DEFENSE INNOVATION BOARD
Open Meeting Minutes
October 24, 2017
9:06 AM to 11:04 AM
1776, Crystal City, VA

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 fifth public session on October 24, 2017 from 9:06 a.m. to 11:04 a.m. in the conference room of 1776 at Crystal City, VA.

DIB Members (voting)(8)
Dr. Eric Schmidt (Chair)
Dr. Richard Murray
Ms. Marne Levine (Telephonically)
Dr. Eric Lander
Dr. J. Michael McQuade
Mr. Milo Medin
Ms. Jennifer Pahlka
Dr. Neil deGrasse Tyson

DIB Ex-Officios (non-voting)(0)

DIB Staff Support (non-voting)(6)
Mr. Joshua Marcuse, Executive Director
Mr. Michael Gable, Alternate Designated Federal Officer
Ms. Francine Anderson
Colonel Mark Berglund, US Army
Ms. Courtney Greenley
Mr. Nicolas Lopez
Major Joshua Reno, US Air Force
Mr. Aaron Schumacher
Mr. Alexander Kravets

Guest Presenters (4)
General Stephen Wilson, US Air Force
Petty Officer 1st Class Richard Walsh, US Navy
Lieutenant Colonel Joe Salinas, US Army
Captain Chris Benson, US Marine Corps

Public Session Attendees (284)

Livestream Participants (78)

Public Commenters (9)
Lieutenant John Hawley, USN
Mr. Jaymie Durnan
Mr. Steven Allec (virtual)
Lieutenant Colonel Dave Harden, USAF
Mr. John Weiler
Mr. Mark Parrish
Mr. James Cloninger
Mr. Chris Perrine
Mr. Chris Taylor

PUBLIC MEETING SESSION

At 9:06 AM, Mr. Michael Gable, Alternate Designated Federal Officer (ADFO), opened the public session and welcomed the members of the public and those joining over the livestream hosted on the Defense Innovation Board's (DIB) YouTube page.

Mr. Joshua Marcuse, Executive Director, introduced the Defense Innovation Board members and outlined 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 DIB Chairman, Dr. Eric Schmidt.

Dr. Schmidt thanked Mr. Marcuse and 1776 for hosting the Board's public meeting. He also congratulated the Department and the military for an outstanding victory in the Raqqa area. Dr. Schmidt mentioned that the Board feels like it is starting to have an impact and is very much looking forward to supporting the Department and Secretary of Defense over the next year. He continued to say that the Board sees a hunger for change, an interest in new things, and a modernization process that matters a great deal. Since the last public meeting in July, the Board had visited U.S. Armed Forces Japan and U.S. Armed Forces Korea. Dr. Schmidt said both were great places to understand complex strategy, technology, and personnel issues. He then introduced Mr. Milo Medin to discuss the concept of an innovation accelerator.

Mr. Medin thanked Dr. Schmidt and introduced a potential new recommendation. He began his presentation by saying that one of the main recurring problems reported by both industry and the military is the issue of speed. He summarized the issue of speed by asking how we move faster, make decisions quicker, and reduce cycle times to adapt to adversary moves, emerging technologies, and surprises. He added the Board had observed that the DoD enterprise is not optimized for speed but rather optimized for cost. He posited that if the DoD were to optimize for speed, optimizing for cost may be a byproduct. His reasoning was that it is generally hard to spend money quickly, and that programs that take longer are also more likely to have significant cost overruns. Mr. Medin also said that the Government has historically had expertise in accelerating major science and technology advances from prototype to production but this had atrophied over the last few decades. Mr. Medin acknowledged groups including the Defense Innovation Unit Experimental (DIUx), Defense Digital Service (DDS), and Strategic Capabilities Office (SCO) as being good examples of focusing on time optimization. However, these examples are all outside the main procurement process, so he wondered whether it would be better to launch a new accelerator or to try to change pieces of the mainline process.

He explained that in private industry, to a solve a big problem you take your best people from across the company and equip them with the decision-making ability to execute and then get them to rapidly prototype, experiment, and go into production. Mr. Medin acknowledged that it is too ambitious to utilize that process for all systems, but there is likely a subset of certain problems that can be solved this way. The Board, he added, is in the process of discussing with the Department what kind of structures can be put in place to make this process more effective. He concluded his remarks by saying that a change in the pace of innovation within the Department is required and getting everyone focused on the right variable will likely yield good results.

