Advanced Distributed Learning: A Global Perspective

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+ + + Authored in conjunction with 10 additional partners, representing a total of 12 unique nations/NATO + + +

ABSTRACT

Coalition military forces have become the norm, and to be ready for multinational operations, militaries must prepare using relevant training, education, and exercises. Many nations and security coalitions use advanced distributed learning technologies to, at least partially, meet this demand. Towards that end, this paper examines the intersection of *multinational military training and education* and *innovations in learning science and technology*, specifically those involving distributed learning.

To write this piece, authors from 12 nations/NATO collaborated. Content contributors serve as military officers or civil servants in their defense ministries, and each works in the technology-enabled learning domain. The paper begins by highlighting national strategies in support of multinational collaboration. It then discusses collaborative efforts involving technology-based learning. Next, it describes a survey of the authors' organizations, which examined their priorities, challenges, and uses of distributed learning. Finally, the paper closes with our survey findings and recommended next steps for consideration by coalition military training and education stakeholders.

Some key findings from the survey include the following: Use of distributed learning is expanding across the board. On average across surveyed organizations, enhancing the instructional quality (pedagogy/andragogy) of distributed learning ranks as the number-one focus area. Mobile learning and, possibly, game-based distributed learning may see an uptake in use, but there are unmet needs in the areas of learning analytics and, correspondingly, xAPI and learner/teacher performance dashboards. Finally, international partnerships—specifically in the area of distributed learning—yield tangible benefits.

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> "Last December, I reached out personally to dozens of defense ministers...," wrote US Secretary of Defense Ashton Carter, speaking about the US-led 66 nation coalition dedicated to degrading and defeating *Daesh* (or "Islamic State of Iraq and the Levant" [ISIL]).
>
> "...This week, Canada announced a commitment to triple its training mission in Northern Iraq and double its intelligence efforts throughout the region. The Netherlands recently expanded its current air campaign over Iraq to include targets in Syria, and is contributing funds for medical assistance and rebuilding. In Brussels, I received additional commitments to the fight from the Czech Republic, Poland, Romania, and Denmark pending final approval by their respective parliaments….On Thursday, Saudi Arabia agreed to expand its role in the Coalition air campaign and provide additional support on the ground. Today, the United Arab Emirates said it will do the same..."
>
> *— US Secretary of Defense Ashton Carter (2016, February)*
> *see also theglobalcoalition.org*

Diverse, multinational military forces have become the norm on today's battlefield. Such *integrated operations* require unification of efforts and strategy, tactical and technical-level interoperability, and all of the associated training, exercise, and educational preparation. However, learning and development for integrated operations still fall short of needs. One study found, "in terms of quality, integrated-operations objectives do not seem to be a priority at most DoD [US Department of Defense] training and exercise events." There is also "a general lack of available subject-matter experts from other government agencies and countries" (Spirtas, Moroney, Thie, Hogler, & Young, 2008; p. 50). Among this report's recommendations were to "advocate for stable funding for innovative programs" particularly in support of training, education, and other personnel-focused initiatives (ibid; p. 57).

Towards that end, this paper examines the intersection of *multinational military training and education* and *innovations in learning science and technology*. To write this piece, authors from 12 nations as well as NATO collaborated. Each contributor serves as a military officer or civil servant in defense ministry, and each works in the technology-enabled training/education domain. Most of the contributors serve as directors for their militaries' Advanced Distributed Learning (ADL) Centers. Hence, this article will emphasize the use of ADL technologies. Specifically, we explore each military's use of distributed learning, associated distributed learning requirements, and tangible ways we can collaborate to enhance multinational training and education—through distributed learning.

STRATEGY FOR A COSMOPOLITAN BATTLESPACE

Many nations have embraced the reality of multinational military operations, emphasizing international collaboration in their national defense strategies and taking measures to increase multinational training and education activities. For example, the UK's *National Security Strategy and Strategic Defence and Security Review* (SDSR 2015) states: "Strong alliances and partnerships worldwide are more important than ever. In almost every aspect of our national security and prosperity, we must work with others, not because we cannot work alone, but because the threats and opportunities are global." Similarly, the *Canada First Defence Strategy* (2008) shows that multilateralism is the Canadian government's preferred *modus operandi*. Of the strategy's three "core actions," two directly reference international cooperation: ensuring the security and sovereignty of Canada, contributing to the defense of North America in cooperation with the US, and contributing to international peace and security.

For a Scandinavian example, the long-term plan from the Norwegian Ministry of Defense (MoD) highlights multinational collaboration as one of nine priority areas. It states that the Norwegian Armed Forces "shall contribute to international military cooperation, in order to secure peace and stability" and that "this includes contributing to the Defense Security Sector Reform with selected partners" (Norwegian MoD, 2012, p. 13). Further, Norway has actively demonstrated its dedication to international cooperation by participating in several ongoing multinational operations in Afghanistan, Iraq and Mali, in addition to a number of UN missions.

