DoD Initiatives

The State of American Education as a National Security Crisis

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Executive Summary

This document, a follow-up report to DARPA initiatives in focus, comes with a second set of DARPA and related agency initiatives and is intended to demonstrate that the Department of Defense sees American education infrastructure as a national security concern.

DoD Initiatives: The State of American Education as a National Security Crisis

The second set of DARPA and Government initiatives of interest will be presented differently than the first. This area has had so many wide-reaching agency initiatives that it may be best to spend more time discussing the results from a small number of highly important and illuminating endeavors rather than attempt to build a chronological narrative similar to the former set.

In 2010, General Martin Dempsey, the commander of the Army's Training and Doctrine Command (TRADOC), published a series of essays calling for a "Campaign of Learning". These essays were a series of attempts to urge the Army to invest in a host of organisational initiatives meant to develop decision-making expertise and adaptability. Between 2010 and present, the military has steadily been moving towards confirming that **the state of American Public, Private, Military and Governmental**

Agency Education is a National Security Crisis. In 2011 General Dempsey states that all branches should be looking into requests for problem and project focused learning, better use of technology-delivered instruction, learner-centric models, and application of training and education methods that engage learners. Many agency officials mirrored his suggestions in their own statements and initiatives, emphasising that improving education is a matter of national security.

Performance Training Superiority (DARWARS)

On an unconfirmed date, sometime between 2008 and 2010, DARPA launched the Performance Training Superiority program under the acronym DARWARS with **Dr. Ralph Chatham** as the program manager. Chatham had been deeply interested in the use of **network theory** and *games* to develop skill sets in a new domain called **Serious Games**, or games with intent other than entertainment.

They wanted to find ways to develop expertise rapidly, and they felt that the best way to do that was:

1. Optimisation of Concept Learning
    a. Machine-Assisted Distributed Learning
    b. Meaningful and Multi-Perspective Engagement with Material
        i. Application/Project based learning
    c. Meaningful and Multi-Perspective Engagement with Peers
2. Deterring Education Entropy, Maintaining Competence through distributed learning

They intended to leverage multiplayer games, virtual worlds, **pedagogical agents** and **online communities** to facilitate rapid development of expertise.

An interesting fact to note is that a video game studio, called Bohemia Interactive, worked closely with DARPA on this. While

it's well known for its DAYZ zombie survival game based on a modification of its Arma Multiplayer FPS (First Person Shooter) series, it is not common knowledge that the studio survived the early 2000s by working with the United States Marine Corps. They developed a program called Virtual Battle Space (VBS) to provide simulation training environments. More than 19 NATO nations and 9 partner nations now use VBS. The Arma series was built to act as a platoon-level military simulation tool.

DARWARS, apparently, resulted in a great deal of valuable research (and results), and its work was concluded with the intent of leveraging its research as a foundation for more research on the rapid development of expertise. The results are not visible or publicly available, however, it is believed that the results are the foundation for the DARPA program which carried on the work of DARWARS: Education Dominance.

Education Dominance

Sometime around 2010, as DARWARS was being wrapped up, DARPA launches a program named **Education Dominance** with William Casebeer, a Professor of Philosophy at the Air Force Academy, as the Project manager. The intent was to demonstrate that education could be improved by an order of magnitude. Instead of focusing on the classroom, **it focused on the end-goal of education: Expertise and Employment in your field**.

The primary objective of this project was to show that **we could create experts in months rather than years**. They recognised that education of this type would be difficult to scale due to scarcity in expert teachers. Consequently, the secondary objective was to develop a system in which technology could be used to replicate and scale exceptional education.

The program intended to pilot the project where the value of expertise was *nearly unlimited*, where monetary savings would be wide-reaching and nearly incalculable. They chose the Navy IT Program. According to their research:

"Their computer networks are arguably the most challenging in the world—with nearly 300,000 nodes and over 200 networks that are constantly being reorganized and often becoming autonomous. The challenge to the current Fleet ITs is so great, that typically at least a problem a week cannot be solved onboard ship and needs to be escalated off-ship for solution by elite teams. Over 6,000 tickets are escalated off-ship; many take weeks to solve; **several hundred represent over a million dollars each in operational costs."**

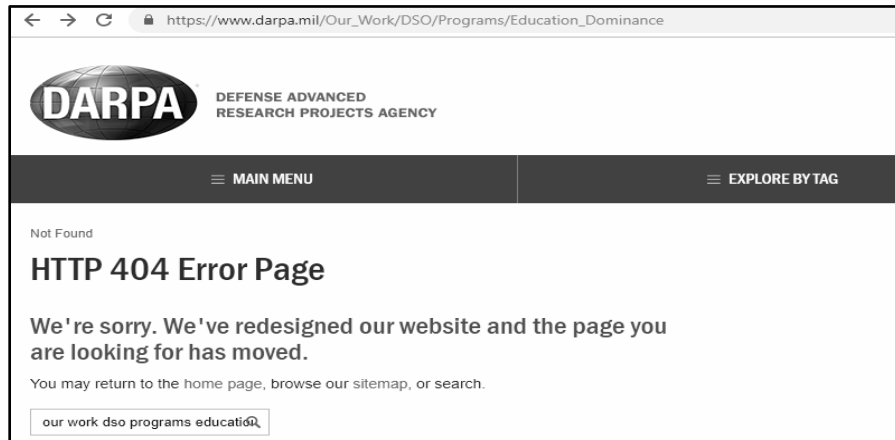The BAA was not found as DARPA seems to have no intention of showing information on the subject:

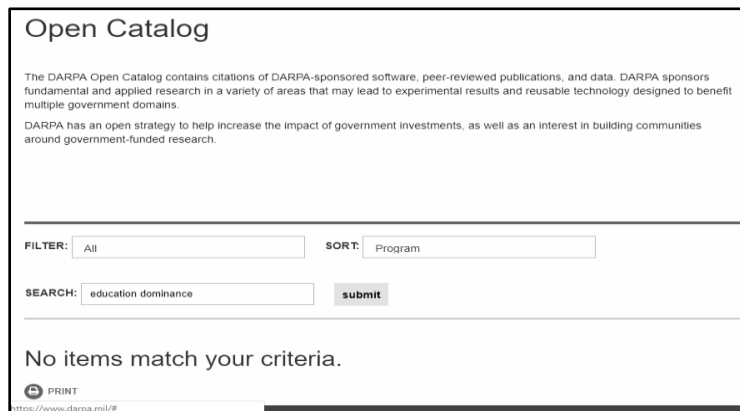*Image 1 - Education Dominance Project Page Not Found (1)*

Image 2 - Education Dominance Project Page Not Found (2)

Details are hard to find, but the following was assembled from references to it in official sources outside DARPA and in newer DARPA projects. According to a document prepared by external analysts J.D. Fletcher and John E. Morrison, Education Dominance was initiated by **Ralph Chatham**. They state that during his preparation for Education Dominance he reviewed a wide variety of technical courses and schools within the Military, and from some obscure documents posted by his wife on his memorial page, it would seem that he also became very familiar with literature on learning theory.

The program focused on the development of a Digital Tutor. The results of which are material to the objectives of this document.

They chose a group of experts to server as tutors. All chosen were gifted teachers who had career experience demonstrating their position in their field as exceptional IT professionals. They had these experts train students one on one, in a way that was described with the slogan:

"An Aristotle for every Alexander."

They then developed a **Digital Tutor** that mimicked the behaviours of this group of tutors. This group was labeled **CID (Center for Information Dominance) instructors.** The exact nature of the implementation is not known, all that is known is that the Digital Tutor was mimicking the behaviours of actual expert tutors.

A second group, labeled **ILE (Integrated Learning Environment) students**, was composed of 17 students graduated from **self-paced computer instruction** of the relevant IT material over the course of what was implied to be **12 or more weeks**

A third group was labeled **ITOF (IT of the future) students**, this group was composed of 20 students that had graduated from a **19-week** IT school that used **classroom instruction**.

The last group was labeled **DT (Digital Tutor) students**, composed of 20 students who had completed **7 weeks** of DT training.

Table 3. Assessment Four: Knowledge Test Means, Standard Deviations, and Number of Observations for 7-Week DT Students, 19-Week IToF Graduates, ILE Graduates, and CID IT Instructors.

Group	Mean	Std Dev	N
DT	207.90	37.30	20
IToF	145.75	25.18	20
ILE	64.52	19.96	17
IT instructors	149.30	53.96	10

Table 1 - Education Dominance Results (1)

Table 19. Average ranking of DT and IToF students from the Oral Reviews.

Digital Tutor			IT of the Future			Probability	Effect Size (Sigma)
Mean	Std Dev	N	Mean	Std Dev	N		
2.31	0.07	7	1.39	0.44	6	$p < .05$	3.02

Table 2 - Education Dominance Results (2)

Panel Member regarding the Oral Review:

> "...this was a blind review. However, differences between the two groups became clear. The response by one of the Board members summarizes an impression evidently shared by all three: It seemed comparatively **unambiguous that the Digital Tutor students understood IT in a way that the other students did not, even though they had less than 7 weeks of exposure compared to the 16 [19] weeks the IT of the Future [students]** spent prior to this event. The confidence of the Digital Tutor students and their clear knowledge was very

considerable. This was further displayed when they provided correct answers or explanations quickly which resulted in further deeper dives for level of comprehension. All 3 panel members were impressed. "

Table 17. Weighted Packet Tracer Exercise Scores of DT and IToF students.							
Digital Tutor			IT of the Future			Probability	Effect Size (Sigma)
Mean	Std Dev	N	Mean	Std Dev	N		
30.39	15.90	20	15.85	13.0	20	$p < .01$	1.00

Table 3 - Education Dominance Results (3)

The DT students, with only 7 weeks of training, were outperforming their instructors, all of which had 9 years or more of experience. Compared with the ITOF and fleet experts:

*"…the DT graduates successfully solved more problems and solved them more efficiently (were **less likely to use unnecessary steps**) and more securely (were **less likely to cause harm or compromise the system**). Of the three study groups, **only DT graduates solved any of the problems with the highest difficulty rating."***

