

# **Public Comments for Defense Innovation Board Public Meeting on July 12, 2017**

## **Public Comment Submitted to the Defense Innovation Board (DIB) for its Public Meeting on 7/12/17**

As a result of the changing role of information, traditional military definitions of success no longer correlate with stable end states. Without addressing how information is and will be created, manipulated, transacted upon, and stored, we will fail to make the policy and organizational changes to reduce the probability of catastrophic loss and appropriately interpret data.

First, in response to a comment made by the DIB Executive Director at an April Defense strategy conference, the nation with the most information will have an advantage. We have reached a tipping point, where more information is no longer a competitive advantage, because it is becoming increasingly difficult to discern true from false information, and in some cases factual correctness does not matter. The national security community needs to be able to develop novel information tactics that redefine current injunctive norms, increase the speed of information verification, and reduce the decision-making cycle. The environment will be increasingly saturated with sophisticated information deception and the processes, sensors, and algorithms for this task are different than what was outlined in the recommendation. The DIB should focus on red-teaming current decision-making and data aggregation paradigms, rather than recommending traditional data aggregation and processing, which is better suited for corporate, rather than national security applications.

Second, the potential for catastrophic loss increases as correlation increases, but for the most part the DoD has focused on creating homogenous ecosystems. As we have seen with the recent repurposing of NSA developed cybertools, the management of a non-rivalrous commodity requires a first principles approach to reducing risk. Globally, there must be a focus on increasing the heterogeneity of platforms, especially for high value systems and information. The ecosystem needs to be optimized for speed of evolution and with current slow acquisition and C&A standards an aggregated data ecosystem is a source of significant risk. Outlined below are a few policy and organizational changes that are necessary prerequisites for furthering the DoD information agenda.

### **1) Change the funding models for information technology, so that data becomes a central asset that can be funded independently of systems.**

The current model funds physical systems, which results in the preservation of legacy systems and problems with data sharing and interoperability. There are not funding mechanisms in place for data migration or data assets independent of the systems in which they reside.

### **2) Develop legal, contracting, and information security guidance to enable data sharing**

Currently, there is no clear owner for data and mid-level stakeholders have the authority to say no, but no clear authority or incentive to say yes. Agencies, such as USAID, have been successful in having dedicated resources in legal, contracting, and HR at the highest levels of the organization to reduce the career and personal risk to mid-level employees who promote open information practices.

**3) Prioritize the development of novel contracting and certification pathways for as-a-service commercial offerings**

The commercial markets have moved almost entirely to as-a-service business models and the DoD does not have clear regulations or language for as-a-service offerings. This precludes DoD from participating in the business models that currently account for the majority of global economic growth. Additionally, the compliance model, including FEDRAMP, excludes all but the largest embedded providers and drives users into gray IT. The IT model for unclassified data should exclude compliance completely to the fullest extent possible.

**4) Design systems to emphasize decision-making at the edges with limited connectivity to reduce the potential for catastrophic risk.**

With limited resources, the difficulty of extracting information from legacy systems, the quantity of data, and the potential for adversaries to use techniques to oversaturate the information ecosystem investments in edge processing, new memory architectures, and computational accelerators are likely to be more impactful in the long-term.

**5) Prioritize training and recruitment to ensure the DoD has the skillsets necessary to make decisions in a non-parametric environment.**

Data-driven decision-making is predicated on the fact the past, at least to some degree, predicts the future. Without the requisite understanding of how to build and interpret algorithms at all levels of organizations, which is profoundly lacking in DoD, advanced analytics will simply provide a false sense of security for prediction of catastrophic risks, because frequently the underlying structural drivers have changed or the number of false positives is prohibitive.

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Dr. Maura Sullivan  
Managing Director  
Eidos Group

**Defense Innovation Board  
Public Comment  
For 7/12/17**

I welcome the opportunity to provide input to the Defense Innovation Board on the subject of machine learning and artificial intelligence (ML/AI). As a technical manager at a tier 1 defense contractor, I strongly agree with the Department's position that ML/AI technologies have the potential to revolutionize warfare and maintain the U.S.'s asymmetric technological edge over our adversaries. In addition, as a former intelligence analyst with combat zone experience, I have seen firsthand the edge that employment of advanced technology brings U.S. forces. Simply put, we cannot afford to have "second-best" technology.

