca Wasser, features deep-dive discussions with the military and civilian leaders driving strategy and future force planning to delve into how the Department of Defense and the services are innovating and preparing for future strategic and operational challenges. Conversations cover a wide array of topics including future defense strategy and force design, new operational concepts, and crucially, balancing readiness with ongoing operations. Past speakers include the Lt. General Hinote, Air Force Deputy Chief of Staff for Strategy, Integration and Requirements, and Dr. Mara Karlin, Assistant Secretary of Defense for Strategy, Plans and Capabilities, among others.	PM, ETM, LCL
Non-Government Innovation Trainings	Colorado State University: Creative Organizational Innovation	Forward thinking and creative problem solving are valuable abilities in today's ever-changing professional landscape. Many of the most successful leaders and enterprises have flourished because of their willingness to embrace change and innovation. Obstacles are inevitable, but with the right kind of strategic planning and organizational creativity, it becomes much easier to transform ambitious ideas into definitive results. This online digital badge program provides a series of innovation training courses that teach you how to envision, execute, and promote a more creative organizational ecology.	PM, ETM
Non-Government Innovation Trainings	Columbia University: Digital Strategies for Business (Online): Leading the Next-Generation Enterprise	In today's world, almost every business is a digital business. In every industry, processes are being transformed by the proliferation of digital technologies and the rise of disruptive threats. To compete, businesses need to adapt and thrive. Organizations need leaders who can think strategically and harness the digital change to create new value for customers and opportunities for business. This program focuses on how managers can develop new strategies and business models to enable their organization to thrive in the digital age. Case studies will feature both digital trailblazers as well as traditional enterprises that are adapting to the digital era.	PM, ETM, CON, BUS-FM/CE
Non-Government Innovation Trainings	Columbia University: Leading Strategic Growth and Change	Leading Strategic Growth and Change is focused on the process of finding opportunities, launching new ventures, and leading necessary organizational changes to revitalize and transform an organization in times of uncertainty. Participants will learn how to thrive in rapidly changing and highly uncertain environments and will be able to immediately apply their learning to make rapid progress on an issue they identify. If you have ever worried about how to drive new growth or how to make a change initiative successful, you will enjoy the insights developed in this program.	PM, ETM, BUS-FM/CE
Non-Government Innovation Trainings	Cornell University (online): Building Innovation Competencies	To create and sustain a culture of innovation and entrepreneurship in your organization, it is helpful to establish an environment that supports certain mindsets. And these mindsets can create first a culture change in your organization, often followed by a higher financial return on investment. These mindsets are the competencies that convert ideas to impact. In this course, you will learn about and apply three key innovation competencies: lean startup, maker culture, and design thinking. Each of these competencies are used by large and small organizations, resulting in new products and services and satisfied employees and customers. Lean thinking is a form of customer discovery where you will develop a series of hypotheses and then test them. Maker culture is based on the do-it-yourself ethos and can help you prototype and test products quickly, reducing time to market. Design thinking is a process of empathetically listening to and then co-designing with your customers. While the three competencies have some overlapping methodology, one or two of them will best support your innovation strategy and tie in more effectively with your organization's overall strategy.	ETM, PM, T&E
Non-Government Innovation Trainings	Cornell University (online): Developing Innovation Strategy	An enterprise with an innovation culture doesn't just happen. You must plan for both financial success and cultural change. There are several types of and approaches to innovation. How do you create an innovation strategy for your enterprise? In this course, you will begin to create a roadmap called the innovation placemat. You will identify your organization's goals and align your innovation strategy to it. You will cultivate an executive champion and set SMART goals for your new product, service, or technology. You will identify risks and barriers to deployment and create mitigation plans to overcome them. Along the way, you will hear case studies of	PM, ETM

		organizations large and small, private and government, established and startup, and in many domains who have successfully established an innovation strategy with sustainable positive effects on their bottom lines.	
Non-Government Innovation Trainings	Cornell University (online): Evaluating and Scaling Innovation	In this course, you will devise a strategy to manage a portfolio of innovation projects at your organization. You will examine best practices for portfolio management and establish a plan to spread your innovation and innovation culture. Then you will examine typical risks to your scaling strategy and establish a sustainment plan. Finally, you will revise your innovation placemat and present a practice pitch. This activity will prepare you to pitch your innovation placemat at your organization.	PM, ETM
Non-Government Innovation Trainings	Cornell University (online): Implementing Innovation	So far you have created an innovation strategy and established a vision, SMART goals, and outcome measures. You've identified competencies such as lean startup, makerspace, and design thinking, and selected tools to build an innovation culture. Now you will learn how to implement your strategy. After you map key internal stakeholders, you will devise a campaign plan for your strategy and build a dedicated team. You will understand the different motivations of your innovation shop and "the performance engine" and learn to work effectively with performance engine team members. You will further build out your innovation placemat with your implementation plan, identifying policies that can enhance innovation at your organization.	PM, ETM, CON
Non-Government Innovation Trainings	Cornell University (online): Innovation Tools	There are many exciting tools you can use to implement innovation at your organization. These tools are the "hammer and nails" of innovation. In this course, you will learn about 14 innovation tools. You will also see how other organizations have used them to successfully increase cultural and financial ROI, please customers, and improve operational efficiencies. These tools range from simpler activities such as conducting employee training, hosting hackathons, and implementing design sprints to more complex methods such as establishing an external incubator, founding a center of excellence, and acquiring another company. You will then further iterate your innovation placemat.	PM, ETM
Other DOD Innovation Trainings	Dragon Innovation Team Training	DITT is an eight-day virtual course partnered through NSIN to connect our Soldiers and Civilians with the nation's brightest academics. During DITT, Corps personnel learn creative thinking, problem solving, and solution development skills. Each DITT serial has a unique course problem statement to solve a real problem for the Corps. DITT makes us better by educating our people, solving problems, and driving an innovative culture across XVIII Airborne Corps.	PM, T&E, ETM
Other DOD Innovation Trainings	DSI's 3rd Annual DoD Hypersonic Capabilities Symposium	DSI's 3rd Annual DoD Hypersonic Capabilities Symposium will emphasize the continued need to develop American hypersonic technologies and leverage these technologies to achieve U.S. National Security goals. Hypersonic Missiles and Glide Vehicles have the potential to be game changing weapons that could cause the US to rethink its posture and strategy across the globe. The 2021 Hypersonics Symposium will facilitate discussions to accelerate the acquisition of hypersonic platforms that will provide the United States the capabilities to maintain the balance of global power.	PM, LCL, ETM, BUS-FM/CE
Other DOD Innovation Trainings	Expeditionary Warfare School: Military Adaption and Innovation	The pace of change continues to accelerate. In order to better prepare ourselves for decision-making in "Tonight's Warfare," it is critical to establish understanding of how history has defined present warfare, how the Marine Corps conducts warfare, and then finally what threats exist. This three-pronged approach to understanding is the fundamental idea that informs the construct of the Military Adaptation and Innovation (MAI) course at Expeditionary Warfare School (EWS). Once understanding is achieved, the MAI curriculum seeks to provide students and faculty with opportunities to analyze and discuss how to spearhead/advocate for relevant change, as both a member and a leader within the organization.	PM, ETM
DAU Innovation Trainings	FAC 031 - SMALL BUSINESS PROGRAMS	Small businesses make up about 99% of all the nation's businesses and employ half of all Americans, and small businesses are the source for many of our greatest innovations. This module provides Federal contracting professionals and program officials an overview of small business types and programs and provides them with the information they need to encourage small business participation in Government acquisitions. It will also help contracting professionals meet specific acquisition requirements related to small business concerns and achieve agency small business goals, while supporting increased opportunities for small businesses.	PM, CON
DAU Innovation Trainings	FCL-A-0021 To Bid or Not to Bid: Industry Perspective	Learn about industry's perspective on Federal procurements such as what influences industry's decision to bid on a given government requirement and/or get on government-wide acquisition contracts/schedules. This video is from the perspective of three distinguished industry professionals, representing a cross-section of industries both large and small.	PM, BUS-FM/CE, CON
DAU Innovation Trainings	FCL-A-0027 Can We Talk: Industry Day Conferences	Explore how to conduct effective Industry Day Conferences. Understand how to set-up and conduct a meaningful and well defined industry day conference that ensures that both the government and industry, engage in outcomes that are optimal.	PM, CON, BUS-FM/CE
DAU Innovation Trainings	FCL-A-0036 - INNOVATIONS IN ACQUISITIONS (AS)	Gain knowledge about key initiatives and policy updates related to innovation, such as Acquisition Innovation Advocates, examples of implementing innovation (i.e., Office of Personnel Management), and information on the Department of Homeland Security's Procurement Innovation Lab (PIL).	PM, CON