Looking at what went right in the DT program, it would seem that the following was present:

1. Machine Assisted Distributed Learning
2. Immediate Handling of Learning Breakdowns
3. Expert Support Available at Any Time
4. Meaningful and Multi-Perspective Engagement with Material
5. Meaningful and Multi-Perspective Engagement with Peers *(project-based learning)*
6. Maintenance of Competence

7. Knowledge Gap Discovery
8. Granularity in Education Modules
9. Reliable Psychometrics for Module Competence

The Digital Tutor made sure that students iterated over what was likely to be forgotten. It was available whenever students felt effectively eliminated from solving challenging problems (Learning Breakdowns) and developed reasonable psychometrics for ensuring the student knew what they needed to in order to move forward. Important to note:

> *"DT students who referred to their Digital Tutor as he rather than it, showed significant performance increases."*

After results were released, The Institute for Defense Analysis, being reasonably skeptical, ran two weeks of competitions between DT Tutor Graduates and Fleet Experts:

> *"...encompassing very challenging, real-world trouble shooting problems, building enterprise-caliber networks from scratch, an advanced knowledge test and an oral review board. Again, the **Education Dominance students dominated in all competitions against Fleet experts with an average of ten years of experience.**"*

Chatham's successor implied that a lot would have to be built out for this to be replicated and that the point wasn't to build something quickly implementable elsewhere, it was just to prove it could be done and what avenues would have to be taken to do so. The Digital Tutor, for example, was hard-coded for IT-study and could not simply be repurposed for other subject areas. It would seem that Chatham may have been working on emergent properties in self-organising social networks while DT was progressing.

To give this project context, it would be important to note that the sample sizes were small, the DT students were students who already demonstrated a high level of commitment and learning

stamina, and this was in a military environment where students could have day-to-day and week-to-week solitary focus on particular tasks, uninterrupted by the outside world. In addition, the following quote from an Edsurge article on the topic may ensure the right message is conveyed:

*"…it should give educators pause to think about the powerful potential support that customized digital tutors could have in specific contexts. And **before jumping to the conclusion that AI should replace teachers**, the report authors also cite research indicating that **powerful results come from careful integration of digital support systems into traditional instructional settings**: "In fact, studies have shown that students taught by carefully designed **systems used in combination with classroom teaching can learn faster and translate their learning into improved performance relative to students receiving conventional classroom instruction"***

*Indeed, that's the potential of digital learning technologies in a nutshell: **they don't replace teaching; they provide powerful tools for making it better.** "*

A set of rather large technical manuals: Design Recommendations for Digital Tutoring Systems, have been written for the Army Research Institute based on this project and its successors. Their content will not be present in this report as the six volumes are still being reviewed and annotated by the report writers.

Bureaucratic Panic-Bloat

In 2011, President Barack Obama announced plans to launch a new agency, ARPA-ED, with a 90m budget. Similar to IARPA, ARPA-ED would mimic DARPA's strategies and structure but apply it exclusively to education.
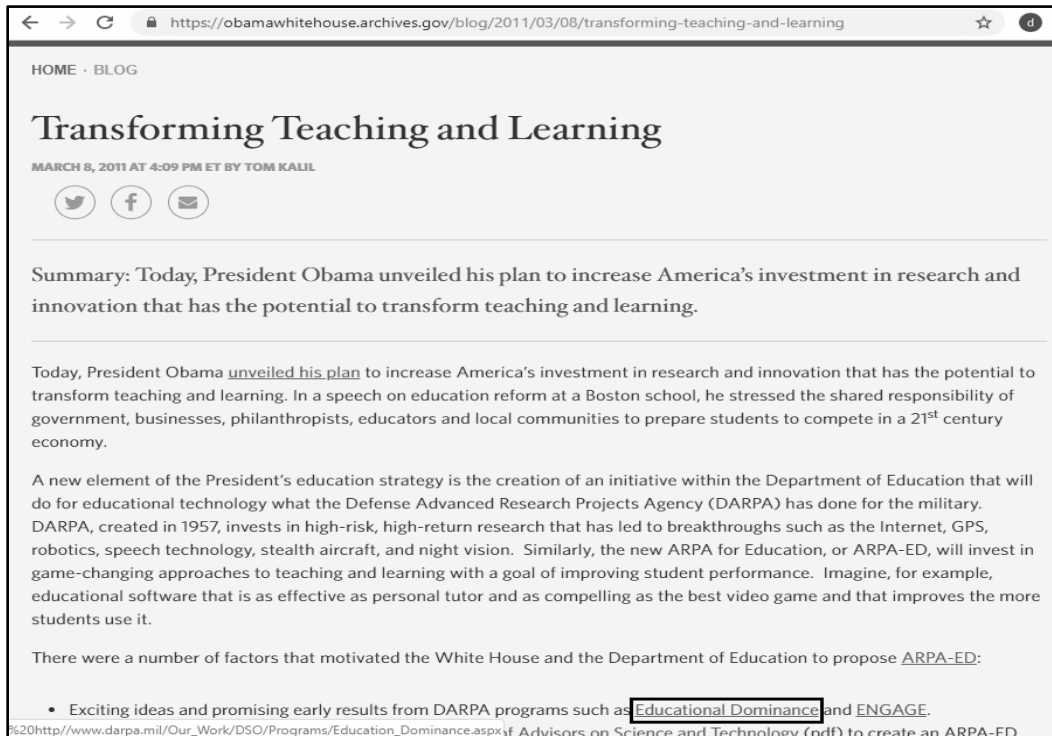