Ms. Levine, via teleconference, began discussing another potential new recommendation, creating a new career field focused on innovation, rapid capability development, acquisition data science, and science, technology, engineering, and math (STEM) skillsets. She said that meeting the technology dimensions of future conflicts will require the Department to have STEM skillsets as a core competency. Therefore, this potential recommendation is about making sure the Department has a personnel system that reflects this need. Currently, she added, there is not a sufficient formal process in place to recruit, train, develop, and sustain a core workforce with these skillsets. While assembling subject matter experts (SMEs) within branches is standard practice across Services, this has not yet occurred for STEM skillsets. This lack of specialized STEM career fields has a number of consequences including that it hinders recruitment and retention.

Ms. Levine continued to explain that recruitment cannot be done in a silo. In order to recruit top talent, she said, the Department needs to demonstrate that it is a place where individuals can build careers in STEM. Without a clear and viable career path for STEM specialists, recruitment will continue to be an uphill battle, especially when these skills are in high demand in the private sector. In the private sector, Ms. Levine continued, companies compete fiercely with one another for top engineers, computer scientists, software writers, coders, and network administrators. With significant resources, these companies can offer individuals a clear career trajectory and promotion within their area of expertise. Ms. Levine transitioned her remarks to retention and said that without a clear career field, STEM specialists are systematically disadvantaged in the promotion process and are rarely given the right opportunities to develop, advance, and apply their skills and knowledge. She pointed out that existing service members with these skillsets often become frustrated due to a lack of utilization and continued development, or they are forced back to their basic branch in order to remain competitive for advancement. This results in a loss of focused talent on emerging challenges and/or a loss of that talent completely. Combined, Ms. Levine summarized, this seriously undermines the Department's ability to build the force it needs to address emerging technological challenges changing the character of warfare. This recommendation, she added, would solve the problem by establishing a branch for these skillsets and enable increased opportunities for recruitment, retention, and development of both new and existing service members. Like the newly created cyber and the nuclear propulsion, aviation, and missile defense branches allow for specialization and focus on core development and departmental challenges, this new branch would allow for more rapid and efficient adoption, integration, and iteration of new technologies as is the norm in private industry. Dr. Schmidt then transitioned to Ms. Pahlka.

Ms. Pahlka began to discuss a new potential recommendation on elevating new ideas in the Department, which she said, also relates to human capital and the personnel system. First, she said that the Board had witnessed no shortage of innovation within the Department, which is encouraging. The Board has met many people who lean forward and care deeply about making the Department more innovative, competitive, and a better place for people to work. Therefore, Ms. Pahlka said that the Department does not have an innovation problem, but rather an innovation adoption problem. She focused in on the 'up or out' personnel system that, while having many wonderful aspects, is very limiting. Since people have to rotate through different positions designed to make everyone interchangeable, the system does not allow personnel to

pursue innovative ideas and see them through to fruition. Ms. Pahlka added that this recommendation is similar to a 'DoD elevator' that acts as a carve-out for personnel who have a great idea to get executive sponsorship and the ability to work on the idea without having to rotate to a new position as they would have normally been required to. Service members would need to apply and not every idea would be worth pursuing; it would have to be very selective. Approved service members would have to secure support from high-level champions and sponsors within the Department to shepherd and accelerate their ideas, provide oversight and feedback, and protect them from DoD antibodies looking to kill new ideas.

Ms. Pahlka mentioned that the recommendation identifies some of the ways great ideas could be killed as well as thoughts on how to stop that from happening. The recommendation also would establish a cadre of advisors to provide expertise around acquisition policy, legal regulation, funding mechanisms, and technical knowledge to help these innovators understand what is required to implement their idea. She continued to say that service members should lead the project until it is adopted / integrated or until it is killed because it didn't work. If it succeeds, she continued, the service member should be brought on as a special implementation advisor for an agreed-upon amount of time to facilitate integration into the larger organization. She also said that a committee of five or seven individuals should create and review criteria every quarter to ensure that projects are moving forward and terminate the ones that are not. This group should be composed of experts, some appointed by the Secretary or Deputy Secretary, and some appointed by the cadre of innovators involved in the elevator, with one member as an independent arbiter from the private sector or academia. Ms. Pahlka concluded by saying this recommendation is not designed to train people to be innovators, but rather empower the innovators that already exist.

