DEFENSE INNOVATION BOARD
Open Meeting Minutes
January 17, 2018
2:11 PM to 4:30 PM
1776 offices at Crystal City, Suite 1000
Arlington, VA, 22202

The Defense Innovation Board (DIB) is a federal advisory committee within the Department of Defense (DoD) operating pursuant to the Federal Advisory Committee Act of 1972, the Government in Sunshine Act of 1976, and other appropriate federal regulations. The DIB meets quarterly and held its fourth public session on January 17, 2018 from 2:11 PM to 4:30 PM in the conference room of 1776 at Crystal City, VA.

DIB Members (voting)(8)
- Dr. Eric Schmidt (Chair)
- Dr. Adam Grant
- Ms. Marne Levine
- Dr. Eric Lander
- Dr. J. Michael McQuade
- Mr. Milo Medin
- Dr. Richard Murray
- Ms. Jennifer Pahlka

DIB Staff Support (non-voting)(9)
- Mr. Joshua Marcuse, Executive Director
- Mr. Michael Gable, Designated Federal Officer
- Ms. Francine Anderson
- Ms. Bess Dopkeen
- Ms. Courtney Greenley
- Mr. Nicolas Lopez
- Mr. Aaron Schumacher
- Ms. Alexandra Curnin
- Mr. Alexander Kravets

Guest Presenters (6)
- Honorable Ryan McCarthy
- Sharon Woods
- Margaret Palmieri
- Morgan Plummer
- Lieutenant Colonel Dave Blair, U.S. Air Force
- Major General Kim Crider, U.S. Air Force

Public Session Attendees (217)

Livestream Participants (72)

Public Commenters (6)
- Colonel Chad Hartman, U.S. Air Force
- Ms. Michelle Asherson
- Mr. Lawrence Grega
- Mr. Joe Schuman
- Mr. Josh Darrow
- Mr. Andrew Hunter

PUBLIC MEETING SESSION

At 2:11 PM, Mr. Michael Gable, Designated Federal Officer (DFO), opened the public session and welcomed the members of the public and those joining over the livestream hosted online.

Mr. Joshua Marcuse, Executive Director, introduced the Defense Innovation Board members and explained the agenda for the meeting. He thanked 1776 for hosting the meeting and for all of their support. He then turned the meeting over to the Chair, Dr. Eric Schmidt.

Dr. Schmidt thanked Mr. Marcuse and said that the Board was happy to be back at 1776 and thanked them for offering their venue. Dr. Schmidt went on to announce the Board's recent decision to produce a written report codifying their findings related to software acquisition and practices in the Department, which was undertaken at the behest of the U.S. Congress.

Dr. Schmidt then began to introduce four new recommendations that had been produced by the Board, which are focused on the themes of speed, agility and flexibility. Dr. Schmidt went on to say that these themes would form the backdrop of the day's subject matter expert testimony, and would ultimately be voted on and deliberated at length by the panel. Dr. Schmidt then asked Mr. Marcuse to introduce the first expert, current Under Secretary of the Army, Mr. Ryan McCarthy.

Mr. McCarthy began by thanking the Board members for their willingness to contribute their time and expertise to help strengthen the Department of Defense's ability to meet international objectives. Mr. McCarthy outlined the gravity and importance for the U.S. military—and Army in particular—to adapt and change its ways in order to maintain our cutting edge and technological advantages, and to stay abreast of our adversaries. He admitted the required large-scale reform to be no small task, and that a change of this scale had not been attempted by the Army since the 1970s.

Mr. McCarthy went on to describe the context for the Army's current need for reform, which in his view has been predicated upon the nearly two-decade focus on sustaining and supporting ground force operations in Iraq and Afghanistan. While Mr. McCarthy emphasized the success in these efforts, he argued that the military threats of the future will likely be starkly contrasted with those that have faced U.S. military forces in the past several decades. Mr. McCarthy proceeded to describe a number of recent demonstrations by the Russians of battlefield technology that illustrated the types of modern threats the U.S. Army needs to match, and stated that these events prompted him to request from Army Chief of Staff, General Milley, a list of top priorities for Army modernizations. These priorities are: the development of a long-range precision capability that improves upon existing munitions, range, and acquisition capabilities; improved manned units with upgraded defensive, offensive and targeting systems; future vertical lift systems, both unmanned and manned; improving existing Army command and communication networks to enable success in low-signal and cyber-contested environments; improving our existing air defense networks to protect ground forces from drones and other modern air technologies; and the development of improved foot soldier defensive and offensive capabilities. Mr. McCarthy emphasized that developments in artificial intelligence, energy technologies, automation and software were crucial to the accomplishment of each priority.

Mr. McCarthy stated these priorities were additionally important due to the ease with which many modern technologies can be proliferated, such as drones and cyber capabilities, and emphasized how far behind the commercial sector the Army was in the development of these systems. Mr. McCarthy emphasized the need of shifting Army development focus from large, hardware-focused projects to streamlined, agile development cycles that encourage innovation and trial and error.