Image 3 - Obama Unveils Intent to Form Education-Focused Copy of DARPA, 2011

As stated in the previous report, when Governmental entities begin to have trouble solving a problem, bureaucratic agency and initiative bloat begin to appear. In this case, it appears **to a degree that is rivaled only by Nuclear and Counter-Nuclear agency and initiative bloat during the late stages of the Cold War.** They begin ARPA-ED and it dies before it began any projects. Over the next ten years, too many of these initiatives, recommendations and research documents appear to count and they are released from a wide range of agencies.

The Army, Navy, Marine Corps, and Air Force all began their own initiatives to investigate how education affects "readiness", one of the more important metrics for fitness in military organisations, and how education might be improved. In 2013, the department of education releases a 100-page document, "Expanding Evidence Approaches for Learning in a Digital World", which details findings from DARPA and other agency projects in pursuit of these previously mentioned initiatives. It **claims it is of extreme importance that all organisations make efforts to improve American Education.**

There are too many initiatives to note here and they are relatively self-similar, so only two will be addressed as they, on their own, clearly demonstrate the **problems that the United States Government needs to solve in order to address what they are describing as a national security concern**.

Problems Long Unsolved

Apparently, since the 1960's, government had seen education as a real concern, but it took until the 1990's before anything was put into motion. Executive order 13111 is signed on January 12th, 1999 by President Bill Clinton, titled **Using Technology to Improve Training Opportunities for Government Employees,** after a **"Life Long Learning"** Summit was held nearby the White House. Section 1 established a task force to investigate how to pursue the stated interests of the order. As a result of this executive order, an initiative named "Advanced Distributed Learning" or ADL, was formed.

It should be noted that, as of 1998, a number of Federal Agencies already had learning initiatives, some with the same titles, and the DoD (Department of Defense) had been leading the way in many regards. That being said, while ADL can be traced back to these programs and at earliest, the funding of the National Guard to build **electronic learning networks,** it was Executive Order 13111 that made ADL what it is recognised as now by forcing the consolidation of these efforts into an inter-agency effort. Soon

after 13111, in April 1999, the DoD releases a 60-page document titled *Department of Defense Strategic Plan for Advanced Distributed Learning*.

The document revealed that the DoD itself had a wide number of learning programs at this point, which indicates that Bureaucratic Bloat appeared around this problem long before Education Dominance and that Chatham's project may have been less about exploring potential future problems and more about investigating deeply-rooted, complex, extant problems the Government had already been struggling with for some time.

The following organisations and sub-organisations were noted within the document, but the multitude of learning programs outside of the DoD's direct jurisdiction were omitted.

4.0 Department of Defense Distributed Learning Programs:

4.1 Joint Distributed Learning Programs

4.1.1 Current Initiatives

4.1.2 Joint Doctrine Initiatives

4.1.3 Joint Command and Control Research Program (JC2

RP)

4.1.4 Joint Deployment Training Center (JDTC)

4.2 Military Services Distributed Learning Programs

4.2 Military Services Distributed Learning Programs

4.2.1 Army

4.2.2 Navy

4.2.3 Air Force

4.2.4 Marine Corps

4.3 Other Distributed Learning Programs

4.3.1 Defense Acquisition University (DAU)

4.3.2 Defense Logistics Agency (DLA)

4.3.3 Defense Intelligence Agency (DIA)

4.3.4 Department of Defense Educational Activity (DoDEA)

4.3.5 Director Central Intelligence (DCI)

4.3.6 National Security Agency (NSA)

4.3.7 Director of Military Support, Consequence Management Program

Integration Office (DOMS CoMPIO)

4.3.8 Defense Civilian Education, Training, and Operations

4.3.9 George C. Marshall European Center for Security Studies

The document and similar releases indicate that following the Gulf War in 1991, Congress, the General Accounting Office, and the OSD Readiness and Training Office found that the **state of readiness and ability to build readiness in reserve forces called to war was unacceptable and potentially dangerous.** It is revealed that this is an initiating factor in funding the National Guard to research electronic learning technologies in the early 1990's.

The Advanced Distributed Learning Initiative becomes consolidated after this document, and directs the Initiative and its participants to work towards the following goals:

1. Establish standards in the interest of developing interoperable tools and content, in other words: **Develop a means to pursue Granularity in Education Modules.**
2. Engender cultural change from "classroom centric" learning to "learner centric".
3. Create robust and dynamic network infrastructure for distribution of learning materials.
4. Form partnerships with businesses, universities, and local governments.