Dr. Murray introduced a potential recommendation to establish an education program to increase the effectiveness and velocity of technology adoption and integration within the Department. He referenced how the Board had stressed the importance of moving quicker than our adversaries; a big challenge considering our adversaries move very fast without the same constraints. He cited the rate at which communications and global networks are developing and the impact that autonomy and artificial intelligence will have both on our own capabilities and those of our adversaries. He related that industry has adopted many techniques to keep pace with this change that the Department could adopt. Dr. Murray explained that 'the system,' blamed for issues in the Department, needs to get fixed. People in the Department need to know how to get things done quickly and must be allowed to take calculated risks. They need to make better use of existing flexibilities, such as Other Transactions Authority (OTA) and special hiring authorities. To this end, Dr. Murray posited that the Department must educate its decision-makers on the types of tools and techniques occurring in the commercial world. This program, he continued, would be similar to the types of executive education that happens in business schools and it would be important to educate leaders at all levels throughout the Department.

Dr. Tyson offered reflections on the previous comments and compared the structure of modern innovative business to the structure of the military. The military, he said, is built on the capacity to take orders and give orders. You train a soldier to be a soldier so they are interchangeable and you build an efficient operating system that functions in a predetermined way. Although American industry at one time mirrored that, modern industry is a stark contrast. This difference he said, is and will continue to be the source of challenges to implementing the Board's

recommendations. To that end, he said all of the recommendations revolve around empowering a service member with innovative ideas within a system that does not natively operate in a way that tolerates empowerment. This system must have room for failure and risk, which the current system does not. The system must be able to identify those with ideas and those who think differently and nurture and reward them. To that end, Dr. Tyson said he was happy with how the Board's deliberations had gone and the discrete ideas and steps that had landed on paper.

Dr. Lander stated that he strongly agrees with the recommendations, as they are very different than the first twelve in that these are all culturally focused. The first twelve, he said, referred mainly to particular areas that the military should focus on. Dr. Lander referenced the word "speed" as the most important word in all of the recommendations. Speed, he said, is now the ability to learn the lessons of the last ten minutes so that you're better prepared to fight the next ten minutes. To do that, there needs be a cultural change across the Department. He acknowledged there are things that ought to be done slowly and carefully and others that ought to be done quickly. Right now, the problem is that there is no choice within the system to do certain things quickly. Dr. Lander then asked how the Department can measure how rapidly and effectively a project is completed. This metric, or set of metrics, would be incredibly important to measure the effectiveness of the implementation of the recommendations.

Dr. Tyson added that we tend to cleanse our memory and alluded to the golden age of space. In reality, he said, the United States was very reactive to the Soviet Union who put the first satellite, nonhuman, and human in space. Everything we did was in response to the threats to our technological and military preeminence. If, he said, we implement a culture that embraces innovation then we will not only be reactive to what is happening now, but will guarantee we will be proactive to any possible threat in the future.

Mr. Medin interjected that he believes the Department of Defense takes enormous amounts of risk by letting things stay stagnant. In that way, the Department transfers risk from the program offices to the warfighter. Leaving code or an obsolete system in place is taking a risk by not providing timely information to the warfighter, as an example. Additionally, he added, the Department focuses too much on process and process does not trump competence. Fundamental decision-making, and making decisions at speed, requires people who have the requisite knowledge and the authority to make decisions, not just check a box on a process checklist. Therefore, we must focus on getting competent people in the room before focusing on the decision making process itself if the Department wants to increase the speed at which things get done. Mr. Medin concluded by saying he believes Department leadership understands this and wants to change it.

Dr. McQuade remarked that he fully supports the direction of the new recommendations and wanted to stress two main points. First, he said it is vitally important to embrace education up and down the organization so that people understand what it means to be innovative and where emerging technologies could be applied to missions. Additionally, ensuring that service members who are pursuing innovation are able to secure enough time to see it through, without being pulled back into the up or out system is very important. Second, he said, it is important that the Department does not segment innovators and create two different environments, one for innovative programs and one for execution. Dr. McQuade believes the education component Dr.

Murray was referring to will help ensure this does not happen. He concluded by saying that how the Department integrates these innovators into the organization must be part of the Board's recommendations.

Ms. Pahlka agreed with Dr. McQuade and stressed the importance of having these innovative people in leadership positions and having fewer service members saying that they had to go outside the Department of Defense to pursue great ideas.

Dr. Schmidt transitioned the meeting to expert presentations. Mr. Marcuse then introduced General Stephen Wilson, Vice Chief of Staff of the Air Force.

General Wilson began by saying that he and his organization had been following the Board's work and admires the recommendations. He told the audience he would spend a few minutes diving into what the Air Force views as important and what they are doing to change all the things the Board had been talking about in terms of culture, technology, and adoption. He agreed with Mr. Marcuse that the Department does not have an innovation problem, but rather an innovation adoption problem. He then added that the Department still needs help unleashing the spirit of innovation throughout the Air Force and the entirety of the Department of Defense. General Wilson began his presentation by outlining the Secretary's five priorities on a slide with 'things' on the left and 'people' on the right. 'Things,' he said, focuses on modernization, equipment and how to be ready to fight current and future fights. 'People,' he said, focuses on talent, developing exceptional leaders, and partnering with allies. In the middle, he said, is innovation, which underpins all of it. Since Desert Storm, he continued, our military has shrunk by about 40% and we now produce ~20 planes a year versus 250 a year as we used to. Therefore, he stressed, our equipment has gotten older and our forces smaller. Frankly, he said, too small for what our Nation is asking us to do.