To accomplish this, Mr. McCarthy said the Army has already established cross-functional teams comprised of military, industry and technology experts to lead pilot initiatives to demonstrate how the Army can implement agile methods for technology development, and announced the intention to establish an Army Futures Command by the end of the summer which would merge roles from traditional commands into a new authority tasked with improving the Army requirements process.

Mr. McCarthy went on to describe that ultimately any effort in reforming the Army will have to include a focus on the culture and technical competencies of Army staff, and emphasized the importance of incentivizing talented individuals to work for the Army and government. Mr. McCarthy closed his comments by emphasizing what he believed to be the crucial role the Defense Innovation Board has to play in helping the Army and DoD as a whole to address these challenges.

Dr. Schmidt proceeded to ask Mr. McCarthy to go into additional detail regarding what the Army is looking to accomplish in the establishment of its Futures command, and how that effort was going to go about tackling the six priority areas Mr. McCarthy had outlined.

Mr. McCarthy began by saying that one of the fundamental purposes of the Futures Command was to streamline the process by which requirements are established, stating that in the past many projects were slowed by an overabundance of stakeholders. Mr. McCarthy went on to say that a unified Futures Command was necessary to the development of future technologies and platforms, given their overlapping applications and the importance of combined arms.

Dr. Schmidt thanked Mr. McCarthy for his remarks. Then, Mr. Marcuse introduced the next keynote speaker, Defense Digital Service General Counsel Sharon Woods.

Ms. Woods opened her remarks by introducing herself, stating that while she is officially the general counsel for the Defense Digital Service, she additionally has a background specializing in federal acquisitions of information technology. She proceeded to give a brief overview of the mission of the Defense Digital Service, indicating its goal is to bring private sector best practices to the way the DoD buys, builds and deploys software, focusing on stalled and failing software practices. Ms. Woods went on to say there are four major takeaways from the work of the DDS that she wanted to share with the audience.

Ms. Woods began by emphasizing that the first step in the acquisition process needs more emphasis to analyze and determine whether or not agencies need to build new systems or buy and adapt existing solutions. She claimed that the market research component of acquisitions

decisions was too often overlooked, leading to decisions to build entirely new solutions when customization could be made to existing market products. Additionally, she emphasized the importance of using open-source software development wherever possible.

Ms. Woods's second point was to stress the importance of having more meaningful engagement with end users in the technology development lifecycle. Due to certain DoD procedures and requirements, it is not always possible for developers to maintain such contact throughout the development lifecycle, which can negatively affect the utility of the end product.

Ms. Woods next mentioned that she feels there is a cultural disconnect between some end-users and the DDS development lifecycle. Typical DDS projects are relatively inexpensive, and can take as few as six months to produce a deployable minimum viable product. Many users and program officers are far more comfortable with being told that projects will require tens of millions of dollars, and take two to three years. Ms. Woods said this is a significant cultural challenge to improving software acquisition.

Ms. Woods's last point of focus was to emphasize the importance of having a software developer with actual coding experience included in all phases of the acquisitions process. If there is not a knowledgeable coder sitting at the table during the acquisitions process, the end product will almost always fall short of its full potential, Ms. Woods said.

Mr. Marcuse thanked Ms. Woods for her words, and went on to introduce the next speaker, Margie Palmieri, director of the Digital Warfare Office.

Ms. Palmieri began her remarks by stating that the Navy is dealing with increasing competition and congestion in its continued operations on the land, air and sea. Ms. Palmieri stated that in the last 25 years, there has been a 400 percent increase in congestion on the seas. She stated that the focus of her remarks is related to the incredible opportunity the Navy sees in using digital technologies to speed capability, improving readiness and operational advantages in the years to come.

Ms. Palmieri next discussed the importance on making changes to how we design, develop and field capabilities in the Navy in order to take advantage of modern technology. She said that the backdrop of the organization was largely designed to be core to the Navy, with direct influence on the organization's mindset.

Ms. Palmieri emphasized the overarching importance of data and data-processing for the future of U.S. Navy competitiveness. She emphasized that both the ships and submarine platforms that comprise the fundamental core of the Navy's strength, as well as the human capital that enables them, are in today's world increasingly connected and empowered by software and data-processing systems. Recognizing the importance of working to improve the methods by which the Navy harnesses data, Ms. Palmieri's office launched several pilot programs, which she stated she would go on to share with the audience.

Ms. Palmieri stated that design, and how design decisions are made is an incredibly important and sometimes overlooked component of improving acquisitions. Recognizing the importance of

including end-users and mission beneficiaries in the design process, Ms. Palmieri's team set up a pilot program, which they termed as a digital factory, to combine designers, end users and program managers to design, test and field solutions in a six-month timeframe. Ms. Palmieri described another large program, which was the Digital Warfare Office's F-18 readiness program. Given the tactical role of the F-18 platform, system readiness is of the utmost importance, and Ms. Palmieri said that it was the Navy's belief that the F-18 readiness levels were becoming a problem. To tackle this, Ms. Palmieri's team put together a group of cross-disciplinary experts including data scientists and enlisted seamen and officers to come up with potential solutions to improve readiness. The team came up with two potential solutions. The first involved establishing a more transparent and cohesive pool of data related to each part of the aircraft that would be visible throughout the upkeep and maintenance process across stakeholders. The second was to create a predictive maintenance system which was comprised of digital part tracking and visualization programs that enabled maintenance crews to develop a better understanding of which parts break down the fastest, and within roughly what timeframe. Ms. Palmieri concluded by saying that while these programs have proven the great potential impact digital innovation can have on the Navy, there remains much work to be done, in particular with regards to the management and treatment of data.