DAU Innovation Trainings	FCL-A-0038 - PROCUREMENT INNOVATION LAB (PIL) PRIMER	This Procurement Innovation Lab (PIL) Primer introduces the Procurement Innovation Lab at the Department of Homeland Security, how it's working to change the procurement culture in the agency, and how its work can help change the procurement culture in your agency. The eight techniques shared are ways to improve the outcomes of your procurements, with the ultimate goal of helping to change the procurement culture in your agency. This is a condensed version of what is taught in the full-day PIL Boot Camp intensive workshop. It is recommended that you review the PIL Boot Camp workbook prior to watching the video. After viewing, students will have an understanding of 8 PIL techniques: -Oral Presentations-Product Demonstrations-Confidence Ratings-Down-Selects-Comparative Evaluations-Selecting Best-Suited, Then Negotiating-On-the-Spot Consensus Evaluations-Streamlined Documentation	CON, LCL
DAU Innovation Trainings	FCL-CM-2500 Category Management 101	This recorded presentation by the Government-wide Category Management Program Management Office gives an abbreviated overview of category management to Federal buyers. By the end of this course, participants will be able to: - Define category management - Explain why the government is adopting category management Students will learn fundamental category management concepts as well as the government's specific approach, how category management will affect them, and about tools they can use to better utilize category management concepts. This recorded presentation by the Government-wide Category Management Program Management Office gives an abbreviated overview of category management to Federal buyers. By the end of this course, participants will be able to: - Define category management - Explain why the government is adopting category management Students will learn fundamental category management concepts as well as the government's specific approach, how category management will affect them, and about tools they can use to better utilize category management concepts. This recorded presentation by the Government-wide Category Management Program Management Office gives an abbreviated overview of category management to Federal buyers. By the end of this course, participants will be able to: - Define category management - Explain why the government is adopting category management Students will learn fundamental category management concepts as well as the government's specific approach, how category management will affect them, and about tools they can use to better utilize category management concepts.	LCL, CON
DAU Innovation Trainings	FCL-CM-3000: Understanding and Applying the new IT Product Service Code (PSC) structure to IT Acquisitions	This course is designed to introduce users to the new IT Product and Service codes and assist them in selecting the most relevant PSCs for IT acquisitions. The PSCs have been modernized for the first time in approximately 40 years, leading to wide-spread changes in how Information Technology Products and Services are acquired, managed, and reported on.	ETM, PM, LCL
DAU Innovation Trainings	FCL-NSF-3001: Understanding and Applying the new Research & Development (R&D) Product Service Code (PSC) structure to R&D Acquisitions	This course is designed to introduce users to the new R&D Product and Service codes and assist them in selecting the most relevant PSCs for R&D acquisitions. The PSCs have been modernized for the first time in approximately 40 years, leading to wide-spread changes in how R&D Products and Services are acquired, managed, and reported on. https://youtu.be/dl_GbQ8TXT8	PM, LCL, ETM
Other Government Innovation Trainings	Federal Laboratory Consortium: What is Technology Transfer	It is the FLC's mission to educate the federal tech transfer community --from newcomer to seasoned professional -- on best practices through in-person and online training. Technology transfer is the process by which existing knowledge, facilities, or capabilities developed under federal R&D funding are utilized to fulfill public and private needs. The videos included are an overview of the federal laboratory commercialization process and the impact technology transfer can have on our economy and everyday lives. Visit federallabs.org to learn more about the FLC and technology transfer.	PM, T&E, LCL, ETM
Non-Government Innovation Trainings	Georgetown: Business Essentials for Successful Managers Bootcamp	Taught by business industry experts and practitioners, this 10-week bootcamp features a blend of online lectures, class exercises, individual, and group work. You'll examine, discuss, practice, and reflect upon the qualities of any successful manager, including effective communication, supporting diversity, optimizing budgets and resources, and problem solving. Leveraging your personal strengths, this program will teach you how to increase team performance and achieve your organizational goals. By the end of the bootcamp, you will know the difference between a manager and a leader and when to be both.	PM, ETM
Non-Government Innovation Trainings	Georgetown: Business Essentials for Successful Managers Bootcamp	Taught by business industry experts and practitioners, this 10-week bootcamp features a blend of online lectures, class exercises, individual, and group work. You'll examine, discuss, practice, and reflect upon the qualities of any successful manager, including effective communication, supporting diversity, optimizing budgets and resources, and problem solving. Leveraging your personal strengths, this program will teach you how to increase team performance and achieve your organizational goals. By the end of the bootcamp, you will know the difference between a manager and a leader and when to be both.	PM, ETM, Bus-CE/FM
Non-Government Innovation Trainings	Harvard University: Disruptive Innovation: Leveraging Multi-Sided Platforms	This program examines what actually happens during the design, development, launch, and scaling of a digital platform business. Moving beyond theory, participants will explore on-the-ground challenges in strategy and management that building a successful multi-sided business platform entails. Participants will identify and develop the skills they need to grow—or compete with—a multi-sided platform venture.	PM, ETM
DAU Innovation Trainings	HBS 421 Innovation and Creativity	Teams that flex their creativity and innovate regularly are simply more successful than others. Learn how to unleash your curiosity, overcome barriers to innovation, take smart risks, and collaborate with others so your organization can continuously improve. You will learn to: Spark curiosity at work.	ETM

		Unlock curiosity at work. Develop innovative ideas. Take business-appropriate risks. Innovate through collaboration.	
DAU Innovation Trainings	HBS 422 Innovation Implementation	Enough talk—it's time to make innovation happen. Transform your idea into a new product, service, or process that will make a real impact to your team, organization, and customers. You will learn to: Identify opportunities for innovation. Focus on your most promising innovations. Test and improve your innovations. Develop a network of supporters for your innovations. Learn from innovation successes and failures.	ETM, PM
Other DOD Innovation Trainings	Immersive Commercial Acquisition Program (ICAP)	Educate and provide top DoD contracting officers with experience on how to effectively acquire innovative commercial technologies from non-traditional defense contractors.	ETM, PM
Other DOD Innovation Trainings	Industrial College of the Armed Forces: Private Sector Fellows Program	Evaluate domestic and international industry, and the government-private sector interfaces that support the national innovation and defense industrial base, to develop and execute resourcing strategy.	BUS-CE/FM, ETM, PM
Other DOD Innovation Trainings	Innovation Project Leaders	The defense acquisition system can be slow and complex – it needs to be hacked! Innovation Project Leaders teaches students to apply lean innovation methodologies to defense acquisition problems. This five-week graduate-level course teaches soldiers modern innovation and entrepreneurship techniques while solving real defense acquisition problems. Soldiers will learn the same proven innovation skills taught to graduate students in over 50 universities across the country. This class focuses on filling a critical missing skill in the capabilities development process – defining evidence-based product features. Learning this skill provides soldiers with the ability to affect emerging capabilities across the development spectrum from the detailed product specifications of a project already in development to the requirements for a new Capabilities Development Document (CDD). Technical experts from the Army Research Laboratory, tech companies, universities and the capabilities development community will work with soldiers to develop real solutions to real problems that can really be implemented. Soldiers will present their final projects at the end of the course.	PM, LCL, ETM, BUS-FM/CE
Non-Government Innovation Trainings	Johns Hopkins University: Applied Innovation for Technical Professionals	"Fail fast", "crowdfunding", "agile", "open innovation"—the nature of innovation is radically changing in the 21st century. How can technical professionals thrive amidst the new models, tools and processes that are creating faster cycles of disruption? This course will address challenges faced by technical managers in creating and sustaining innovation across a wide range of organizations and environments: from government labs to Fortune 1,000 companies to small businesses and startups. Students will learn the many issues involved in turning creative ideas into a product or service and how to gain support for projects, demonstrate value of the innovation, scale to a profitable venture, and sustain the innovation through successive competitive life cycles. Students will also learn about the challenges and techniques for sustaining innovative cultures in large organizations and how to foster "intrepreneurship"—the concept of creating innovations within the processes and cultures of an already established organization. Case studies and interviews with experienced senior managers will provide students with the latest real-world insights. Course Note(s): The weekly seminar-type presentations/discussions are attended via web meeting. Please refer to the course schedule for updated information.	ETM, LCL
Non-Government Innovation Trainings	Johns Hopkins University: Management of Innovation	A critical issue for entrepreneurs and technical managers is how to translate opportunity into competitive advantage. This course explores the management of innovation, including the technical transition of applied R&D into products, the planning and launching of new products, and product management. Management of discontinuous technologies will be explored. The impact of competition by the introduction of new discontinuous technology will be addressed. Managing engineers through the creative process, as well as innovation and technological evolution, will be covered. The course includes both formal and guest lectures. Case studies will be used as an important learning vehicle.	PM, ETM
Non-Government Innovation Trainings	Korn Ferry: Innovation Fundamentals for Defense: 1 Day Program	Our mission succeeds or fails on our ability to re-think challenges, seize new possibilities, and turn new ideas into action faster than ever. Sponsored by the Defense Innovation Unit, Innovation Fundamentals is our an intensive, one-day experience designed from the ground-up to help you think, feel and act as a modern defense innovator. Delivered by defense experts at Korn Ferry, one of the world's foremost experts in leadership development, Innovation Fundamentals combines practical lessons from game-changing businesses with the psychology of behavior change. The result is an intense one-day program tailored to help you become the force that helps make change happen in our unique context.	PM, ETM, BUS-FM/CE