General Wilson proceeded to discuss the rapid state of change and world events citing Ukraine, Crimea, ISIS, Boko Haram, Ebola, Zika, the South China Sea, cyber attacks, OPM breaches, and North Korean nuclear weapons. To that end, General Wilson outlined four major thrusts of change: political, economic, social, and technological. The convergence, he said, makes for an exponentially disruptive time. The General said that he thinks he has a framework for innovation and an action plan. However, he said there are challenges posed by being too complex, too hard, too bureaucratic, too risk-averse, and too easy for adversaries to catch up with and pass. He also said that it is questionable if the United States is actually a world leader in fields like artificial intelligence, hypersonics, nanotechnology, quantum computing, and blockchain. This, he said, is the impetus to change. That change, he continued, revolves around data; now the Air Force has a Chief Data Officer who interfaces with the Air Force's Chief Information Officer. The change also revolves around process change. To that end, the Air Force stood up AFWERX so that anyone with an idea that involves Airspace and Cyber can get assistance in finding the right acquirer, operator, and tester. Additionally, AFWERX connects more broadly into the ecosystem between national labs, academia, and industry.

The General also said technology, people, and culture are vital to supporting the necessary change. First, he spoke about technology, and the Air Force's vision for everything from airplanes to satellites and support systems. The vision encompasses a network that connects

systems that share data so that operators can learn from it. The General alluded to Tesla and how each car talks to and learns from every other car. That type of networking, he continued, could aid ground vehicles like Humvees or Mine-Resistant Ambush Protected (MRAPs) as well as airplanes and space vehicles. He also mentioned a bigger undertaking to reassess the entirety of the Air Force's science and technology portfolio, and the strategy around its research and development. The General then transitioned to people and compared General Doolittle's rise to general, which took 801 days to that of current day, which takes approximately twenty years. He also acknowledged Chris Lynch, director of DDS, as an example of bringing in talent and great ideas from industry to the Department. Lastly, the General mentioned Chief Master Sergeant Kaleth Wright who had been serving 28 years and is an archetype of a great leader. The Air Force, he said, needs to understand how to inspire and retain talent like the examples he mentioned. Lastly, the General spoke about culture and changing the risk-averse nature of it. He agreed with Mr. Medin that all the Department is doing currently is transferring risk to someone else. The General also mentioned that every competition is protested which causes a 100-day delay. Additionally, he mentioned that a predictable, stable budget is important to build a dependable future. The General concluded his remarks by saying the framework for change starts with culture, people, technology, organization, and process. He underscored the sense of urgency and thanked the Board for their expertise and leadership.

Both Dr. Schmidt and Mr. Marcuse thanked General Wilson and Mr. Marcuse introduced Petty Officer 1st Class (PO1) Richard Walsh of the United States Navy to present on behalf of Captain Brunett. PO1 Walsh thanked the Board for the opportunity to speak. He also thanked Vice Admiral Breckenridge for his support and top cover for innovative projects. He also thanked LT John Holly for his support with project Illuminate.

PO1 Walsh began his presentation by explaining that project Illuminate originated out of a document published by the Chief of Naval Operations that called for a high-velocity learning concept. At that time, he reviewed the innovation tools like Lean Six Sigma and design thinking, but realized they were focused entirely around a process, project, item, or technology. Very few of them were focused on the individual. Therefore, PO1 Walsh and the Illuminate team put together a curriculum focused primarily on the person and innovator first, and the technology or product second. In comparison to Lean Six Sigma, where one designs and optimizes a process for efficiency, here the goal was to develop the person first so they can generate multiple good ideas, not just one. Project Illuminate began by experimenting with TED-style talks and trained a thousand people in two weeks. This initial training was well received and showed an appetite for this type of training, especially for people towards the bottom of the organization with no direction on where or how to start innovating. That led to a course and book, called Illuminate, that was published across the Navy and Marine Corps that acts as a guide to Naval innovation.