Mr. Marcuse thanked Ms. Palmieri for her words, and went on to introduce Morgan Plummer, director of MD5.

Mr. Plummer began by thanking Mr. Marcuse for his kind introduction and for having the opportunity to speak. Mr. Plummer described MD5 as a national security innovation coordinator, encouraging streamlined, rapid prototyping with a focus on connecting national security stakeholders with the venture capital and academic communities. Mr. Plummer stated that he feels there are three great challenges facing innovators within the Department of the Defense. The first of these challenges is what Mr. Plummer termed the challenge of personality, which is represented by the fact that many young innovators in the DoD initially find traction with larger than life personalities who act as champions. However, Mr. Plummer said, given the rotational nature of the DoD as a human resources organization, this often ends up being a short-lived experience when those mentors move on to their next assignment. Mr. Plummer identified the second challenge as one of culture, in which the problem-solving mission of innovators is often perceived as less important or worthy of attention than the more tactical, downrange work done by many offices in the DoD. Mr. Plummer then described the third, and largest, challenge to innovation as one of managing individuals and human talent, which is stymied due to the legacy human resource management systems built into the Department of Defense.

Mr. Plummer went on to describe several examples of programs that MD5 has been working on to bring innovation into the Department of Defense. Mr. Plummer's first example was introduced as a form of mobile innovation boot camp, which could be deployed throughout the DoD to instruct military personnel in various innovative practices and techniques such as agile development and Lean Startup methodologies. Additionally, Mr. Plummer announced that MD5 had launched an online innovation portal called Innovation Challenge which provides young DoD innovators the ability to upload innovative ideas and proposals to a platform that provides direct access to senior leadership. The final program Mr. Plummer described relates to rapid prototyping, which MD5 is encouraging through some of its outreach programs in academia.

Mr. Plummer concluded his comments by recognizing the often lonely and challenging path faced by individual innovators attempting to effect change within DoD. Mr. Plummer closed by describing how crucial the element of networking is, and emphasized the importance that MD5 puts on connecting innovators throughout the DoD ecosystem.

Mr. Marcuse thanked Mr. Plummer for his words, then introduced Air Force Lieutenant Colonel David Blair, an advisor for special operations and drone operator.

Lt Col Blair began his remarks by thanking the Board for extending him the offer to speak. Lt Col Blair stated that while much of the narrative of innovation in the Pentagon involves the challenges of DoD's many layers of bureaucracy and procedures, for the operators and personnel at the tactical edge, there remains great passion in implementing innovative methods.

Lt Col Blair said that while the United States has historically been great at innovating, it has not excelled at institutionalizing its greatest inventions. Lt Col Blair used submarines as an example, stating that while the United States utilized submarines in the Revolutionary and Civil wars, it was the Germans who fully developed and implemented them to great effect in the early 20th century. Additionally, Lt Col Blair highlighted the fact that we often have great and underutilized human resources within the DoD, but that standard practices for evaluating personnel capability do not fully capture all of the talents of our servicemen and servicewomen.

Lt Col Blair next said that he was becoming concerned that while the United States struggles with adopting innovative ideas proposed by our personnel, other countries may start succeeding at these challenges.

Lt Col Blair said that he believes one of the keys for improving the rate of innovation within DoD was to provide platforms to disseminate the stories of successful innovative experiments within the military. He highlighted several examples of organizations that are enabling this, including SOFWERX and AFWERX, which he felt were helping to change the culture to allow innovators cover for attempts that may or may not succeed. Lt Col Blair concluded his remarks by emphasizing the importance of creating a form of protection for innovators to break through the cultural and institutional obstacles which prevent them from experimenting with new ideas.

Mr. Marcuse thanked Lt Col Blair for his remarks, and introduced the next speaker, Air Force Chief Data Officer, Major General Kim Crider.

Maj Gen Crider opened her remarks by thanking the Board for the opportunity to speak, stating it to be a pleasure to be a part of such a talented panel of experts. Maj Gen Crider said she was particularly excited to be speaking so recently after the launch of the Air Force's first AFWERX innovation hub in Las Vegas, which would host an online portal for Air Force innovators to collaborate and exchange ideas.