Other DOD Innovation Trainings	Marine Innovation Unit: Marine Expeditionary Force (MEF) Innovation Team (MIT)	Provides a mutual, innovative medium with an opportunity for Marines in the MEF to communicate their ideas, grow innovative knowledge and insight, mass observations and results to (re)assess emerging capability requirements, and incorporate a cyclical process using the aspects of design thinking based on the warfighting attributes. The MIT's mission is to educate, collaborate, and accelerate the application of technologies and design thinking toward MEF priorities to transition the MEF to the future operating environment by challenging conventional approaches.	ETM, LCL
Other DOD Innovation Trainings	METC (Medical Education and Training Campus) Technology Innovation Group	The team, made up of mostly METC instructors, operates four main lines of effort to progress curriculum and instructional delivery that will allow METC students and other trainees to gain exposure to a variety of technological aids that augment the learning environment. These four lines of effort are virtual/augmented reality, 3D printing, video/podcast production, and machine learning/artificial intelligence. "We are a group of volunteers with a passion for innovation and technology that emphasizes a 'grassroots' approach to solving problems around the TRG," stated Air Force Master Sgt. Brian Hermes, an instructor in the METC Radiologic Technologist program and the Alamo Spark lead.	PM, ETM, LCL, CON
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Fundamentals of Integrated Photonics	Are you an engineering student or early- to mid-career engineer, in a specialty area that is rapidly adopting optical and photonics-based materials or device designs, to create innovative systems solutions for modern high-tech applications? Are you seeking a comprehensive and yet succinct introduction to silicon-based integrated photonics? Do you want to promptly acquire a common lexicon and technical perspective to help you begin to envision new application-specific systems components, that can leverage the unique optical functions of integrated photonics? Welcome to Fundamentals of Integrated Photonics: a self-paced, modular gateway course that upskills you in the foundational principles of silicon-based materials and devices, and in integration design strategies for planar photonics links. Silicon-based integrated photonics is a modern engineering technology that caps thirty-plus years of research and development, into hybridizing the information-relay capacity of optical fiber telecommunications, with the processing infrastructure of microelectronics. While the early days of silicon photonics presumed this synergy to enable ever-higher computational performance for microprocessors, the last two decades have begun to open up transformative new opportunities for it in cloud computing datacom, microwave and millimeter-through terahertz wireless, chemical and biological sensing, augmented imaging, and quantum computing area applications—in addition to next-generation telecom.	PM, ETM
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Integrated Photonics Simulation Library	In this introductory course, you will explore a library of interactive web simulations that help you build intuition for PIC component design. You will move beyond ray optics to learn the basics of modal analysis and mode superposition using novel methods of 2D and 3D data visualization. The simulations, videos, and exercises will help you gain an advanced foundation in integrated photonics that will be useful for both novice and expert PIC designers alike.	T&E, PM, ETM
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Integrated Photonics Test: Passive Devices	Prof. Hu (MIT) reviews test characterization methods for passive integrated photonics components, including fiber-to-chip coupling schemes, waveguides, spirals, Mach Zehnder Interferometers, Y-splitters, ring resonators, and directional couplers. Waveguide characterization will focus on loss and dispersion measurements, and examine wavelength and polarization dependencies. Prof. Jaime Cardenas (U of Rochester) will offer his expertise in Design for Manufacturing (DfM) and testing at a wafer-scale. This three-week asynchronous course will be released in Spring 2021.	PM, T&E, ETM
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Photodetectors and Modulators for Silicon Photonics	The course will discuss the basic principles of designing and fabricating photodetectors and modulators for silicon photonics. The devices are often fabricated in research fabs but can easily be adapted for the use of PDKs. The first part will review photodetector requirements and the materials and device designs that can meet those requirements. Examples of fabricated photodetectors will be given and simple process flows will be discussed.	PM, T&E, ETM
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Photonic Integrated Circuits 1 (PIC1) Fabless Design of Photonic Integrated Circuits within the AIM Photonics Foundry	The course is structured around the design of a basic transceiver, and starts off with an overview of fabless PIC design followed by a review of passive photonic devices (waveguides, bends, splitters/combiners, interferometers). You're then walked through the process of designing the transceiver chip with a focus on two active devices (electro-optic modulator, photodetector). The course highlights device compact models as the PDK methodology for flexible simulation and layout of PIC chip designs, and rigorously trains you in EPDA industry-standard software.	PM, ETM, CON
Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing) : Photonic Integrated Circuits: Sensors	Have you wondered about how a PIC sensor works? This new course covers the basics of photonics chem-bio sensing components and techniques. This will provide learners with insights that will lay the foundation for them to envision their own PIC sensors. They will learn to make judicious decisions regarding wavelengths, materials platforms, light sources, spectrometers, and photodetector solutions based on their desired application. The course includes a diverse line-up of invited lectures with leading-edge PIC sensor experts from around the world, who review critical metrics for designing photonics sensing systems.	PM, ETM, BUS-FM/CE

Other DOD Innovation Trainings	MIT IKIM (Initiative for Knowledge and Innovation in Manufacturing): Understanding Cost and Environmental Impacts of Photonics Manufacturing	Can sustainable integrated photonics be produced cost effectively? The goal of this class is to make students aware of the key cost and environmental issues in integrated photonics manufacturing and to expose them to the core methods of evaluating production cost and environmental impact. Specifically, these tools are process-based cost modeling and environmental lifecycle assessment. This course was developed to cultivate awareness of these issues and the corresponding analytical tools within designers of photonics integrated circuits, but the strategic nature of these topics makes the content relevant for most individuals engaged in design, production, or marketing of such products. The course includes a diverse line-up of invited lectures with leading-edge experts from around the world, who review critical methods for evaluating photonics.	PM, ETM
Other DOD Innovation Trainings	National Intelligence University: MST 656 The Economics of Technology	This course examines resource allocation, intelligence collection, and strategic philosophies from an economic perspective, as they jointly apply to technology and innovation. At the completion of the course, the students will be able to assess how technological innovations are affected by various economic inputs and how those innovations are then applied to benefit the nation's ability to develop its defense. Practical knowledge gained in the application of this course will partially fulfill U.S. congressionally mandated reforms within the acquisition and intelligence interface.	PM, ETM, BUS-CE/FM
Other DOD Innovation Trainings	National Intelligence University: MST 659P Research, Development, Test, and Evaluation (RDT&E) Intelligence (former MST 698R)	This course examines principal facets of science and technology intelligence (S&TI): security, intelligence, and counterintelligence aspects of worldwide scientific research, development, test, and evaluation (RDT&E), and system acquisition. The economic drivers and effects of technical innovations are studied, with special attention to disruptive technologies that have large and rapid social, economic, or military consequences. Worldwide academic, commercial, and government research in physical science, biomedical science, and engineering is considered, as well as the acquisition processes used to design and deliver innovative devices and systems, and to verify that the devices and systems meet their design requirements. These matters are viewed from an intelligence and counterintelligence perspective, with an eye to how they can be exploited or disrupted.	PM, ETM
Other DOD Innovation Trainings	Naval Post Graduate School: Applied Design for Innovation (697)	This curriculum provides students with experiential learning around the challenges of innovation. Students will use a blend of design-thinking and analytic social science methods to engage in the problem-framing, ideation, creative collaboration, and stakeholder engagement necessary for successful innovation. This curriculum is designed to meet the changing needs of Special Operations, partners and allies in the context of rapidly changing technology and Great Power Competition.	PM, ETM
Other DOD Innovation Trainings	Naval Post Graduate School: INFORMATION SYSTEMS MANAGEMENT (870)	The Information Age has generated a revolution in the means in which we conduct business and warfare. New technologies have changed the traditional views of the marketplace, supply chain management, and logistics. As the range and complexity of computer applications have grown, the need to manage and exploit those resources has increased. This curriculum provides both the technical skills and business acumen to deal with a constantly evolving digital world. The information Systems Management (MBA) curriculum provides the knowledge skills and competencies to: • Manage the acquisition of Information Systems. • Manage Information Systems and infrastructure support afloat and ashore. • Solve Information Systems engineering and management problems individually and in teams. • Effectively manage and lead in today's constantly changing digital world. • Develop and implement effective strategies and policies to take advantage of technological opportunities and mitigate risk. • Assimilate new technologies and transform organizations, processes, and strategies to compete in the marketplace or on the battlefield	PM, CON, BUS-FM/CE, ETM
Other DOD Innovation Trainings	Naval Post Graduate School: SYSTEMS ENGINEERING AND ANALYSIS (308)	This curriculum is designed for combat officers, and will enable the student to exploit emerging technologies to achieve war-fighting advantages. The students will blend their operational experience with a thorough technical education to expeditiously integrate new technological capabilities into operational applications. The officer will be able to evolve current tactics and doctrine to expeditiously leverage imminent technological advances. This warfighting oriented program provides a solid understanding of the principles and applications of systems engineering, and employs these principles to gain insight into operational problems. This program includes a core of courses, in fields of modeling, simulation, weapons, and sensors that will enhance understanding and analysis of selected case studies and weapons systems. The program is designed as a highly integrated graduate education experience. There will be lectures, team projects, and individual research as well as seminars from visiting experts. Each arriving officer is evaluated for existing knowledge, skills and competencies and an individual course of study developed.	PM, LCL, ETM