Despite Illuminate's success, PO1 Walsh continued, there remain a few missing components. First, there is no consistent training process for leadership on how to create innovative organizations and environments. Additionally, there is zero incentive in the military for middle level managers to move ideas forward. This chokepoint in the middle of the organization needs to be optimized in order to support innovation. PO1 Walsh referenced Clayton Christiansen's innovator's dilemma and said in the case of the military, when you approach the top you are weakest because you are optimized against risk. Therefore, the zero defect mentality means there

is no incentive to embrace risk, which destroys innovation inside the military.

Second, he continued, the 'up or out' system forces people to make it as long as possible without getting fired. To combat this, PO1 Walsh recommended that exercises and audits should be designed to break the system every time. The Department should create objectives that are impossible to achieve, and standards that are incredibly high, so everyone fails. That will spur non-traditional ways of thinking and ultimately a new standard. He used a personal example of preparing for audit teams where his team knew the questions they would be asked beforehand so they memorized a script. The Navy must move away from this, he said, and instead challenge the force. He concluded his remarks by saying that protecting funding lines for innovation programs talks louder than words. Mr. Marcuse thanked PO1 Walsh and introduced Lieutenant Colonel (LTC) Joe Salinas, United States Army Special Operations Command.

LTC Salinas began his remarks by thanking Mr. Marcuse for the opportunity to speak. He then said he would address the Board's recommendations from a ground level perspective. LTC Salinas stated he was glad to hear such an emphasis on culture. He provided an example from his Army Special Operations team that focused on problems that don't have traditional solutions. When his team unpacked why they were successful, the team concluded it was because they took calculated risks because none of them were beholden to career, timeline, or milestone requirements. He also agreed with Mr. Medin's point about the necessity of moving towards an objective even when it is not very well defined. One challenge specific to Special Operations is that it is a no-fail mission. Too often, this translates to an acquisition strategy where the perfect solution is needed before taking the first step.

LTC Salinas described an example from 2014 where his special operations team executed a drone delivery of a cell phone across enemy lines. The drone did not meet all performance objectives, it only flew 5 km instead of the desired 10 km, but it started the team down the road of thinking how drones could be used against U.S. forces. At that time, the prevailing attitude was that drones were toys and could not pose a huge threat. However, in 2017, because of drones, U.S. forces returning from Syria say that we don't own the air space under 3,500 feet, a significant statement which hasn't been said since the Korean War. Regarding drones, he stated that U.S. forces are mainly reactive, deploying counter-drone solutions so slow that by the time they are deployed, they are obsolete.

LTC Salinas proceeded to talk about process and referenced a conversation he had with a Silicon Valley startup with interesting technology to target and manipulate blockchain. The startup had spoke to Cyber Command (CYBERCOM), which told the startup to submit a whitepaper and CYBERCOM would respond within 18 months. He said this timeline illustrates the trouble nontraditional performers have in helping the government keep pace with rapidly advancing and proliferating technologies. This is important because commercial technology is rapidly approaching the level formerly only expected from proprietary Government ownership. Mr. Marcuse thanked LTC Salinas and invited Captain Chris Benson of the Air Force to speak.

Capt Benson began by thanking Mr. Marcuse and said that he was one of the creators of the Air Force technology accelerator which works with other innovation organizations within the Department and small, nontraditional companies to create technically viable, operationally

useful, and financially sustainable options. He said one of the hardest parts of their jobs is finding those options and working with the traditional Department acquisition professionals to integrate the solutions. Capt Benson proceeded to provide an overview of how he and his team evolved the Air Force technology accelerator in three main phases; first was working nights and weekends, the second was working part time, and the third was working full time. The first 'nights and weekends' phase originated as an idea at Squadron Officer School, with support from then-Commandant, Brigadier General Goodfellow, to answer the question on how the Air Force should work better on innovation. During that phase, the team started to uncover an unofficial network of Department innovators.

In the second phase, Capt Benson and the team found people with similar problems and requesting resources, enabling the team to start working on the technology accelerator part time. Capt Benson provided an example of a program on autonomy and counter-drone technologies they would start in January 2018 in Boston with a company called Techstars. The team found other officers, acquisition professionals, engineers, and lawyers who wanted to help. The team was then able to raise money, which allowed them to engage mainstream users and acquisition professionals at the very beginning of the process so they could help with the integration towards the finals steps. Capt Benson thanked General Wilson for getting them to the final stage where they work on the technology accelerator full time as part of AFWERX which provides the team with top cover, mentorship, strategic guidance, and support. Mr. Marcuse thanked Capt Benson and invited Captain Chris Wood of the Marine Corps to speak.