Maj Gen Crider stated AFWERX is an innovation hub located in Las Vegas just outside Nellis Air Force base in close proximity to academia, and is meant to connect scientists, business leaders and engineers with the Air Force to find solutions to the Air Force's most pressing

challenges. Maj Gen Crider said that in addition to AFWERX, the Air Force has regional Spark Offices at the base level, the first of which is located at Travis Air Force. The purpose of this Spark Office, Maj Gen Crider said, was to recognize and foster the amazing innovation already existing among airmen, encouraging the longevity of great innovative ideas. One example Maj Gen Crider mentioned from the Travis Air Force Base office was an innovative change to Airmen noise-cancelling headphones on the flight line, which had yet to become part of the flight line kit capability. Maj Gen Crider stated the Air Force additionally has Spark Tanks, which host contest competitions in partnership with the Air Force Research Lab, calling for proposals for innovative ideas. She continued, saying the Spark Tank selects finalists from proposed ideas, culminating in presentations to Air Force leaders. Community development at the national level is an Air Force priority, Maj Gen Crider mentioned, so AFWERX locations host meetings each week to discuss Air Force challenges and solicit ideas from event participants.

Maj Gen Crider also addressed some of the higher-level efforts the Air Force is making to improve collaboration between innovators. She stated the Air Force is actively working across the DoD with MD5 and other innovation organizations to build a portfolio of curricula spanning the spectrum of innovation education. These curricula will range from basic topics such as innovative design thinking and startups, all the way to competitively-selected training programs which would offer more advanced design thinking and industry internships. The purpose of the competitive programs, Maj Gen Crider said, is to build a cadre of cross-function innovators.

Additionally, the Air Force is looking into leveraging cutting-edge technologies and design thinking principles to improve how Air Force personnel learn and structure their training programs, Maj Gen Crider continued. She stated the Air Force has a concept called Pilot Training Next, which is aimed at addressing the urgent pilot training challenges the Air Force has by exploring technology-enabled solutions to completely change how the Air Force approaches pilot training. The variety of technologies, she stated, would include virtual and augmented reality, advanced biometrics, and artificial intelligence and analytics, all of which would tailor education environments to individual students, improving the way we train our aviators.

Maj Gen Crider moved on to discuss the Air Force's efforts to improve business processes in support of improved innovation. She stated that all of the technologies and methods being discussed within the innovation community—such as Agile development, lean methodology, DevOps, blockchain, and machine learning—need to be better understood by Air Force leadership and commanders in order for them to understand and empower the innovation efforts of their Airmen. Maj Gen Crider thanked the Board for the opportunity to share her remarks.

Mr. Marcuse thanked Maj Gen Crider, then turned the meeting over to Chairman Schmidt and the Board.

Eric Schmidt thanked Maj Gen Crider for her remarks, saying that the Board is very eager to work further in support of her innovation efforts. He added that the innovation efforts within the Air Force are exactly the type of efforts the Board would like to see throughout the military.

Dr. Schmidt stated that the Board had four recommendations to discuss in the public forum.

The first recommendation, he said, is the creation of a fast-track for technology initiatives. He asked Milo Medin, who had worked on the recommendation, to lead the Board's discussion.

Mr. Medin began by stating that one the larger challenges within DoD is managing the timeliness of acquisition and implementation activities. He said the Board was trying to form a recommendation to find a way to bridge the gap of something often referred to as the valley of death, in which ideas often are waylaid between proposal and implementation. Mr. Medin stated that, while he did not believe the Board had yet arrived at a recommendation that was actionable, he had come to the belief that with the appropriate computing power, the DoD's S&T organization would be able to make significantly faster progress in tackling software programs on its own. He added that even for many hardware related programs, software has become a significant and important component. Mr. Medin stated that despite the great activities of organizations like Strategic Capabilities Office (SCO) and Defense Innovation Unit Experimental (DIUx), there remained a space within S&T for some improvements in internal software development and fast-tracking, and that the Board was aiming to have its recommendation ultimately address this problem. Mr. Medin said that he also believes that some of the work with the section 809 teams may help address reforming and improving the baseline software adoption process. He finished his comments by saying he aimed to continue to discuss this topic further with additional stakeholders and internally before coming up with a recommendation specific enough to be voted upon. Mr. Medin then asked the Board if they had any questions.

Dr. Schmidt asked Mr. Medin whether or not the coming Departmental reorganization in February would affect the recommendation, or if the recommendation itself was meant to be timed with the reorganization. Mr. Medin replied by stating that he was currently unaware of any details related to the proposed reorganization, and therefore would not be comfortable to comment on that for the moment.

Dr. McQuade added that the perspective he and Mr. Medin had regarding the recommendation was influenced by numerous examples of the past several decades where organizations had established some form of a rapid capabilities office at one time or another. Dr. McQuade said that part of the challenge the Board faced was figuring out the right balance between giving innovators and developers the freedom to experiment with their development while also having some sort of formal codification procedure that would be inherent in introducing a fast track capabilities office. It was their goal, he added, to figure out what the right balance would look like, and where it would reside, in order to avoid redundancy with existing efforts.

Mr. Medin added that he particularly liked Ms. Woods' comments regarding the fronted management and assessment of the complexity of the system. He said that one of the things the Board had found in their work was that the ability to triage the scope of a particular problem at the beginning was incredibly important. He added that in some instances, from a compute-difficulty perspective, problems which seemed particularly challenging were actually quite trivial. He felt that understanding the difference between the truly difficult problems and those that were straightforward was going to be a very important initial step for whatever recommendation they eventually develop.