Most importantly, and in-line with the notion that it is the **entire** American education system that represents a national security concern:

5. To develop technologies that will facilitate high quality training and education opportunities **for all Americans** and research mechanisms and financial vehicles to **make training and post-secondary education available to adults throughout their lifetimes**.

ADL: Advanced Distributed Learning and BASIC

Though associated materials have implied the ADL has run into similar problems to other initiatives noted in this document regarding social and behavioural research, it has achieved some notable milestones over the last two decades since its consolidation, some of which will be discussed. If an outside actor wants to understand what it is that the military currently wants in terms of education, they can look to the problems ADL has encountered and intended to solve in their various initiatives, active and inactive, as they represent the consolidated interest of the American Intelligence Community, Military, and Government.

Much of what will be detailed below will come directly from their site and from their recent BAA HQ0034-18-BAA-ADL. It should be noted that despite the fact it presents itself as more closely associated with the Education Department, it is considered a

Defense Agency and they report to Charles Drummond who has the titles of Deputy Assistant Secretary of Defense for Force Education and Training in the Office of the Assistant Secretary of Defense for Readiness. The current director of ADL is Dr. Sae Schatz, who has a strong background in E-Learning and performance assessment.

Data and Ontological Standards

ADL has been very interested in establishing data standards in order to ensure interoperability between their many initiatives. They currently require all companies that work with them directly to abide by these standards, known as SCORM and xAPI. Unfortunately, SCORM and xAPI were designed when NoSQL was not considered an option, and therefore, for many companies, these standards may be too rigid to be considered useful. They have a new BAA released which addresses this, not by asking for a new standard, but asking for a way **to convert NoSQL to their data standards**. This may be unlikely to succeed meaningfully and indicates key problems in the large bureaucracy that administers ADL and their communication with engineers. That being said, they have managed to design terms which are valid and useful.

Glossary of ADL Terms

The small glossary below has been of great use to the report writers and is important to discuss.

LRS | Learning Record Store

An LRS is an application interface for storing, accessing, and visualising data about experiences, activities and performances. Within the ADL system, it means it meets xAPI standards as a data store. Generally, the xAPI standards, as they apply to the LRS, are meant to assist in **data visualisation**.

In a report by ADL and partner company Eduworks, "Using Competencies to Map Performance across Multiple Activities", the writers assert that Learning Record Stores are exceptionally important for developing common language and grammar in order to facilitate **granularity in educational modules.**

Robby Robson was one of the authors of this report. He is a former chair of the IEEE (Institute of Electronics Engineers), which is the world's largest professional organisation and has been implementing standards in electronics since 1884. He is currently the principal investigator on the ADL initiative Competency and Skills System (CASS), he's been working in the area of competencies and outcomes-based education since the late 1990's. His co-writer was Jonathan Poltrack.

LMS | Learning Management System

ADL takes its definition of Learning Management Systems from Carnegie Mellon's Learning Systems Architecture Lab:

A Learning Management System (LMS) is a software package used to administer one or more courses to one or more learners. An LMS is typically a web-based system that allows learners to authenticate themselves, register for courses, complete courses and take assessments. LMS's are generally intended to have:

1. **Structure** – centralization and organization of all learning-related functions into one system, enabling efficient access to these functions via layered interface navigation functions.
2. **Security** – protection from unauthorized access to learning content, learner records (**LRS**), and administrative functions.

3. **Registration** – finding and selecting or assigning courses, curricula, etc. by learners and their supervisors. This may include instructor-led training classes.
4. **Delivery** – on-demand delivery of learning content and learning experiences to learners.
5. **Interaction** – learner interaction with the content and communication between learners, instructors, and course administrators, as well as communication between the content and the LMS (e.g., SCORM content).
6. **Assessment** – administering assessments and the collection, tracking, and storing of assessment results data, with further actions taken (possibly in other systems) based on the results of assessment. Many LMS's include the ability to create assessments as well.
7. **Tracking** – tracking of learner data including progress on a predefined set of training goals and requirements, and tracking of courses for usage, especially in relation to required deployment of mandated training (for example, compliance training).
8. **Reporting** – extraction and presentation of information by administrators and stakeholders about learners and courses, including the information that is tracked as described above.
9. **Record keeping** – storage and maintenance of data about learners. This includes both demographic info that profiles learners and the training progress and accomplishments of learners. This is especially critical when

an LMS is deployed as the official "system of record" for an organization.

10. **Facilitating Reuse** – **searching and recombining courses and possibly parts of courses** for delivery in different curricula and learning tracks (this is a much more prominent feature of LCMSs (Learning Content Management System) but is often included in an LMS).

11. **Personalization** – configuration of LMS functions, interfaces, and features by learners and administrators to match personal preferences, organizational needs, etc. In advanced systems, "personalization" can also include tailoring of content or learning experiences to address the learner's assessed or detected learning needs **(Knowledge Gap Discovery).**

12. **Integration** – exchange of data with external systems to facilitate enterprise-wide tracking of learner performance and transfer of user data, and to exploit external content and learning resources (i.e. content management systems).