Realizing the potential of new ML/AI technologies requires focused attention, investment, and strong public/private partnerships to ensure the successful transition and implementation of these technologies. In establishing the Algorithmic Warfare Cross-Functional Team, Deputy Secretary Work has taken an important first step in bringing these technologies that have already made significant impact in the commercial world into warfighting domains. The advances in computer vision technology alone have the potential to turn the thousands of hours of full-motion video (FMV) captured by DoD platforms into actionable intelligence at a fraction of the time and effort currently required by human operators. In my book "Activity-Based Intelligence: Principles and Applications," I and my co-author, Dr. Patrick Biltgen, address the challenges posed by current Processing, Exploitation, & Dissemination practices and in particular argue for the importance of using technology to extract value from ISR assets at every step in the processing chain, enabling analysts far removed from direct PED operations to gain valuable insights from data captured by these platforms.

There are three key challenges, however, that the Department and its industry partners – both traditional and non-traditional – must help address in order to realize the full benefit of ML/AI technologies.

The first challenge is **transition**. Whether existing or new techniques will be successful in increasing the capability of DoD platforms – from a technological standpoint – is not a matter for debate. What happens "next" – after new technology proves successful in tackling a current, urgent DoD challenge – is perhaps the greatest challenge. Effectively transitioning new technologies requires a partnership between system integrators, platform and system developers, the services, and the Department. Increasing innovation input cannot alone solve problems unless the challenge of innovation throughput is simultaneously addressed.

The second challenge is **operational demonstration**. Computer simulation of new technologies to perform initial assessments of effectiveness is an invaluable tool. I believe, however, that to completely understand and test these new technologies, demonstrations in environments that closely resemble eventual operational deployments is required. Operational demonstrations – for example, live flight tests of current platforms with advanced technology – allow for rigorous experimentation and

documentation of results. These demonstrations also can be structured around known, properly labeled ground truth data, critical for enabling ML/AI techniques.

The third challenge is **data**. Many ML/AI technologies rely on labeled training data. In many commercial applications, this is relatively simple. The same organization that owns the data is the one applying ML/AI techniques to the data, and the data sets are complete and contiguous as a result, ready for labeling, with readily understandable ground truth. In many parts of the DoD's mission space, however, the same is not true. Platforms and systems are built by multiple companies, but the data itself are often classified. Traditional forms of test data, used for system verification & validation, are insufficient for training ML/AI algorithms. Accordingly, the DoD must examine ways to make both classified and unclassified training data available to ML/AI developers across both the government and private industry. This will encourage competition amongst technologists as well as enable the government to make like-to-like comparisons of developed algorithms and technologies, enabling better evaluations and value for taxpayer dollars. I am currently a part of efforts that are examining best practices in labeling data as well as research efforts concerning both real and synthetic data, and welcomes the opportunity to engage the Department along with our industry colleagues in establishing processes and procedures to allow for a level field enabling scientific advancement and technology development in these critical areas.

Thank you for considering my input. I remain deeply committed to partnering with the DoD to develop the next generation of critical technologies and welcome the chance to engage with the Defense Innovation Board to further discuss these key challenges to adoption of ML/AI across operational and non-operational settings in the government.

Very respectfully,

Stephen Ryan

**To:** Defense Innovation Board (DIB)  
**From:** Brian T. MacCarthy  
**Subject:** Public comment for DIB public meeting on July 12, 2017

I am keenly interested in the progress made thus far within DoD around the following Defense Innovation Board recommendations:

- Recommendation 1: Appoint a Chief Innovation Officer and Build Innovation Capacity in the Workforce
- Recommendation 2: Embed Computer Science as a Core Competency of the Department through Recruiting and Training
- Recommendation 5: Catalyze Innovations in Artificial Intelligence and Machine Learning
- Recommendation 12: Establish Global and Secure Repository for Data Collection, Sharing, and Analysis

Based on these recommendations, and incorporating components of the workforce for next generation training and recruiting techniques, I'd like to highlight how we at Booz Allen Hamilton are thinking about how to recruit for a future workforce wearing hoodies and backpacks. One idea is to build a community of interest (much like "Hacking4Defense") but focus less on just the student side and really target companies, startups and even young men and women who are still in uniform. The Navy is doing this today through "HacktheMachine." Think of "HacktheMachine" as a digital test experience for the future. Currently, we have fighting squadrons virtually every capability, but not for Cyber, Machine Intelligence or Data Science.