Other DOD Innovation Trainings	Naval Post Graduate School: TEMASEK DEFENSE SYSTEMS INSTITUTE (TDSI) PROGRAM (MS	This joint Naval Postgraduate School (NPS) and National University of Singapore (NUS) program provides qualified personnel with an advanced understanding of the dynamic complexity of military warfare for exploiting emerging technologies to achieve war-fighting advantages. The joint curriculum provides a platform for the education and the integration of operational staff and defense technologists to plan, design, develop, create, operate and sustain Integrated Military Forces of the 21st Century. The first two quarters (six months) of the joint curriculum are conducted at NUS by faculty from NUS and NPS, and provide a firm grounding in key technical and project management skills. The third to sixth quarters (one year) are conducted at NPS, where the students will enter into designated specialization tracks such as Communication Systems, Sensor Systems, Operations Research, Information Assurance and Guided Weapons Systems. The students blend their operational experience with a thorough technical education to expeditiously integrate new technological capabilities into operational applications.	PM, CON, BUS-FM/CE
Other DOD Innovation Trainings	Naval PostGraduate School: Innovation Certificate	This certificate supports students who are working to bring innovation into adoption. The three courses teach how to design for a military environment, how processes of adoption work in organizations and communities, and how to learn the leadership skills to mobilize a community to adopt the innovation. The certificate includes a capstone project that applies the learning from the three courses to design a significant innovation and bring it into adoption in a military community. This certificate is delivered online with a mix of synchronous and asynchronous elements. It includes coaching for the capstone project. An optional in-person workshop will be offered for students who want to learn more about hands-on practices.	PM, LCL, ETM, BUS-FM/CE
Other DOD Innovation Trainings	Naval War College - EL 605 Science, Technology, and Strategy	What role does technology play in the development and transformation of strategic thought? At one extreme, some argue that technology is no more than strategy's handmaiden; others argue that technology transforms strategic thought by inventing new forms of action and destruction. This course eschews both extremes, arguing that new ways of understanding the history and sociology of science and technology demand new ways of understanding the dynamics of technology, strategy, and state power. Rather than study these domains separately, the course will use historical and contemporary materials to examine how new forms of scientific and technological knowledge shape, and are shaped by, strategic concerns. We aim to provide students with a toolkit to better understand the incorporation of technical knowledge into the modern state's strategic focus.	T&E, PM, ETM
Other DOD Innovation Trainings	Naval War College - EL 660 Cybersecurity: Preparing for a Post-Western, Hostile, Advanced Cybered World	The course will be an overarching look at the cybered world threat development. The course will examine wider issues where cyber space and other trends are likely to intersect to produce surprises for the U.S. and other civil digitized societies. The course will push the envelope to explore not only what exists today but what can be foreseen as likely sources of future surprise including emerging technologies such as artificial intelligence, and what trends we should follow to continuously recalibrate our anticipation of both technological and societal developments associated with cybered.	T&E, PM, CON, ETM
Other DOD Innovation Trainings	Naval War College - EL 681 Information Warfare, Electromagnetic Maneuver Warfare and Cyberspace Operations	This course examines the importance of the information environment in contemporary warfare, the emergence of cyberspace as a warfighting domain, and the challenges associated with the joint military operations, as it pertains to cyberspace and electromagnetic spectrum operations through electromagnetic maneuver warfare (EMW) and information warfare (IW). Today's operating environment requires commanders and their staffs to think beyond traditional military solutions. This is an area in which concepts are ever evolving, technology is nearly impossible to baseline, and available operational expertise is constrained. Throughout the semester, we will investigate and seek to understand how commanders can leverage IW, EMW and cyberspace capabilities in operational planning and execution.	ETM, CON
Other DOD Innovation Trainings	Naval War College - EL 780 AI for Strategic Leaders – Unpacking the Black Box	This is a project-based course which prioritizes seminar time for collaboration between student teams and external partners in industry, academia, operational units, and federally funded research and development centers. Students will identify an operational problem and design a proposal for AI-based solution in accordance with expectations and protocols of Defense authorities such as the Defense Innovation Unit and the Rapid Reaction Technology Office (DASD EC&P). The Chief of Naval Operations has prioritized the "integrat[ion] of decision science into leadership development […] to improve our understanding of human judgment and, through that understanding, improve decision-making and leadership" (FRAGO 01/2019). This course responds to this call and provides a team-based environment to learn fundamental concepts of data science and how they apply in operational contexts. The course will explore the strengths, weaknesses, opportunities of, and threats to systems employing Artificial Intelligence in its application to contemporary operational challenges	ETM, PM
Other DOD Innovation Trainings	NDU: ES 6104 - Innovation and Entrepreneurship in Defense Acquisitions	Sustaining a technological advantage requires defense acquisition leaders to balance on the edge of a coin. On one side, technological innovation continues to transform our world at an increasing pace. Examples include robotics, information and communications technology, genetics, nanotechnology, biotechnology, and more. On the other side, the decision support systems within the DoD progress at the same methodical pace. Thus the edge, where defense acquisition leaders operate, is a tension between the dynamic world of innovation and a defense acquisition process characterized by highly defined methods, budgets, schedules, and oversight requirements. Through a mix of seminar lessons,	ETM