Dr. McQuade commented that he felt that a crucial element for their recommendation was to move away from a cost-based or milestone-based management scheme and transition toward a time-based model. He hoped to see an effort to hold programs accountable to the goal of having an effective minimum viable product by the end of a specific timeframe.

Dr. Schmidt added that in an earlier version of DARPA, there was a shot clock system where developers had one year to build projects, and a second year to develop them into a translation point. He added that if the projects didn't translate after those years, the project was cancelled, without any possibility for extensions. Dr. Schmidt asked Mr. Medin to confirm that he was not looking for a vote at this point and instead preferred more time to develop this recommendation.

Mr. Medin replied that yes, while he was serious about furthering the Board's understanding on the topic, he was not ready for a vote at that time.

Dr. Schmidt responded by asking if the Board agreed that this recommendation was particularly interesting, and that they wanted more time to continue to pursue it. The Board members all responded verbally at once in the affirmative. Dr. Schmidt then turned things over to Dr. Grant to discuss the next potential recommendation.

Dr. Grant opened his remarks by introducing the recommendation, which centered around creating a structure for incubating and executing new ideas from the field. He added that Ms. Pahlka had initially brought up this idea in the Board's October 2017 meeting. He restated that the basic idea they have is there are many innovative ideas that arise in the field but are very quickly struck down or never given a chance. He then asked the audience to give a show of hands of how many people had ever had an innovative idea in the military, but had it rejected by a superior. Dr. Schmidt confirmed the majority of the audience raised their hands. Dr. Grant then asked the audience for a show of hands for who had ever seen an innovator leave the military after not having been promoted. Dr. Grant continued by saying that it had become clear to the Board that some new ideas are stifled because they come at the cost of efficiency, or are often just too new and unknown to people. He also added that the Board has previously heard from people in the military that are hesitant to implement certain ideas simply because they have never heard of them before.

Dr. Grant continued the discussion by claiming that some of the individuals in the Department who persisted in tackling problems with innovative ideas were often not promoted because of their efforts, and that the "up or out" system was losing talented human capital. He and the Board felt it was important to find a way to identify service members with a track record for innovating, but without necessarily a desire to continue to progress in the military, and give them an opportunity to harness their innovative thoughts and contributions. He added that the basic idea of the recommendation is to identify and provide these individuals a forum to connect with each other and capture their innovative power regardless of whether or not they stay in the military. Dr. Grant then turned the floor over to the Board for further deliberation.

Dr. Murray stated that he felt this was a good idea, and one that companies often deal with, and that perhaps there were analogues within the private sector for dealing with these types of human

resource challenges.

Dr. Schmidt affirmed that within the tech industry there are management and technical tracks that are equivalent all the way up to the top of the firm, with both sides working together. He felt that some model with general officers paired alongside technical officers might be analogous and a useful model to explore.

Dr. McQuade said it was important to understand what human capital policies would need to be created versus reformed, and that it would be important to find a balance between overly formalizing a process and still finding a way to give structured encouragement.

Dr. Schmidt then asked Dr. Grant if he was ready to move forward with a formal vote on the recommendation. Dr. Grant declined, signaling their intent to continue to flesh out the specifics of the recommendation.

Dr. Schmidt thanked Dr. Grant, and turned the floor over to Ms. Levine for the next topic.

Ms. Levine opened by saying that she felt the Board had made a lot of progress on her recommendation, and that the Board was likely to be ready to vote on it. The recommendation was to create a new I+STEM career field within the military, with the "I" standing for innovation. She stated this originated from the fact that the character of warfare was changing rapidly, and that wars of the future would require innovation and STEM skill sets. This was to include traditional STEM fields but also areas like data science and rapid capability development and acquisition. She stated that although department leaders already considered this area to be core skill set, the existing personnel structure did not reflect their centrality, and there is not a pathway for individuals to advance in their military career while pursuing expertise in these areas. She added that many individuals with these skills ended up either feeling underutilized or quit the military altogether to pursue opportunities within the private sector.

She continued by saying that while the previous recommendation touched on this problem by offering a way to harness exceptional innovation and talent by removing a small cohort of top talent from the traditional human resources structure, this recommendation was a complimentary approach which aimed to establish an I+STEM specialization within the existing system by creating a new career field, affecting a larger cohort of people. She added that this approach was not dissimilar from similar occurrences when the DoD created special tracks for needed skill sets such as nuclear propulsion, aviation, space and missile defense, information operations, and special operations. Ms. Levine continued that this approach was not dissimilar from something she had experienced within Facebook, when the firm needed to build out an artificial intelligence (AI) competency from scratch. She stated that this not only required recruiting new talent, but additionally involved training existing members of the workforce who were interested in learning new critical skills. She said the firm built an AI immersion training program in which programmers could learn new skills. Following this, the programmers were offered the option of either returning to their old teams, or continuing in AI-specific research groups. She stated that by building an AI-specific employment opportunity for employees, the firm was able to retain top talent and channel it toward filling a critical need for the company. Ms. Levine believed one of the reasons this approach was successful was because it utilized both people's strengths and