You can find a good article on this series here:

<https://www.fastcompany.com/3068299/navy-sends-out-an-hos-challenge-hack-our-ship-to-woomillennial-tech-talent>

My thoughts on the specific four recommendations listed above are as follows:

**Recommendation 1:** A tournament driven approach to changing the workforce is critical. Several commands have attempted this, but centralizing the efforts into a CINO office might be key to sharing the insights, as each Service is typically unaware of what the other Services have done. A nice article on Booz Allen's approach can be found at:

[https://www.boozallen.com/content/dam/boozallen\\_site/sig/pdf/thought\\_p/Innovation\\_Blueprint.pdf](https://www.boozallen.com/content/dam/boozallen_site/sig/pdf/thought_p/Innovation_Blueprint.pdf)

**Recommendation 2:** I welcome the opportunity to submit a future public comment on how to embed DS/Full Stack Dev at a grass-roots level, tapping into the COEs for the Services.

**Recommendation 5:** We have a new initiative inside the firm on what areas of Machine Intelligence/Learning we want to play in with our current expertise and where we believe we

need to take the firm in order to support the DOD/IC. We also are looking at our Agile Hubs in Charleston, Denver, St. Louis, Austin, Seattle, and San Diego as being the incubators or COE for the firm in these geographies. In these cities we have deep benches of cleared individuals who are focused on algorithmic warfare initiatives and are looking to retrain thousands more in Machine Intelligence and Data Science.

**Recommendation 12:** Oversaturation of data seems to be a bigger and more complex challenge than accessibility. I would therefore focus on deconstructing data, following commercial models for making it more open and accessible, wherever possible. Also, regarding computer vision and augmented cognition, I suggest exploring programs involving crowdsourcing, such as the largest data science crowdsourcing challenge in the world, known as the Data Science Bowl, where we partnered with Nvidia and Kaggle:

<http://www.businesswire.com/news/home/20170502005892/en/10000-Global-Problem-Solvers-Yield-Winning-Formulas>

I look forward to the DIB's public meeting in July and to finding ways to further adopt the DIB's recommendations.

Sincerely,

Brian T. MacCarthy  
Director, San Francisco Solutions Studio  
Booz Allen Hamilton

## **Today, I am here to ask a question: How Might We (HMW) build a culture of innovation in the US Military?**

My name is Andres Lazo and I served as an E-5 Sergeant in the US Army. About 10 years ago, I was sitting behind a machine gun in Iraq when an Explosively Formed Projectile (EFP) and a hot molten copper round slammed into the right side of my helmet. As a result, I sustained a Traumatic Brain Injury (TBI) and was awarded a Purple Heart. Today, I recently completed a new civilian tour of duty as a GS-13 Innovation Specialist in the Federal Government.

So, why am I here?

- I'm here because I believe we need to seed design thinking mindsets across the US Military, and at all levels, so that every service member can be empowered as an innovator on the battlefield.
- I believe that in order to develop the leaders of tomorrow, we need to make a significant investment in modernizing the training and education of our young leaders today.
- I believe we need to invest in the important skills of creativity, complex problem-solving, and critical thinking in our service members.

Across the US Military, there are groups of individuals and small teams of innovation that are leading the way. Teams such as the US Navy's Illuminate, the US Air Force's CyberWorx, and USSOCOM's SOFWERX are providing new ways of tackling challenges to our future leaders. However, more work is needed in order to:

- Connect the disparate pieces of "centers of excellence" and build a unified whole "network."
- Make the tools of innovation open, accessible, and consistent across the military branches.
- Modernize the curriculum of the Service Academies, ROTC, and Professional Military Education (PME) programs to include innovation skill building (in creativity, complex problem-solving, and critical thinking).

Right now, I am a part of a unique team of military veterans and active service members at Stanford University who are working on a concept called "Military Design Thinking" to create new solutions and address some of these goals.

In closing, I'd like to leave you with a few other questions:

- What if we are underutilizing our most valuable resource, our human talent?
- What if some of our best and brightest feel undervalued and underutilized--and now they are leaving the US Military?
- And, what can we do to better invest in our people and culture today to change all that?

Thank you,

Andres Lazo