13. **Administration** – centralized management all of the functions in this list.

TLA | Total Learning Architecture

A TLA is defined as a software platform which enables next-generation, personalised, data-driven, and lifelong learning. It is meant to be the platform that combines solutions to the critical problems that prompted ADL to begin work in the first place.

Rapid Development of Expertise

Many partner companies have tried to help Advanced Distributed Learning with this interest. Eduworks is a major player, run by **Dr. Benjamin Bell** who worked with **Ralph Chatham** on providing adaptive training systems, under the name STRATA (Synthetic Teammates for Realtime Anywhere Training and Assessment) to the Air Force. ADL has many projects in this domain, but given their key projects, partners, and initiatives it would seem that a number of items in this segment are essential to this goal:

1. Knowledge Gap Discovery
2. Preventing Competence Decay
3. Organisation and Verification of Credentials

Identifying Prerequisite Knowledge

It is understood that we learn via metaphors, this is consistent with the work of Erich Neumann, author of the book "The Origins and History of Consciousness". If we do not know what the student knows, then we cannot identify the causes of **learning breakdowns.** Learning breakdowns can be defined as moments where students lack the necessary metaphors to bridge to a new concept. We cannot teach tensors if a student doesn't know linear algebra, we cannot teach linear algebra unless the student knows algebra and functions, we cannot teach functions unless the student knows algebra and notation etc. **Rapid Knowledge Gap Discovery** is a recurring problem in much of the literature. **ADL has been unable to address this problem meaningfully** as solving it is interdependent on potential solutions to other unsolved problems, such as Organisation and Verification of Credentials and the Modularisation of Education.

Verification of Credentials

Verifying credentials is a complicated problem, but the primary underlying problem is **standardisation** and external verification. **Onboarding of Credentials is far more difficult than in-system credentials**. To make the problem exponentially worse, there is

also consideration of the nature of credentials themselves. Credentials are generally homogenous and static but the competencies they're meant to accredit are not. The **underlying skills and memory** have (1) overlap with other skills and memory and (2) state, a state which is **in constant decay.**

These credentials need to be organised in a way that is helpful and accessible, currently, they are not. Finally, ADL has suggested that it would need to crowdsource test materials as it cannot meet the needs of learners via centralised hard-coding. **ADL has identified these problems and has initiatives (active and inactive) attempting to address them. None have had meaningful success.**

It seems that a key element of what their partners see as useful, is the concept of ***pathways*** to credentials. **CredentialEngine**, a partner of ADL and Eduworks, is releasing this feature in 2019 but may not meet standards found in the DoD literature.

Competence Decay

There needs to be a means to assess current state of underlying skills and memory associated with a credential, with the intent of assisting the learner in returning to the learning materials before they decay critically. **ADL has identified this as a problem but has failed to address it meaningfully.**

Storage and Organisation of Credentials

ADL set standards years ago regarding LRS or Learning Record Stores, unfortunately, despite the fact that they require all contractors who work with them to abide by the standards set by SCORM and xAPI, they have changed these multiple times. As noted earlier, to make matters worse, they set these standards prior to the advent of NoSQL databases. The standards are hard-coded, inflexible, and sterile. While reviewing these standards, it was found that in many cases contractors used the data structures—but didn't comply heuristically with what was

intended by ADL. This indicated that they were only using them to be able to work with ADL, not because they were good standards. Worse yet, **ADL didn't seem to notice they were not being used correctly.** They are strongly considering **blockchain for storage and verification,** but they have noted that problems need to be solved before considering it seriously.

ADL has recognised there are problems with how credentials set in these standards are constructed and has also recognised that there are inherent problems with how they would have to be organised given their structures. **They are seeking solutions for things as simple as *how to organise credentials that fall under more than one domain*.**

ADL has had multiple initiatives attempting to solve these problems, none have addressed them meaningfully.

Modularisation and Granularity

They note in their literature that the ability to mix and match classes and courses in order to establish numerous **pathways** to expertise is of interest. More importantly, modularisation would be essential to identifying knowledge gaps and standardising credentials. **They have noted this as exceptionally important but have failed to address it in a meaningful way.**

Concept Maps and Gamification

ADL has identified, through thorough research, that concept maps are an excellent way to help turn learning into a *Serious Game* as described by **Ralph Chatham**. They helped fund the development of Sero!, a concept map platform which was intended to be used in the military. Sero! hijacks some spatial and visual memory as well as reward mechanisms in the brain. It was noted in the first report that **many students (military and civilian) spent extra time studying in order to fill gaps in their Sero! concept maps whether they were instructed to or not**. It also showed significant effects on test scores. However, Sero!,

in a final evaluation report, was found to be inefficient for a number of reasons, none of which were related directly to concept maps as a concept. Instead, the problems seemed to be found elsewhere within this segment:

1. Terrible User Experience
    a. Described as "Visually Noisy"
2. Errors and Bugs
3. Lack of Prerequisite Information

The key problem with Sero! seemed to be that it was a badly built product. **The science was sound, but the product was nearly unusable.**