		case studies, and guest speakers, ES 6104, seeks to understand how DoD acquisition programs can guide, enable, and leverage innovation. Field studies are planned for the Boston, MA, to explore government and industry innovation ecosystems	
Other DOD Innovation Trainings	NDU: ES 6134 - Industrial Mobilization and Competition	Industrial Mobilization and Competition (IMC) explores two capabilities required of the national security innovation and industrial base: (1) Mobilization in production to in response to conflict or national crisis ("sprint") and (2) competition in innovation to outpace and deter strategic rivals over the long-term ("marathon"). IMC investigates mobilization through explorations of history, modern challenges, and current policies and procedures. The course investigates competition by comparing innovation investment incentives and patterns relative to rival nations and evaluating the costs and benefits of active innovation policy. IMC further supports these investigations by examining the challenges, trends, and management of global supply chains	ETM
Other DOD Innovation Trainings	NDU: ES 6206 - Industry Analysis	The Industry Analysis (IA) course provides students with tools, frameworks, and vocabulary to understand firm behavior through the lens of firm leadership. By focusing on leadership incentives, the course identifies policy implications for government action – or non-action – in improving the ability of the related industry to meet national innovation and defense industrial base requirements in the context of strategic competition. These implications then support the student's Industry Study in developing policies to help industry improve or sustain its ability to meet U.S. national security requirements in the context of the 2021 Interim National Security Strategic Guidance and 2022 National Defense Strategy.	PM, ETM, BUS-CE/FM
Other DOD Innovation Trainings	NDU:ES 6105 - Leading Innovation in Business and Government	With the recent interest in bridging the gap between the U.S. military and cutting-edge companies in Silicon Valley, the DoD has come to recognize the value of leaders that can consistently create the conditions for innovation in organizations across a broad spectrum, from technology development to leadership of large military units. As such, this seminar begins to study how to lead innovation by investigating the topic through the lens of business theory, to include the writings of Harvard Business School Professor Clayton Christensen and other prominent authors and through the discussion of key case studies. Seminar members then apply this theory as they meet with business and government leaders from such organizations as the Defense Advanced Research Projects Agency (DARPA), In-Q-Tel, XPRIZE, Sirius XM, and Innovation Works to observe and discuss innovative business concepts and public sector acquisition policies and practices. Field studies are planned for the Pittsburgh, PA, robotics, and autonomous systems innovation ecosystem	ETM
Other DOD Innovation Trainings	Next Generation Materiel Readiness Forged through Data Advantage, Technology, and Innovation Symposium	Here, members of the maintenance and sustainment communities in both the public and private sectors discuss current and future initiatives and issues, share lessons learned, establish and maintain valuable networks, and recognize the best DoD maintenance units.	ETM, PM, CON
Non-Government Innovation Trainings	Northwestern: Leading and Sustaining a Culture of Innovation	This intensive program takes you through all the essential elements of creating, leading and sustaining a culture of innovation. Our expert faculty and industry-practitioners will guide you through an exploration of how to instill an innovation mindset within your organization, how to identify resources and commercialize innovation opportunities, how to foster innovative behaviors and values, how to build innovation capabilities and how to create an agile and innovative organization. Every participant will be coached on how to develop an innovation strategy for their own organization and an Innovation Culture Blueprint. Some participants will also present their strategy and blueprint to their peers.	PM, ETM, LCL
Other DOD Innovation Trainings	NSIN Bootcamp: U.S. Army XVIII Airborne Corps[14]	Together, we will transform XVIII Airborne Corps to meet the challenges of today and tomorrow. All of us, regardless of rank, are empowered to solve problems and identify opportunities to improve how we fight and how we support our people. We will establish the right culture, processes, and capture our initiatives in programs of record that will outlast all of us.	ETM, PM
Other DOD Innovation Trainings	NSIN Capstone: Arizona State University: National Security Academic Accelerator Program	NSA2 launched in 2021 as an exciting new partnership with the National Security Innovation Network. Its purpose is to leverage ASU's active presence in the defense innovation ecosystem to advance development of dual-use ventures capable of serving both commercial and defense markets. Throughout the fall and spring, participating teams engage with the Department of Defense, as well as with business development professionals and industry contacts and will engage with targeted training and mentorship experiences to move their ventures forward. ASU Capstone students developed a loading system with Naval Air Systems Command (NAVAIR) Cargo and Special Operations for the CH-53 Super Stallion, VF-22 Osprey, and CH-47 Chinook helicopters. In March 2022, the team traveled to Marine Corps Air Station Yuma to learn about the aircraft that they were working on and ask Marines questions to better understand how loading systems should function.	ETM, PM, LCL
Other DOD Innovation Trainings	NSIN Capstone:[15] Georgia Tech	Capstone students innovated a software application with U.S. Special Operations Command (USSOCOM) to modernize departure airfield control officers (DACOs) processes, adapting operational procedures such as personnel and inventory reloading onto aircraft during a crisis.	ETM, LCL
Other DOD Innovation Trainings	NSIN Capstone: Ohio State University	Students in the inaugural cohort of the Masters in Translational Data Analytics program at Ohio State University presented their Capstone solutions to DoD leadership at the end of the semester.	PM, ETM

[14] NSIN offers multiple "bootcamps" but this is the only one that had enough information to be integrated into the study.

[15] NSIN Capstones appear to be individual events. As the data represents a snapshot in time this data was included.

Other DOD Innovation Trainings	NSIN Capstone: San Diego State University and Rice University	NSIN Capstone students at San Diego State University and Rice University prototyped boats for the U.S. Coast Guard this semester. These student technologists improved coastal surveillance, detection, and interdiction capabilities against threats posed by the transit of drugs in autonomous surface vessels across the maritime border with Mexico and into California. The students at Rice University also received a cash award of $3,000 as the top innovation prize at the university's engineering design showcase event, Willy Revolution Awards for Outstanding Innovation.	ETM
Other DOD Innovation Trainings	NSIN Capstone: Texas A&M	Ten students improved a vital computer-aided design system with the guidance of mentors from the U.S. Army Combat Capabilities Development Command (DEVCOM) Analysis Center. The students also visited DEVCOM to demonstrate their prototype.	ETM
Other DOD Innovation Trainings	NSIN Capstone: University of Colorado at Denver	University of Colorado Denver (CU Denver) students in NSIN Capstone developed cost-effective solutions for first responders to communicate and navigate during indoor emergencies, working with staff and resources from the Air Force Research Laboratory (AFRL).	BUS FM/CE, ETM
Other DOD Innovation Trainings	NSIN Capstone: University of Hawaii	Capstone teams showcased their prototypes to over 70 people from the DoD, UH Mānoa faculty, and economic developers and researchers at Defense Powered by Innovation in April 2022.	ETM
Other DOD Innovation Trainings	NSIN Capstone: Wash U	WashU Capstone students presented Arctic research to National Geospatial-Intelligence Agency (NGA) at Moonshot Labs.	ETM
Non-Government Innovation Trainings	Penn State World Campus: CORPORATE INNOVATION AND ENTREPRENEURSHIP	The graduate certificate in Corporate Innovation and Entrepreneurship is a 12-credit online program for industry professionals who are interested in developing a knowledge base and skill set in the area of innovation and entrepreneurship in the corporate sector. The program focuses on all aspects of corporate innovation management, such as: ideation, product / service development, managing customer experiences, brand management, entrepreneurial leadership, innovation strategies and methods, developing innovative corporate cultures, leading innovative teams, benchmarking, competitor assessment, future trend tracking, new venture creation, and technology commercialization. The certificate is geared towards individuals working in small businesses, on up to and including global conglomerates, where innovation and continuous improvement are imperative. Individuals interested in launching startup companies will also find this program beneficial.	ETM
Non-Government Innovation Trainings	Penn State World Campus: ENTR 820 Corporate Innovation Strategies and Entrepreneurial Methods	Explores the methods used to foster innovation and entrepreneurship in a corporate setting, with a special emphasis on how organizations foster creativity, innovation, and new venture creation.	PM, ETM
DAU Innovation Trainings	PMT 4020 Executive Program Manager's Course	In the classroom (CLRM) Executive Program Managers Course (EPMC) you will: Capitalize on enhanced thinking approaches to evolve organizational constructs and portfolio strategies Optimize portfolio capabilities management by leveraging innovative approaches aligned to customer need and available resources Synthesize leadership styles and impact to balance resources with stakeholder expectations Construct governance processes to support successful capability delivery and sustainment Develop your workforce by aligning personnel to meet mission need while cultivating skills Employ Business Acumen to grow the industrial base and improve acquisition outcomes Strategize at the enterprise level to maintain alignment and awareness of key stakeholders IMPACT: EPMC is designed to increase the collaboration skills and leadership capabilities of leaders selected to serve as program and portfolio managers, and to provide the skills and abilities propelling them to be the top in their Service and DOD. EPMC takes a multidimensional approach to developing key leaders by combining lessons, reflective learning, self-evaluation, networking opportunities, and immersive simulations to provide attendees new insights and requisite abilities. During this three-week offering, you will: Conceive portfolio-level changes to improved future outcomes Develop and assess value propositions for innovative approaches Analyze portfolio-wide leadership styles to consider constraints and leverage diverse opinions Compile governance processes for organizational operation and capability delivery Evaluate business strategies and consider the impact on the industrial base Appraise stakeholder engagement to influence key relationships You will work with a team of faculty and peer experts from diverse business disciplines, providing in-depth knowledge in core areas including Thinking Models, Integration, Leadership and Management, Governance, Workforce Development, Industry and Stakeholder Engagement.	PM, ETM
DAU Innovation Trainings	PMT 4050 Leading Change to Drive Innovative Culture	The course is designed to take you on a journey of self-discovery with focused attention on practicing innovational techniques to address real world problems through simulation exercises. Enter the course with your team's wicked-hard-challenge and develop a breakthrough idea through peer-to-peer dialogue, simulation exercises and instructor-led training using intersectional thinking. Depart the course with a breakthrough idea for your team and expanded knowledge on innovational thinking for other challenges in your organization.	PM, CON, ETM