enjoyment. Ms. Levine stated that from research conducted by Dr. Grant and the Facebook people analytics team, they have learned that people who stayed at the company found their work enjoyable 31% more often, and used their strengths 33% more often. She continued by stating that offering opportunities for skill-related career growth and training is the best method to retain those individuals with natural propensities for certain skills. Ms. Levine felt that in order to channel these individuals' capabilities, it was necessary to break up the dichotomy of either developing STEM skills or advancing in their career. She added that there were already some small-scale examples of this happening within the military. Her first example lay within the U.S. Marine Corps, where Marines were using the MOS (military occupational specialty) function to break the dichotomy between advancement and specialization in skills. This recommendation, she said, was to formalize this process and scale it across the DoD.

Ms. Levine then cautioned that before bringing this recommendation to a vote, she wanted to acknowledge some of the risks that come with creating an I+STEM career track. She stated that she recognizes that developing an innovative career field risks creating an isolated group, as well as the perception that innovation is the specific responsibility of select individuals as opposed to something all DoD personnel should aim to understand and embrace. To ensure that I+STEM is integrated throughout the department, she suggests designing a model that allows individuals to cycle between innovation specific positions and assignments in their current field. Additionally, she reaffirmed that if I+STEM is implemented in this way, this recommendation will help build the Joint Force the DoD needs in order to address the changing nature of warfare.

Dr. Schmidt posed a question, asking whether or not a cyber officer about to be transferred into a non-technical position would have an opportunity to continue down an I+STEM path should this recommendation be implemented. Ms. Levine responded by saying that while she felt those specific details needed to be fleshed out in the future, in general the idea would be to allow that individual the opportunity to stay in I+STEM and still get a promotion.

Mr. Medin felt that the key element to this recommendation was that it would help alleviate the burden of continually contracting out technical skills by developing an internal pool of knowledge and capabilities, and expressed his full support for the recommendation.

Dr. Grant added that he felt this recommendation was particularly interesting since it enabled the opportunity to integrate I+STEM field individuals into existing traditional force structures.

Dr. McQuade stated that the issue they are particularly trying to solve is not related to the contractor or civilian workforce; rather it is aimed particularly at those in uniform who want to remain within a technical role.

Dr. Schmidt jumped in, asking what thought the Board had given to the challenges with civilian and contractor related skill development. Ms. Levine replied that the focus of the Board had been on uniformed personnel, and that specifics on that would need to be investigated and discussed further.

Dr. Schmidt thanked her and emphasized that he would be in favor at some point doing a separate piece of work looking at whether or not there were any disincentives to civilians

remaining in technical roles as well.

Dr. Schmidt asked Ms. Levine whether or not she recommends the Board approve the recommendation, to which she replied yes. Dr. Schmidt asked the Board if there was any further discussion on the issue, and if the Board agreed on approving the recommendation. The Board replied unanimously in favor of approval.

Dr. Schmidt turned the floor over to Ms. Pahlka to discuss the next recommendation.

Ms. Pahlka introduced the next recommendation to establish technology and innovation training for DoD senior leaders. She continued her opening remarks by using a comic strip panel to illustrate a current challenge within the DoD. Ms. Pahlka referenced a comic strip from the XKCD series in which a character indicates it will take a significant amount of time, study and resources to verify the categorization of a particular animal. Ms. Pahlka stated the point of this joke was to illustrate the difficulty in intuitively understanding what is difficult or not in computer science for those without a STEM background. Ms. Pahlka added that this is a challenge she understands personally, as she herself has had to develop an understanding of science and technology in her private sector work without having had formal training in STEM subjects. Ms. Pahlka stated that while she and the Board have been very inspired by the caliber of DoD leaders they have met, many currently lack the understanding of computer science that the Board feels would be necessary to make basic intuitive judgements of STEM-related issues at a high level.

Ms. Pahlka emphasized that the Board did not believe DoD leaders should develop STEM skill sets, rather they need education to be able to make informed decisions to help foster best practices in STEM-related fields and programs. Ms. Pahlka believed that if DoD leaders were provided with the tools, knowledge, and strategies to harness technology and innovation, they would understand how these technologies affect national security, and would be better at helping innovation succeed. Ms. Pahlka stated that education and training in these fields would be a great step forward to empowering leaders to be able to manage innovators within their ranks. Ms. Pahlka added that this initiative should be accompanied by existing programs that are occurring at the grassroots level throughout the Department, such as the Air Force's collaboration with MD5. She concluded her comments by stating that the Board believes not just senior officers, but also junior and mid-level officers should have the opportunity to be educated on these subjects to make use of innovative forces throughout their careers. Ms. Pahlka then opened the recommendation to the Board for deliberation.