Capt Wood thanked Mr. Marcuse for allowing the Marine Corps to participate in the meeting. He told the audience he would discuss a project called Next Generation Logistics (NexLog) which looks at the future of logistics technologies in the Marine Corps. Capt Wood said that Lieutenant General Mike Dana had provided top cover and gave them incredible autonomy to explore logistics technologies and exploit them through real-time, continuous experimentation. This experimentation, he noted, had occurred at both a very tactical level and a large-scale level within international exercises. They had transitioned those capabilities into new requirements for future concepts, programs of record, and small S&T investments. In total, the team had undertaken about fifty initiatives in the past two years and now have roughly a $35 million budget in the Program Objective Memorandum (POM). Capt Wood was able to do this by cobbling money together from different parts of the Department including research and development labs and other innovation organizations and applying lean startup, design thinking, and crowd sourcing. Overall, the team has seen roughly a forty percent transition rate of their experiments getting into the POM.

Capt Wood said the team's success is in part due to its flat organization structure. The team has a colonel, a GS-15, a GS-14, and a master gunnery sergeant. However, the organization is flat which allows them to make decisions on the fly and anyone can make critical decisions. This, he said, has enabled the team to go from idea to capabilities within 6-18 month timeframes and keep up with the pace of technological change in the commercial industry. For instance, the team had put 3D printers in the field and solved problems in combat environments. They have mission-customized drones that were put into combat, used effectively, adapted in the evening with a new sensor, and put back in the field the next day. He also mentioned that they had taken 5 to 300 pound cargo drones and flown them in the field in a developmental role to understand the

concepts and requirements. Capt Wood stressed that pushing aggressively forward in the field, versus simply with paperwork or PowerPoints, allowed the teams to accelerate things, saving money and time by not wasting either on concepts that don't work. Capt Wood said it had been helpful to work with the Defense Innovation Board and Defense Digital Service as well as the research and development enterprise which is vastly under tapped with huge amounts of engineering talent and expertise. Capt Wood stressed the continued importance of transitioning technologies and building new pathways to keep up with the pace of technology. Part of this, he said, is balancing the chaos and messiness of innovation, feeling uncomfortable and frustrated and continuing to push forward.

In terms of bad news, Capt Wood said that the team had found a lot of concern on how the Federal Acquisition Regulation (FAR) is being employed. He said there are creative ways to move through the FAR, but people don't know the pathways and have not been incentivized to find them. Therefore, the team ends up fighting the rate of obsolescence instead of the rate of change. This point, he said, is a nuance that most people lose where one is not necessarily looking to get the latest and greatest of a technology but is simply looking to get something that is not the worst possible solution. This, he agrees, transfers risk to warfighters; he stated that there needs to be a harder conversation about where risk should be accepted. Additionally, Capt Wood said that the culture differences throughout the Department are stark. His team interacts a lot with innovative organizations ranging from startups to large companies like Amazon and Google who are deliberately trying to instantiate culture. Instantiating culture, he said, is much easier from the start when you haven't let it erode over time. In his opinion, the Department has let some of the spirit of innovation erode and to get it back will require significant cultural changes to how the Department looks at things. He concluded by saying that the same way the Department has looked at emerging battlefield capabilities and employing them to combat adversaries, it must start to look at the way we adapt our capabilities at a service-wide scale. This, he said, must become critical and core to what the Department, as a warfighting institution, must do.

Dr. Schmidt thanked the presenters and Mr. Marcuse invited Dr. McQuade to provide an update on the Science and Technology subcommittee.

Dr. McQuade began by describing that last year, the Board had spent a lot of time looking at not the specifics of what science is being done but instead how innovation around the way S&T gets done within the services, and what the Board can offer from an outside perspective. As the Board begins its second year, there is a convergence around software of interrelated ideas which has the Board's primary focus looking at how the Department develops software. Dr. McQuade requested the audience to think of software broadly, not just from a mission-critical sense of embedded software inside a weapons system. For instance, he said, think about software that enables logistics and personnel movement and software that manages careers. All of this, Dr. McQuade continued, is being done in a way that the Department has collectively done for a very long time. Therefore, the Board's priority is to look at how the Department can and should change the way it develops and buys software at large.

Dr. McQuade said that software challenges had come up constantly in the Board's conversations. The kinds of questions the Board will explore this year relate to what the Department can do on

its own, what it is constrained to do by Congressional authorities, and what authorities exist that people are not exercising in the way we acquire, develop, and define software currently. He continued to acknowledge the opportunity presented by the reorganization of the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics, and what that will mean for the Assistant Secretary of Defense for Research and Engineering (DDRE) and how it fosters innovation in the software environment, and for acquisition. He said the Department must ensure that they have access to modern skills, tool, and methods that industry uses to deliver software capabilities. Dr. McQuade said the Board will look at case studies from a few different services on both major and minor programs to hopefully deliver a blueprint that can guide the software acquisition process itself and guide development in DDRE of the skills and technologies that future systems will need. He also outlined three other topics the S&T subcommittee will focus on including cyber and network vulnerabilities, data as a critical and strategic weapon, and creating a centralized capability to provide artificial intelligence and machine learning skills, capabilities, datasets, and training sets for the Department as a whole.