		Immerse yourself into several simulations and explore radically different thinking in pursuit of new breakthrough ideas for your team and program. Work in a peer-to-peer learning environment and grow through the art of team collaboration.	
DAU Innovation Trainings	SBP 102 Introduction to Small Business Programs - Part B	Only taught in VILT mode, see SBP 102V. The course goal for SBP 102 is to apply basic knowledge of the legislation, policies, acquisition process, and market research techniques required to advise stakeholders effectively, to advocate for small business participation in defense acquisitions, and to educate small businesses on doing business with the Department of Defense (DoD).	PM, CON
Other DOD Innovation Trainings	School of Advanced Air and Space Studies: SAASS 660 Technology and Military Innovation	This course presents theories and utilizes case studies to help students understand technological evolution throughout human history, from the Stone Age to Artificial Intelligence. It also considers why military organizations successfully innovate—or fail to do so. The course draws on theories of complexity, computation, and heterogeneous engineering, but also emphasizes the human and social aspects of innovation	PM, ETM
Other DOD Innovation Trainings	SOF Design and Innovation Basic Course - Virtual	Course is fully online blending asynchronous lectures students can watch at their own pace with scheduled faculty guided group video conferences. Faculty and students meet once per week for 3 to 4 hours. Course provides foundational military design education for students interested in organizational change, innovation, creativity and disruptive thinking for SOF applications in complex emergent contexts. Students learn how to operate in design teams, use a wide range of multi-disciplinary design concepts in a flexible, adaptive methodology for fostering reflective practitioners and change agents across the SOCOM enterprise.	ETM, PM
Other DOD Innovation Trainings	Squadron Officer School: Design Thinking	In Gen Brown's strategic approach for Air Force success titled "Accelerate Change or Lose," he calls on us to “place capability in warfighters’ hands faster—through innovation, experimentation and rapid prototyping, and a collaborative approach with our service and industry teammates.” The Strategic Design curriculum applies the team building techniques and leadership behaviors learned in the Leadership curriculum through the practice of human-centered design thinking, which is a set of activities used in industry to drive creative problem solving. Using a complex organization as the foundation, this curriculum is delivered in a series of workshops starting with empathy building and analysis, and working through problem definition, idea generation, low resolution prototyping, and testing. The Strategic Design week is aptly referred to as "Accelerating Change and Solving Problems Together."	PM, ETM
Non-Government Innovation Trainings	Stanford University: Achieving Innovation through Inspiration XINE110	It is often said that success is 1% inspiration, 99% perspiration. Ironically, teams tasked with growing business ventures often neglect the 1% that fuels the 99%. Inspiration isn’t something you wait for. It’s something you work for. With practice, you can approach the world as a rich source of raw material to provoke new ways of thinking, and benefit from diverse collaborators to get inspired when you need it the most. This innovation course equips you with the critical tools you need to consistently and repeatedly source inspiration and turn unknowns into radically new products and services. Use simple-yet-powerful tools to "think outside the box" and overcome business bottlenecks Collaborate effectively with your team and generate ideas that drive innovation Apply strategies for continuously filling your "Innovation Funnel" with great ideas Increase your likelihood of delivering breakthrough solutions, goods or services	PM, LCL, ETM
Non-Government Innovation Trainings	Stanford University: Building Company Culture XINE242	People are the heart and soul of your organization. The mindsets and values of your employees define your company and ultimately determine the experience of your customers. Knowing how to build processes that create, foster, and reinforce culture helps you stay true to your organization’s vision, even as it expands. In this course, you’ll learn how to thoughtfully and meaningfully grow company culture. Attract and hire the right employees Form, manage, and align effective teams Create incentives, offer feedback, and manage friction Rebuild or strengthen your existing company culture Operationalize company mindset and avoid losing your culture while scaling up	PM, ETM, T&E
Non-Government Innovation Trainings	Stanford University: XINE 214 Empathize and Prototype: A Hands on Dive into the Key Tools of Design Thinking	Move beyond theory and dive into hands-on practice in the art of innovation. In this course, you’ll be introduced to the key concepts and tools of design thinking by two of the Stanford d.school’s top design thinking practitioners. Through a series of application-based exercises, you’ll learn step by step how to approach new projects and challenges with the mindset of an innovative problem-solver. Build empathy with your customer to gain valuable insights Use rapid experimentation to prototype concepts quickly and effectively Gain early user feedback to reduce time to launch Synthesize your project findings into a compelling problem statement	PM, ETM, BUS-FM/CE
Non-Government Innovation Trainings	Stanford University: XINE 229 Leading Innovation	Do you have what it takes to inspire people to practice—rather than just talk about—innovation? In this innovation course, Professor Robert (Bob) Sutton digs into the differences between leading innovation and managing routine work. You’ll explore the hallmarks of skilled leaders with	PM, ETM

		a special focus on staying in tune with the people you lead. The course features interviews with four, star innovators: Sylvia Acevedo, tech executive, and entrepreneur; Michael Dearing, venture capitalist, and senior business strategy leader; Perry Klebahn, Director of Executive Education at the Stanford d.school; and Carl Liebert, global business leader. Embrace "failure" and learn from it Foster innovation by combining creativity with practical application Build and maintain a motivated, cohesive team of doers Lead organizations and teams through challenging times Turn knowledge into action by overcoming common traps that prohibit the implementation of innovation	
DAU Innovation Trainings	STM 0010 Prototyping and Experimentation	This Online Training (OLT) course provides an overview of the role of prototyping and experimentation in the DoD acquisition process, the fundamentals of prototypes and experiments and the process for planning and executing prototyping projects and experiments. It is based on the DoD Prototyping Guidebook and the DoD Experimentation Guidebook	T&E, ETM
DAU Innovation Trainings	STM 1010 Introduction to DoD Science and Technology Management	This online training (OLT) course provides an introduction to the management of developing and transitioning new technologies from the Department of Defense research enterprise to its customers, including acquisition programs, warfighters, and industry. It provides an overview of the role of science and technology in the systems acquisition life cycle. The course focuses on the processes, techniques, policies and best practices that will be employed to ensure the Department is investing in appropriate technologies and that those technologies are refined, matured, and protected to be ready for use in a timely fashion to provide its warfighters with the technological edge needed to accomplish their mission.	PM, ETM
DAU Innovation Trainings	STM 2040 Technology Project Management	This Online Training (OLT) course provides select topics, procedures and mechanisms that can be used to develop and transition new technologies into the DoD's warfighting systems. It provides learners with the opportunity to identify strategies to achieve project goals, identify project planning activities, determine appropriate science and technology business arrangements, identify elements of a project technical review, and identify why technology transition is challenging and important.	PM, ETM, T&E
DAU Innovation Trainings	STM 204V Intermediate Science and Technology Management	This virtual instructor led training (VILT) course provides Science and Technology professionals with an understanding of the procedures and mechanisms that can be used to develop and transition new technologies into the DoD's warfighting systems. It provides students with the opportunity to apply critical skills in areas such as technology evaluation, budgeting, schedule management, contracting strategies, transition agreements, risk/opportunity management, intellectual property, and technology verification. Students apply these skills in evaluating a set of technologies as they progress from applied research to the point of transition to a program of record.	PM, ETM
DAU Innovation Trainings	STM 304V Leadership in Science and Technology Management	The virtual instructor led training (VILT) course is designed for senior DoD science and technology managers, this course focuses on the application of leadership skills within DoD science and technology organizations. It emphasizes the principles of strategic planning, technology roadmap development and technology portfolio development prioritization and evaluation. The course challenges students to think critically in instructor facilitated exercise to make sound recommendations on which technologies to pursue consistent with organizational core functions, customer requirements and technology opportunities.	PM, ETM
Non-Government Innovation Trainings	Temple University: Innovation Strategy	A graduate certificate in Innovation Strategy is an efficient, high-impact program that prepares the next generation of innovation leaders and high-potential employees to build agile organizations, strategically drive innovation, and make decisions appropriate for the rapidly changing global competitive landscape. It is part of a system of entrepreneurship and commercialization support programs offered by the Innovation and Entrepreneurship Institute (IEI).	PM, LCL, ETM
Non-Government Innovation Trainings	Texas A &M: BUSA 516 - Emerging Technologies and Business Innovations	This course covers emerging technology applications in business analytics and management. The hands-on course contents include the mechanisms of new technologies and how managers can integrate technology innovations into their decision making process.	PM, ETM
Non-Government Innovation Trainings	UC Berkeley: Innovation Management	This 1 unit elective provides an in-depth look at the discipline and function of innovation management. The class begins by answering the questions, "What is innovation, innovation management, and how does it differ from product management". Modules then cover setting an innovation strategy, building support structures inside firms, managing innovation pipelines and processes, and creating a holistic innovation culture. Last, students will get an in-depth look at a "day in the life" of an innovation manager and finish with a class project.	PM, ETM
Non-Government Innovation Trainings	UC Berkeley: Special Topics in Technology Innovation and Entrepreneurship Topic: Future of Technology: How Innovators Critically Examine Game Changing and Time Wasting Technologies	Why did Altavista fail, and Google succeed? Same for Myspace and Facebook? Was it technology, marketing, people, luck, execution, or something else? It is trivial to discern good ideas and profound technological shifts after the fact. But how could you become your own futurist and learn to analyze emerging trends and foretell the outcome? We will study and analyze both failures and successes in virtual reality, blockchain, artificial intelligence, healthtech, and other technologies. Students will conduct literature reviews, netnographic analysis, and case studies in order to identify patterns that they could later apply to their own research, career decisions, or entrepreneurial ventures. The format of the class will include lectures, guest speakers from distinguished entrepreneurs and innovators, peer-reviewed presentations,	PM, LCL, ETM