Ms. Levine began by asking Ms. Pahlka what the largest pitfalls would be in this recommendation. Ms. Pahlka mentioned two particular pitfalls she hoped to avoid. First, that the recommendation would only end up focusing on senior officers, emphasizing the importance on giving all officers the opportunity for this training. Second, she cautioned DoD leaders that these educational initiatives should not be referred to as learning new technologies, but rather learning approaches to technology, and suggested that the use of the term technology may give leaders the wrong impression that they are expected to become technically proficient in innovation and software capabilities.

Dr. Lander strongly affirmed that this recommendation would have incredible importance in improving the Department.

Dr. Schmidt then asked the Board if all were in favor of approving the recommendation. All Board members unanimously signaled approval. Dr. Schmidt recognized the vote, summarizing that two recommendations were approved and two required further work. Before moving to the next section, he asked for any final comments from the Board.

Dr. Lander briefly noted that he was more and more impressed with the examples of innovation he had seen within the DoD, stating that in more and more places there were signs of live examples of innovative practices occurring. He emphasized that the more examples you have in the years to come, the easier the job of education will be within the Department.

Dr. Schmidt then turned to Dr. McQuade and Dr. Murray, asking for an update on the progress on the software study.

Dr. McQuade first stated the software study was tasked by Congress through the Fiscal Year 2018 National Defense Authorization Act to complete a one-year study on streamlining software development and acquisition regulations within the DoD. The Board's focus was to improve the effectiveness of software adoption, identify case studies for best and worst practices, and make recommendations for legislative and non-legislative reforms. Dr. McQuade emphasized software as being naturally different from hardware, making its acquisition inherently different. He also mentioned the cyber elements related to software are very different from hardware-based threats. Given the diversity of different types of software, he claimed it is the Board's working assumption that there would not be one solution to fit all software challenges. Dr. McQuade said while the Board had made some progress, they had yet to arrive at an answer to what specific recommendations would or would not come out of the results of this study. Dr. McQuade then turned the floor over to Dr. Murray.

Dr. Murray stated that their intention was to avoid doing yet another acquisition study, and instead bring a modern approach to analyzing how machine-learning driven data analysis could play a role in analyzing the software acquisition process. He explained that the Board took a wide approach to the subject, investigating within Silicon Valley how large private organizations are using machine-learning technologies for data analysis. He also said the Board wanted to investigate if it were possible to avoid manual, small-sized data sets, which are often out of date as soon as they are produced, and instead look at large data sets to conduct machine-learning techniques. However, Dr. Murray cautioned that it was still unclear what form their recommendations would take.

Dr. Schmidt asked Dr. Murray to clarify if the study would address both software on DoD weapon systems as well as software for business operations.

Dr. Murray responded affirmatively, stating that it was their intent to address how various types of software should be acquired and developed with DoD.

Dr. Schmidt asked if there were any additional comments to be made on the subject. After

recognizing there were not, he turned things over to Mr. Marcuse.

Mr. Marcuse made several highlights on the DoD's progress in implementing previous Board recommendations. He began with the Office of the Deputy Chief Management Officer, which is working to build fast, interactive learning experiences to improve innovation workforce capacity. He spoke of the National Geospatial-Intelligence Agency's declaration to make innovation recruiting a priority. Mr. Marcuse highlighted that the Office of the Assistant Secretary for Defense for Research and Engineering had assembled a working group to develop an AI strategy. He mentioned that DoD was creating a new Office of Strategy & Design to improve acquisition processes within the DoD and assist with the reorganization of the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. Additionally, Mr. Marcuse described how the Air Force was making progress in better acquiring micro, nano and low-orbit satellites within their Rapid Capabilities Office. Mr. Marcuse referred to a secured "DevOps" program at the Joint Improvised-Threat Defeat Organization to improve the rapid collection, fusion, and dissemination of operational data, which helped address the Board's latest recommendation on treating data as a strategic asset. Finally, Mr. Marcuse ended his remarks by stating that the Defense Innovation Board launched a new website: innovation.defense.gov.

Mr. Marcuse then transitioned into the public comments session.

PUBLIC COMMENTS

Colonel Chad Hartman, U.S. Air Force, stated that although the DoD was developing "DevOps" environments, they do not fit within the traditional paradigm when it comes to R&D funding. While Col Hartman felt that some of the progress had been made because the Air Force was benefitting from being in a bit of a gray space, he thought it was important to look ahead and recognize that at some point the DoD would need to reconcile the gaps between the traditional development procedures and the accomplishments made by these experimental acquisition efforts.

Ms. Michelle Asherson opened by saying she had several items to share as food for thought with the Board. The first was, rather than creating a separate I+STEM career track parallel to traditional career tracks, they should make a minor or innovation specialization that personnel could attach to the existing roles, and reserve billets within posts that are tagged for innovation specialists. An example of this would be to have personnel spend a rotation at a location like DIUx or innovation command, then follow on and spend an additional rotation at an innovation tagged command, effecting more rapid inculcation of innovative thinking throughout the service. Her second recommendation was to establish a STEM reservist corps. She mentioned that DHS has a stage program where they establish critical technologies where experts are needed to be on call. She suggested encouraging civilians to volunteer to be on call for a technical specialist service role. Ms. Asherson next suggested emphasizing existing tools and CRADAs, which she felt were not very well understood, and could be better leveraged throughout the military.