Mr. Marcuse thanked Dr. McQuade for his overview and proceeded to provide a brief update of the Department's activities related to Board recommendations. He reminded the audience that being a Federal Advisory Committee, the Board provides advice to senior leaders but has no authority to implement. Therefore, he continued, it is important to reflect on what is being done throughout the Department with that advice. Mr. Marcuse began with an update on the Board's recommendation on building innovation capacity in the workforce and establishing a Chief Innovation Officer. For this recommendation, he presented an example of an intelligence, surveillance and reconnaissance (ISR) team experimenting with new methods of processing, exploitation, and dissemination. This, he said, is a great example of senior leaders providing top cover to try new ways of accomplishing the mission.

Mr. Marcuse transitioned to the recommendation to embrace a culture of experimentation and a mentality of A-B testing. Three specific examples were highlighted by Mr. Marcuse. First was the Air Force's Air Mobility Command new personnel policy that aims to help close a pilot shortage. This policy was tested on a small group and iterated on before scaling. Second, Mr. Marcuse acknowledged the special unit within the Marine Corps that Captain Wood spoke about that was designed to use new weapons, systems, and tactics. Part of their success is in their ability to get lessons learned rapidly back to headquarters staff. The third and final example is the 3rd Battalion, 5th Marine regiment that plays a similar role to Captain Wood's unit. These are all examples of individual units designated to run experiments at a much faster rate of iteration to increase the velocity of learning.

Mr. Marcuse turned to the recommendation to expand the use of available acquisition waivers and exemptions. First, he said, the Army is making sweeping changes to their acquisition approach by creating their own modernization command, which will look across a number of different recommendations. Recommendation Ten, computing power and bandwidth, is connected to most of the recommendations related to data software technology and artificial intelligence because it provides the compute resources necessary for the work being discussed. Mr. Marcuse referenced a number of notable examples. First, the Deputy Secretary of Defense signed a public memo adopting cloud computing resources across the enterprise. Second, the Defense Logistics Agency is looking at a wide commercial cloud contract looking at how to

power innovative logistics accelerate data sharing and interoperability to move items faster across the world. Third, there was a recent announcement from Navy to do a broad push to adopt cloud infrastructure, platform, and software as a service.

With respect to data, Mr. Marcuse continued, there are four notable examples. First, NGA has a new set of public-private partnerships that revolve around data analysis, computational techniques, leveraging other resources in the Intelligence Community, and how to team up better with academics, industry, and others to apply state of the art data and analytical approaches. Second, the Army Research Lab is conducting interesting work around human variability and wearable technologies to generate data and insights on how to improve soldier performance in the field. Third, the Air Force is executing a large effort to embrace data, led by General Wilson and Major General Crider, which a great example of integrating disparate lines of effort across an organization. Fourth, and finally, the Navy has also established their own digital warfare office focused on pilot initiatives around data, compute, and bandwidth that look at the future of digital warfare in the maritime domain.

Mr. Marcuse transitioned the meeting to public comments and invited LT John Hawley to speak.

Lieutenant John Hawley, from Fleet Forces Command, made the comparison between Illuminate-trained innovators and starfish. Starfish, he said, not only grow another leg when one is cut off, but the separated leg regrows an entire starfish. Similarly, he said, service members that have gone through the Illuminate trained are cutting off their legs and spreading throughout organizations. He acknowledged that Illuminate doesn't pretend to have all the answers but rather acts as a catalyst for innovation and as a baseline course to disrupt the status quo.

Mr. Jaymie Durnan introduced himself as a New Hampshire farmer who wanted to talk about speed and trust. He said that sometimes, instead of going faster, we have got to figure out how to slow the other person down. He added that information moves at the speed of light, but decisions move at the speed of trust.

Mr. Marcuse read a comment from the YouTube live stream from Steven Allec that said, "I see the goal of DIUx, DIB, DDS, etc, to work themselves out of a job, to create an innovative department. Is this a shared vision, and is there a day when we will no longer need these groups?"