		quantitative and qualitative data gathering, and group exercises. Students will produce a technical report highlighting the barriers for adoption of emerging technologies. The report has the potential to be published and added to your professional portfolio. Critical thinking and the ability to question everything are the only prerequisites for this analytical survey course. This class is open to students from all majors and levels. Some seats in the class may be reserved for students in certain majors to ensure that we have the appropriate mix of technical backgrounds, but the remaining seats are open to anyone. SCET welcomes students with diverse backgrounds, perspectives and skills to join our collider environment where we create new ideas!	
Non-Government Innovation Trainings	UC Berkeley: Special Topics in Technology Innovation and Entrepreneurship Topic: Leadership Exploration and Discovery (LEAD)	Leadership Exploration and Discovery (LEAD) prepares technical and business minded students to be leaders at any level of a technology organization. Instruction in this class takes many forms including individual learning through assigned reading, videos, case studies and self-assessments; and in-class learning with lectures, immersive activities, and dynamic guest lecturers. Throughout this course, you will learn who you are as a leader and how you can become the leader you want to be. This course explores key leadership concepts relevant to the high-technology world in firms of all sizes from startups to large corporates. Topics include leadership traits and characteristics, leading when not in charge, leading through change / uncertainty / chaos, creating and leading teams, effective leadership communication, leading remote / distributed workforce, how to promote innovation, and leadership tools and techniques. This is an introspective course. Students who push themselves to explore what is important to them and who they are authentically be as a leader will gain the most from this course. This course will immerse students in entrepreneurial leadership concepts, principles, mindsets, behaviors, and philosophies necessary to thrive in technology firms today. The course focuses on building skills such as leading effective teams, leading product decisions, leading in uncertainty, and effective communication. The class will explore leadership at all levels from individual contributor to founder and CEO, and students will examine techniques required for success in various entities. Students will get a sense of how leadership impacts an organization, and how they can lead, grow, and improve to ensure their organizations are effectively led. The goal is to arm students with specific knowledge both about leadership and about themselves for them to be effective leaders now and into the future.	PM, ETM, LCL
Non-Government Innovation Trainings	UMBC: Entrepreneurship, Innovation, and Leadership	This certificate has an emphasis on diffusing innovation and design thinking. It is intended for someone who wants to drive change through innovation and incorporate innovative practices in their workplace. Students will learn to successfully harness, promote and diffuse innovation and an innovation mindset across all levels of an organization. Students will learn the models of innovation to prepare individuals in leadership positions for effective decision-making. Students will learn to foster an innovative environment of communication and collaboration, including how to identify the Rules of Engagement in a collaborative environment, spot the barriers to collaboration, and see the difference between getting collaboration right and wrong. Students will learn how to find and frame problems in creative ways using techniques such as ethnographic observation, prototyping, storytelling, journey mapping, value chain analysis, and divergent/convergent idea generation.	PM, ETM, BUS-FM/CE
Non-Government Innovation Trainings	University of Maryland: ENES463 Strategies for Managing Innovation	Emphasizes how the technology entrepreneur can use strategic management of innovation and technology to enhance firm performance. Examines the process of technological change, the ways that firms come up with innovations, the strategies that firms use to benefit from innovation, and the process of formulating technology strategy. Provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.	ETM
Non-Government Innovation Trainings	University of Maryland: ENES660 Fundamentals of Product Management	Provides a comprehensive survey of product management and its growing role in producing technology-driven products that customers love. Guides students through the product lifecycle and market lifecycle, diving into the competencies needed at each stage. Topics include startup and corporate strategy, product strategy, vision setting and evangelism, development lifecycle approaches based on customer involvement and product stage, the various types of innovation at each stage of the lifecycle, and how the product manager leads the team through it all. Learn the basics of customer discovery, product discovery, product delivery, and the core-context model for managing products through maturity.	ETM
Non-Government Innovation Trainings	University of Maryland: ENES662 Innovative Ideas and Concept Development	Enables aspiring entrepreneurs to understand the content, methods, and models for new venture opportunity assessment and analysis. Focuses on how to identify and analyze entrepreneurial opportunities for technology-based ventures by first understanding the personal self and decision-making factors. Explores how to evaluate new venture opportunities and challenges within industries and markets.	BUS-FM/CE, PM, ETM
Non-Government Innovation Trainings	University of Maryland: ENES663 Strategies for Managing Innovation	Emphasizes how innovative leaders can use strategic management of innovation and technology to enhance firm performance. It helps students to understand the process of technological change; the ways that firms come up with innovations; the strategies that firms use to benefit from innovation; and the process of formulating technology strategy. It provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.	ETM
Non-Government Innovation Trainings	University of Maryland: ENES464 International Entrepreneurship and Innovation	Focuses on the need for every entrepreneur and innovator to understand the global market in today's hypercompetitive world, and to appreciate how to compete effectively in domestic markets by managing international competitors, suppliers, and influences. Explore how the distinction between foreign and domestic markets is becoming less pronounced. Develop skills to identify and manage opportunities on a global basis.	ETM

Non-Government Innovation Trainings	University of Michigan: EMGT 500 Management for Engineers	This course provides the knowledge, skills, and attitude required to manage an efficient and productive engineering organization within the company, and manage effectively at upper cooperate levels. Topics include: integrating and coordinating people, functions and projects; managing technical resources; leadership and management; strategic planning for integrating and transferring technologies into products and processes; managing innovation, ethical behavior and legal compliance.	PM, ETM
Non-Government Innovation Trainings	University of Michigan: EMGT 535 Marketing Mgt and Policy	This course studies the salient features of technology-driven marketing and distinguishes technology-push from market-pull marketing. Highlights the technology-marketing interface in the context of strategy planning, market segmentation, product innovation, channels of distribution, promotional and pricing decisions. Particular attention will be paid to technology inventor-user interactions, process of adoption, and technological innovation. (College of Business).	ETM
Non-Government Innovation Trainings	University of Michigan: OM 662 Product Development & Tech Management	The objective of this course is to provide in-depth knowledge of the frameworks, policies, and issues that arise in the design and development of new products and the management of technology. In particular, the integration of new product development and innovative technology management within a supply chain forms the basis of knowledge offered in this course including the set of activities and processes associated with new product introduction and the development of new technologies. Topics include the product design and development phases, firm capabilities, product architectures, the make vs. buy decision, supplier involvement, industrial design, design-for-manufacturing, prototyping, and the management of technological change. Part of the course is project-based and covers modern tools and methods for product design and development. Prerequisite(s): OM 521 or IMSE 580 or EMGT 520	PM, T&E, ETM
Non-Government Innovation Trainings	University of North Carolina: Carolina Graduate Certificate in Innovation for the Public Good	The certificate provides graduate-level training that teaches students how to: Focus innovation designs around the voices, experiences, wishes and aspirations of those affected by the innovation. Develop an understanding of their own experiences, intentions, strengths, limitations, motivations and biases as changemakers. Identify, define and analyze problems. Recognize opportunities, challenges and the assets of communities. Generate optimal solutions by applying social innovation in practice. Understand how the context of problems and imagined solutions affects the way innovations are designed and implemented. Recognize and assess the strengths and limitations of various social innovation approaches – and identify which are most appropriate in specific contexts. Engage stakeholders in the co-design, implementation, evaluation and adaptive learning associated with an innovation. Build and maintain collaborations and partnerships in support of shared mission over time.	PM, ETM
Non-Government Innovation Trainings	University of Notre Dame: National Security Innovation	National Security Innovation is a University 3-credit hour course in collaboration with the Department of Defense that teaches students to work with the Defense and Intelligence Communities to rapidly address the nation's emerging threats and security challenges. Military and government civilian leaders understand and appreciate the global missions of the Department of Defense and the most pressing challenges that threaten our national security. From inside the Pentagon, the challenge collaborators meet with student teams virtually for one-hour each week to frame the challenge and share resources that inform the team's activities. The teaching team facilitates these meetings to ensure they are productive conversations.	PM, ETM
Non-Government Innovation Trainings	University of Virginia: Innovating for Defense	In this course, students will work on real problems facing the U.S. Department of Defense. Students will study the structures and processes of the various national security agencies and how those agencies approach the problem of innovation. For most defense institutions this is a combined problem of technology, policy, and law. Multifunctional student teams made up of students from each of the School of Engineering and Applied Science, the Batten School, the School of Law, and the College of Arts and Sciences will work together through the semester on an actual problem submitted by DoD to the class. As part of the course, student teams will prepare a series of project updates along with a draft and final project presentation.	ETM, CON
Non-Government Innovation Trainings	University of Washington: Introduction to Technology Commercialization	Explores essential business, legal, engineering, and other skills necessary to take new technology from research to market. Covers intellectual property, market analysis, licensing, funding mechanisms such as venture capital, and product marketing. Presenters are entrepreneurs and successful business-people representing a broad range of areas relating to the commercialization process.	PM, ETM
Non-Government Innovation Trainings	Utah State: TESY 4330 - Product Innovation Processes, Tools, and Strategies	In this course, students experience the processes, tools, and strategies used by new product developers in industry. The course encompasses strategies for production, development, innovation, and management.	PM, ETM
Other DOD Innovation Trainings	William & Mary: National Security Innovation Network (Hacking 4 Defense)	The National Security Innovation Network sponsors programs at 50 nationwide universities. Sometime referred to as Hacking for Defense (H4D), it is designed to provide students the opportunity to learn how to work with the Department of Defense (DoD) and Intelligence Community (IC) to better address the nation’s emerging threats and security challenges.	PM, LCL, ETM, T&E