Mr. Lawrence Grega introduced himself as a large proponent of innovation. He noted the

importance of action, advice, and awareness in improving the way the Department deploys and acquires innovation. He also mentioned the importance of cyber personnel, and argued that the Department should encourage retirees and civilians to contribute to advisory groups that could serve the DoD with their expertise.

Mr. Joe Schuman began by expressing his appreciation for the I+STEM recommendation, though he recommended the recognition of one caveat. He felt there was a population of individuals in the public who desired to contribute to military service, but for one reason or another were prevented by bureaucratic processes from joining. Mr. Schuman suggested finding a way to tap into this group of individuals as a way to bring in STEM skills to the Department.

Mr. Josh Darrow mentioned he found that the length of acquisition time, information stovepipes, and loss of technical expertise within the workforce were the largest challenges for innovation in DoD. He reflected that we have lost technical know-how following the end of the Cold War. He felt that while DoD recruits high caliber engineers out of school, they often lack the experience necessary to build the world class expertise the Department needs. He proposes that if government engineering organizations had the responsibility to design, build, and test prototypes, in addition to developing the expertise that can only come through engineering experience, it could also help counter some of the pain points surrounding data sharing.

Mr. Andrew Hunter thanked the Board for its comments, and mentioned that he wanted to emphasize the enormous gap between designers and end-users. He argued that beyond simply software, it was important for the Board to push to find a way to emphasize the inclusion of end-user feedback in all types of design and innovation throughout the DoD.

Dr. Schmidt made closing comments.

END OF PUBLIC SESSION

ADJOURNMENT

Mr. Marcuse, with the concurrence of the DFO, adjourned the DIB's January 17, 2018 public meeting session at 4:30 PM.

I hereby certify, to the best of my knowledge, the foregoing minutes are accurate and complete.

Eric Schmidt, Ph.D.
Chairman, Defense Innovation Board

PARTICIPANT LIST:

Matthew Addington
Rob Albritton
Ed Alfriend
Caroline Armstrong
James Armstrong
Joseph Arora
Keith Arscott
Richard Arthur
Michelle Atchison
Benjamin Bain
Lisa Balzereit
Kerrin Barrett
Matthew Bauer
Peter Beck
Paul Becker
Lauren Bedula
Lisa Bembenick
Jon Bennett
Kevin Berce
David Blair
Ashley Bliss
Heather Bloemhard
Dominic Bonaduce
James Bowen
Paul Brand
David Bray
James Brooks
Jeanette Broz
Derek Campbell
Michael Canty
Richard Carlin
Christopher Carney
Randy Castleman
Mike Champness
Michelle Chance
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Cameron Childs
Aurora Chiste
Fazle Chowdhury
Patrick Clancey
James Cloninger
Ed Connors
Jack Corrigan
John Costella
John Costella
Blythe Crawford
Kimberly Crider
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George Darakos
Josh Darrow
Mike Dauber
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Claudia DeCarlo
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Arnaud Gary
Trey Gordner
Lawrence Grega
Timothy Griffin
David Hahn
Jeff Hannon
David Harden
Steven Hargan
Chad Hartman
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Kristen Hayden
Greg Hays
Richard Hencke
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Jordan Higgins
Robert Hirt
Shawn Hollingsworth

Karl Holmqvist
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Monica Hutchins
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Barry Ives
David Jacobs
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Mary (Molly) Just
Rachel Karas
Erica Kaster
Kerry Keel
Carol Kerins
Denise Keyes
Danishai Kornbluth
Anthony Kress
Carol Kuntz
John Latini
Steven Lauver
Rebecca Leggieri
Bel Leong-Hong
Zach Levy
Jeffrey Lofgren
Jeffrey Long
Ali Malik
Christopher Marchefsky
Stephen Mariano
Joseph Marks
Sam Marrero
Alex Martinez
Scott McCain
Sean McDonald
Robert Medve
Roger Misso
Kyle Mosley
Adam Motiwala
Stephen Munday
Julia Murillo
Ramia Nathan
Robert Nelson
Tom Nelson
Laura Odell
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Kelli Ogborn
Anastasiya Olds
Guclu Ozenci
Jake Parduhn
Mary Parker
Jared Payne
David Peeler
Chris Perrine
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Terri Phifer
Gregory Phillips
Nathan Picarsic
Stephan Pillmeier
Daniel Pines
Graham Plaster
Morgan Plummer
Imre Porkolab
Heather Price
Shahier Rahman
Shabin Raj
Shenita Ray
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Patrick Scannell
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Gregory Scott
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Shannon Walsh
Ed Wang
Keysha Webb
Richard Webster
Enlai Weng
David Wheeler
Logan White
Fulton Wilcox
Nicole Williams
Lavonne Williams
Clarence Wilson
Zachary Wingate
Barry Gene "B.G." Wright
Jim Young
Jim Young
Khuram Zaman
Christopher Zember
Rob Zuppert