Lieutenant Colonel Dave Harden of AFWERX thanked Mr. Marcuse and the Board for their commitment to the field of innovation and said they had literally helped save one of his initiatives. He added that he is seeing a groundswell of innovation, which is refreshing and inspiring. However, he added, the Department is still a place where the culture requires a Herculean effort to push innovative efforts through. He also said that though Congress wants the Department to effectively use dual-use technologies, the internal interpretations of that guidance is often narrow with little risk tolerance which creates stumbling blocks. He concluded his remarks by emphasizing that it is amazing to see the inspiration and creative ideas when airmen are given the permission to innovate. He thanked the Board for continuing to challenge their team's creativity in coming up with contractual ways to solve project problems and advising on they can overcome cultural challenges.

Mr. John Weiler, member of the IT Acquisition Advisory Council think tank, said that their sole purpose was to break the dependency on the defense industrial base. To that end, they had established 24 partnerships with nondefense industries, reaching 180,000 companies. Mr. Weiler agreed with the Board that the Department has a large culture problem and it will be important to break through the impediments to change, including access to knowledge of those who are already innovating.

Mr. Mark Parish, from HelpFirst.com, told the audience that the Department is one of the largest funders of scientific and medical research, however most people are completely unaware. He added that the Department is truly a global force for good and that it can do a better job of communicating that mission and creating partnerships between citizens and warfighters.

Mr. James Cloninger made two main comments; first, he posited whether or not it would be prudent to look at the inefficiencies and redundancies of multiple services and departments, and second, that the Department has over half a million buildings worth over $10 trillion in replacement value which poses a big opportunity for innovation.

Mr. Chris Perrine, from Protective Innovations, asked how a startup with an innovative product can get the attention of the Department or DIUx. He added that the main product they are selling was invented in the Air Force but the project died at the GS-15 level so his startup is now trying to get the Air Force's attention again to buy their own product back. This, he thought, was absurd.

Mr. Chris Taylor, CEO of the data analytics firm Govini, senior adviser to MD5, and Georgetown professor of Hacking4Defense, advised the Board that when considering talent development, the Department should look at the region's consortium of graduate students. He added that the Department needs as much civilian talent as it does military talent. He also prompted leaders to provide national security problems to Hacking4Defense so that talented graduate students from across the country can help solve them. Mr. Taylor also said that the Department needs more organizations like MD5, DIUx, and In-Q-Tel to spur more investment and competition to drive efficiencies and cover more areas of emerging technologies.

Dr. Schmidt asked if any Board members had final comments.

Mr. Medin added that the Board had communicated to Department leadership that in a scenario where the commercial sector is leading innovation and driving investment, the best the Department can do is to get to parity. He added that there will never be a strategic advantage in an area where the commercial sector is driving innovation. Specifically, he said, we have moved into a space where many of the key technologies for future military competitiveness actually are being driven outside of the traditional government investment complex, which is a deep paradigm shift. Mr. Medin said the issue therefore becomes how quickly the Department can integrate technology and use it to solve really important problems.

Dr. Tyson agreed with Mr. Medin and added that the IT industrial complex is somewhat commoditized because it is a consumer-driven enterprise. Since it was not always that way, he

recommended the Department should stay open to industries that are not yet commoditized.

Mr. Medin clarified his remarks by saying he does not think it is just limited to IT, but includes material sciences among others, where the commercial sector is driving innovation, which poses a major challenge for policymakers.

Dr. Schmidt began closing comments by saying that the Board sees the beginnings of great success and many gems that had been assembled with partners throughout the Department. However strong a start this is, he added, it is not sufficient. Though there has been progress made against a 40-year old edifice of historical frustration with procurement, among other aspects, it is going to take more than a few brilliant leaders in the Department to address the core issue. At a high level, Dr. Schmidt added, the Department will have to rethink its internal, complicated processes that have evolved over decades, primarily looking at the POM. The Department must also rethink innovation in the context of autonomy, software, and artificial intelligence, and the Board is not seeing enough of that. Lastly, the Department must rethink culture and shift from risk-aversion to risk-seeking in the planning sense. To achieve this, Dr. Schmidt said, there will have to be massive consensus building. He also called upon the Board to make the four proto-recommendations stronger and make it clear what the requests or actions are to effect change. Dr. Schmidt concluded by saying that ultimately, the threat at a technological level will likely emanate from China and the rate at which it is innovating, which will prompt a response similar to the United States' response to the threat posed by the Soviet Union.

Mr. Marcuse concluded the public meeting.

END OF PUBLIC SESSION

ADJOURNMENT

Mr. Marcuse, with the concurrence of the ADFO, adjourned the DIB's October 24, 2017 public meeting session at 11:04 AM.

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

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

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