Appendix B. Initial Innovation/Tech Adoption Training Resource List

- AF Techstars Accelerator
- AFWERX
- Air Command and Staff College
- Air Force Institute of Technology
- Air Force Research Lab
- Air University
- Air War College
- Allied Space Accelerator
- Army Applications Lab
- Army Research Lab
- Army SBIR/STTR
- Catalyst Accelerator
- College of Naval Command and Staff
- College of Naval Warfare
- Command and General Staff College
- Command and General Staff School
- DAF MIT AI Accelerator
- DARPA
- Defense Acquisition University
- Defense Innovation Marketplace
- Defense Innovation Unit
- DOD Labs
- Doolittle Institute
- DreamPort
- ERDCWERX
- Expeditionary Warfare School
- FEDENSEWERX
- Hyper Space Challenge
- Industrial College of the Armed Forces
- Joint Forces Staff College
- JOINT SPECIAL OPERATIONS UNIVERSITY
- Marine Corps Command and Staff College
- Marine Corps University
- Marine Corps War College
- Marine Innovation Unit
- Maritime Advanced Warfighting School
- MGMWERX
- National Defense University
- National Intelligence University
- National Security Innovation Capital
- National Security Innovation Network
- National War College
- Naval Postgraduate School
- Naval Research Lab
- Naval War College
- NavalX
- Navy SMIR/STTR
- Other Transaction Consortia
- Rapid Innovation Fund
- Rapid Reaction Technology Office
- School for Advanced Leadership and Tactics
- School for Command Preparation
- School of Advanced Air and Space Studies
- School of Advanced Military Studies

- School of Advanced Warfighting
- SOFWERX
- Squadron Officer School
- Starburst Accelerator
- STRIKEWERX
- T3Accelerator
- U.S. Army War College
- U.S. Army Warrant Officer Career College
- United States Army Command and General Staff College
- United States Army War College
- United States Army Warrant Officer Career College
- xTechsearch

Appendix C. Key Term Report Definitions

Architectural innovation	A type of innovation that combines existing services, products, processes, services, products, and/or policies in a novel way (e.g., Joint Warfighting Concept).
Disruptive innovation	A new service, product, process, structure, or policy that creates an outsized impact on an existing system or market (e.g., e-commerce impact on the retail market).
Facilitator	An individual who helps bring about an innovation-adoption outcome by providing indirect or unobtrusive assistance, guidance, or supervision during the innovation-adoption journey.
Incremental innovations	Minor improvements to existing services, products, services, products, processes, services, products, and policies (e.g., Standard weapon life cycle replacement).
Innovation	The development of a new or significantly changed service, product, process, structure, or policy.
Innovation (tech transition) journey	The process that occurs when an innovation is identified, developed or acquired, integrated, and adopted by the intended users enabling a system to leverage the innovation's value.
Innovation Change Agents	The organization(s), leader(s), facilitator(s), and end-user(s) who are a part of the innovation-adoption journey.
Innovation phases	Identification, acquisition, and integration/acceptance.
Innovator	An individual or team who initiates the conceptualization and/or development of a new or significantly changed service, product, process, structure, or policy .
Leader	A person with a vested interest in, authority over, and responsibility for an organization’s performance.
Legacy sectors	Established, complex systems or organizations that are resistant to radical or disruptive innovation(s).
Organization	A structured entity comprised of a collection of people formed to achieve a particular purpose.
Policy	An implemented procedure or protocol.
Process	A formalized series of actions or steps taken to achieve a particular end;
Product	Manufactured or refined goods
Radical innovation	A new service, product, process, structure, or policy that changes the way we defend our nation.
Service	An offering that does not involve manufacturing goods;

Structure	An organizational system that determines roles, responsibilities, and information flow; and
User	An individual within an organization who uses a service, product, or process and is directly impacted by structure or policy.

Appendix D: Survey

Section 1: Identifying Information

1. What unit or organization do you represent?

2. What courses and/or training related to innovation and emerging technology transition does your organization offer?

3. What courses/training do you engage with directly?

4. What is your role within this organization?

- ◯ Instructor
- ◯ Administrator
- ◯ Program Director/Lead
- ◯ Other (please specify)

Section 2: Course Information

5. Is there a cost to take this course?

6. How many in-class hours does your class take to complete?

7. Does this course provide accreditation or certification to a professional series?

8. What professional series (MOS, etc.) comprise the students taking this course?

9. If you collect workforce post performance metrics from course participants, please list them below.

Section 3: Course Content

10. What functional areas, if any, are covered in this course?

- [ ] Business: Cost Estimating
- [ ] Business: Financial Management
- [ ] Contracting
- [ ] Engineering and Technical Management
- [ ] Emerging Technology Identification and Capability Planning
- [ ] Emerging Technology Operations Training Integration
- [ ] Emerging Technology Operations and Contingency Planning
- [ ] Life Cycle Logistics and Sustainment
- [ ] Program Management
- [ ] Requirements Development
- [ ] Return on Investment Analysis
- [ ] Test and Evaluation of new capabilities
- [ ] Test and Evaluation of emergent technology in the field post operations
- [ ] Other (please specify)

11. What Innovation Phases are covered in your course?

- ( ) Identification
- ( ) Acquisition
- ( ) Integration

12. What educational background is required to take this course?

13. What work experience is required to take this course?

Section 4: Future Plans

14. What updates, if any, do you plan to make to your course?

15. Are there any other related courses you plan to implement? If so, please describe them briefly.

16. What topics are needed to better prepare the services for innovation and emerging technology transition.

17. Are you aware of additional programs that exist outside of the Department of Defense that offer strong education and training opportunities in this area? Please include private sector or academic institutions.

Acronyms and Abbreviations

Adaptive Acquisition Framework	AAF
Defense Acquisition University	DAU
Department of Defense	DoD
Department of Navy	DoN
Federal Acquisition Regulations	FAR
integrated logistics services	ILS
Naval Special Warfare Command	WARCOM
Office of Naval Research	ONR
other transaction authorities	OTA
peer, near-peer	P-NP
product support manager	PSM
Resources and Requirements Directorate	N8
test and evaluation	T&E
university affiliated research centers	UARC
urgent operational needs	UONs
Virginia Tech Applied Research Corporation	VT-ARC

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[xxi] ONR Interview

[xxii] Duffie (2022)

[xxiii] Task Force Ocean

[xxiv] WARCOM Interview

[xxv] Joint Innovation Enterprise Approach

[xxv] Extend Office