Learning Profiles

The Military's human talent analytics platform is fragmented and not standardised, it contains nearly 250 individual, disconnected databases and a variety of mechanisms for analysis and record keeping. It is a legacy system, some of which still uses paper as a primary means of record storage. ADL has a strong interest in updating this and has experimented with a number of learning profiles. **The science is sound, but the products are unusable.**

Social/Project Based Learning

ADL has found that social and project-based learning is a boon to training time. Direct access to instructors or an **MKO (more knowledgeable other) to assist with learning breakdowns** has been shown to be invaluable. **Meaningful, Multi-perspective Engagement with Peers and Material** has also been shown to be invaluable. They acknowledge that they need an ecosystem of co-learners and instructors paired with an incentive system in order to scale potential solutions. **The science is sound, but they have yet to address this in a meaningful way.**

They want a Centralised Platform with Decentralised Actors.

Identifying and Reducing the Impact of Bad Actors

With the (hypothetical) introduction of an ecosystem of co-learners comes the risk of Bad Actors and Irrational Players. They are concerned that, with such an introduction, the **community will be at risk of being exposed to false or intentionally misleading information planted by bad actors (foreign government agents, terrorists, and "trolls")**. They were looking to network theory as a potential avenue for solutions. In this process it would seem that **they're encountering problems more associated with Game Theory and Philosophy than with network security.**

They classify bad actors, or *threat actors*, as follows:

1. Terrorists
    a. Using the TLA as a means to spread propaganda or train recruits
2. State Actor
    a. Using the TLA to plant false information or otherwise disrupt education
3. Insiders
    a. Administrators on the network misusing the TLA to cyber-stalk or modify learning records for personal gain
4. Irrational Players
    a. Intentional misuse of the platform for entertainment

Their literature has found that the best way to protect the network is using a community approach, similar to **Waltzman's whole-of-nation defense**.

They have failed to address any of these problems in a meaningful way.

Personal Assistant

There is a great deal of research on the use of digital personal assistants, some of which was addressed in the previous report.

It would seem ADL is interested in using a digital assistant to facilitate the learner's use of the platform. The development of this is **thoroughly outside of their scope and, apparently, capability.**

At the Tipping Point: Problems Unsolved

As mentioned in the previous report, if an outside actor wants to understand what it is the government wants, they must look to BAAs; if they want to understand what problems the government is struggling to solve, they can read the narrative within streams of BAAs and watch for bureaucratic bloat.

In 2017, ADL releases a document called "At the Tipping Point: Learning Science and Technology as Key Strategic Enablers for the Future of Defense and Security", reaffirming its initiatives. It includes the director Dr. Schatz as an author and the document **clearly indicates that the Pentagon and the DoD recognise education as a legitimate national security concern** and, as stated in the title, an **enabler of massive improvements in adaptability.**

On September 21st of 2018, **ADL releases a BAA**. On March 13th of 2019, days before the writing of this report, the Foundational Science Research Unit of the U.S. Army Research Institute (ARI) for the Behavioural and Social Sciences, known as the **FSRU, released a BAA** with solicitation ID W911NF-19-S-0006. **Between the two documents, everything in the prior segment was asked for.**

It has been 20 years since the government began moving towards solving the problems discussed in the prior segment. It has been 10 years and literally dozens of agencies and hundreds of initiatives and studies. The science is sound, yet no widely implemented program exists yet, and it is exceptionally important to understand why and what that should mean to the readers of this document.

Conclusions

It is the conclusion of the Report Writers that ADL has failed to find adequate, implementable solutions to the problems they've codified because they have failed to use the economic technology DARPA has refined. They have too many active projects, many of which have products attached, that they are managing directly. They would be an excellent candidate for a case study on government agencies attempting to handle product cycles.

They produce high production trailers and teasers for products that don't exist and may never exist.

They show this to stakeholders:

Learning Ecosystem of the Future

1,286 views

ADL Initiative
Published on Jan 30, 2018

Image 4 - ADL Initiative Video Given to Stake-Holders (Learning Eco-System of the Future)

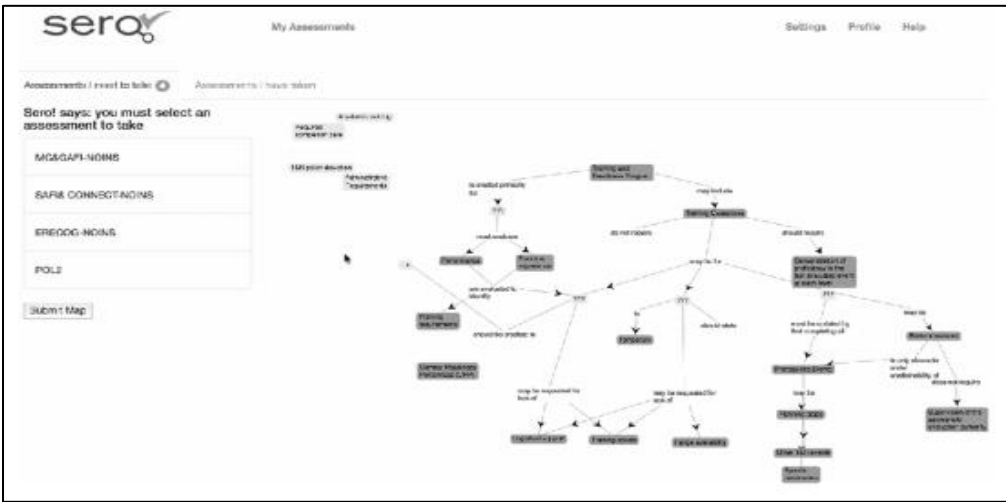When in reality this is the product they're subjecting focus groups to:

Image 5 - SERO! Concept Map

SERO was a key partner. As of 2019, **they charge $3000 a day to demo the program shown above.** Invoice information for ADL was unavailable, but upon searching the Comptroller's records it was found that there is a pattern of *realignment and addition* of funds to ADL to start new programs*.*

776: Advance Distributed Learning	0.000	0.000	0.000	10.384	0.000	10.384	0.000	0.000	0.000	0.000	Continuing	Continui

Note
AMENDED BUDGET REQUEST JUSTIFICATION: FY 2017 OMNIBUS Reprogramming: $+10.384 million is realigned from Operations and Maintenance to Research, Development, Test, and Evaluation (RDT&E) in FY 2017. Funds will be budgeted in RDT&E for FY 2018 and out to continue the research, development and overall support of the program.

This is a new start program to OSD from the Defense Human Resources Activity.

Table 4 - GAO ADL Budget Realignment

As early as 2003, the GAO (Government Accounting Office) noted that **ADL already required a 2.2-billion-dollar annual budget;** this was 600 million above what was planned for and that they were meeting serious challenges. Many of those challenges seemed to stem from the fact that the ADL was too close to the technology they were developing. The GAO report was to Congress on Progress and Challenges to this program and defined its actual goal as developing technologies that meet the following standards:

1. Accessible
   Ability to access education remotely

2. Interoperable
   Ability to integrate components with other systems easily

3. Reusable
   Ability to design instruction components that can be mixed with other instruction components (modular)

4. Durable
   Unlikely to become obsolete

5. Affordability
   Reduce instruction hours and infrastructure costs

GAO
Accountability · Integrity · Reliability

ADL Program Challenges

Table 4: Training and ADL Allocations By Component for Fiscal Years 1999 through 2002 (in Millions)

Component	FY 99 Allocation	FY 00 Allocation	FY 01 Allocation	FY 02 Allocation	FY 99-02 Total
Total DoD					
Total Training	$7,532	$7,973	$8,868	$9,361	$33,734
ADL	$88	$94	$116	$133	$431
ADL Percent of Total Training	1.17%	1.18%	1.31%	1.42%	1.28%
Army					
Total Training	$3,239	$3,394	$3,762	$4,047	$14,442
ADL	$60	$58	$75	$92	$285
ADL Percent of Total Training	1.85%	1.71%	1.99%	2.27%	1.97%
Navy					
Total Training	$1,789	$1,862	$2,064	$2,135	$7,850
ADL	$6	$4	$7	$10	$27
ADL Percent of Total Training	0.34%	0.21%	0.34%	0.47%	0.34%
Marine Corps					
Total Training	$433	$450	$478	$478	$1,839
ADL	$10	$14	$16	$18	$58
ADL Percent of Total Training	2.31%	3.11%	3.35%	3.77%	3.15%
Air Force					
Total Training	$1,870	$2,033	$2,304	$2,439	$8,646
ADL	$2	$4	$4	$3	$13
ADL Percent of Total Training	0.11%	0.20%	0.17%	0.12%	0.15%
OSD and Joint Staff					
Total Training	$201	$234	$260	$262	$957
ADL	$10	$14	$14	$10	$48
ADL Percent of Total Training	4.98%	5.98%	5.38%	3.82%	5.02%

Table 5 - GAO ADL Program Allocations

It has been 16 years and what could be estimated to be well over tens of billions of dollars since this GAO report was published. The science is sound, but there are no widely implementable results yet. **The Pipeline wasn't performant because the Pipeline wasn't used**.

It has been 16 years since Palantir, the on-site data visualisation and analytics company, was founded. They are now widely implemented across government agencies of all types and sizes and private businesses, including but not limited to local police, CIA, DoD, and Morgan Stanley. Palantir has, what is widely referred to as, *a working product*, and the company is now worth tens of billions of dollars. **Palantir used the Pipeline.**

The new release of BAAs seems to indicate that the government is now considering the use of the Pipeline so that ADL's work may approach a conclusion by considering products built without their direct oversight. In fact, **if a company offers codified solutions to the codified problems they're looking to solve to the codified standards they've set, they have to seriously consider using it. If they don't, they'll be in violation of a law set in 1994, the Federal Acquisition Streamlining Act** which was meant to prevent the wasting of government funds on attempts to manage product cycles internally. Palantir sued the U.S. Army on this basis in 2016 and received an 800-million-dollar contract to provide software related to the case in 2019.

ADL will need to make a greater effort to include the private sector or it will likely fail to produce any result.