On the other side of the world, the New Zealand Defence Force considers its Mutual Assistance Programme an integral contribution to regional security. The program involves, for example, offering training/education to regional partners, exchanging personnel (i.e., secondment) among participating countries, and otherwise providing instructional development and advisory assistance. Program activities, such as those, complement New Zealand's other political, economic, and development efforts to secure and stabilize the South Pacific region (NZDF, 2005).

International cooperation also plays a prominent role in US strategy. For example, the most recent *Quadrennial Defense Review* (QDR 2014), the foremost public document on US defense strategy objectives, describes a three-pillar strategy involving (1) protecting the homeland, (2) building security globally, and (3) projecting power to win decisively. Several of the methods for achieving these strategic ends involve global partnerships as well as innovation. In the report's words: "Innovation—within our own Department and in our interagency and international partnerships—is a central line of effort. …With our allies and partners, we will make greater efforts to coordinate our planning to optimize their contributions to their own security and to our many combined activities" (p. IV).

PREPARATION FOR INTEGRATED OPERATIONS VIA DISTRIBUTED LEARNING

To be ready for multinational operations, military forces must prepare using relevant training, education, and exercises. Many nations and security cooperatives (such as NATO) use advanced distributed learning technologies to, at least partially, meet this demand. For example, from NATO's *e-Learning Concept* (2014) policy:

> **What's Distributed Learning?** Colloquially, and for this paper, "distributed learning" refers to technology-enabled learning delivered to people at different times and/or locations. Classically, this means tools such as e-learning, web-based videos, and smart-books (ePubs). Adding the term *advanced* implies inclusion of cutting-edge techniques and technologies such as mobile learning, browser-based adaptive tutors, and web-enabled serious games.

> The current operating environment of NATO's forces requires an agile and responsive training system. The rapid tempo of change in the operational environment and the speed of introducing new capabilities developed by industry and academia magnify our responsibility to arm the war fighter with the necessary skills in a reduced timeframe and more holistic manner. Similarly, the complexity of sharing the area of operations with a number of governmental, non-governmental and international organisations with differing priorities and in front of a global audience requires the development of tailored training programmes. ...In addition to keeping NATO's educational framework current with academic and industry trends and standards, we must address the contemporary reduction in military budgets and the responsibility of the nations to provide trained forces, coupled with the requirements to avoid duplication of efforts, pool resources, and engage nations and partners. *...e-Learning represents an innovative, powerful and cost-efficient means of delivering this requirement* (emphasis is ours, p. 3).

Similar to NATO, the five-nation NOrdic DEFence COoperation (NORDEFCO; including Denmark, Finland, Iceland, Norway, and Sweden) considers advanced distributed learning a critical enabler. One of NORDEFCO's main Cooperation Areas is "Training and Exercise" (COPA TEX), and its aim is to "continuously identify possibilities to coordinate and harmonize military training activities among the Nordic nations in order to enhance competence and skills" (NORDEFCO, 2014, p. 7). To support this objective, the nations have established an ADL forum of experts and hold an annual NORDEFCO ADL Conference. Finland hosted most recent of these in May 2016, and in April 2017, Sweden will host the fifth annual event.

The US-based ADL Initiative (a DoD program) also operates a Global Partnership Network, including members from NATO, NORDEFCO, and other coalition states. The network includes 11 national partners (Canada, Finland,

Latin American region, New Zealand, Norway, Poland, Republic of Korea, Romania, Serbia, UK, and US) as well as the NATO Allied Command Transformation. Participating nations sign bilateral agreements between the US DoD and their respective MoDs. In addition to these international members, the US Office of Personnel Management and two US-based universities (University of Memphis and University of Wisconsin–Madison) take part in the network. Participating military/government organizations (including NATO) each operate a dedicated ADL Partnership Center, overseen by a local Director. The Directors are active duty military personnel or civil servants. In the US, select academic institutions may join. These ADL Partnership Laboratories support the network through research, while the military-based Partnership Centers focus more on operational course development and delivery.

Distributed Learning Collaboration Example

One of the ADL Partnership Network goals is to foster international collaboration and information sharing. For example, in 2015, three ADL Partners joined efforts to collaboratively develop e-learning assets. This project began when the Norwegian Defense schools and training centers started transitioning from traditional classroom courses to online learning. Among other initiatives, the Norwegian Defense University College was tasked to develop an e-learning course for instructors, covering learning theories, pedagogy, and practical examples on how to "teach" online (Norwegian MoD, 2012). With external funding from the Ministry of Local Government and Modernisation, in cooperation with four other governmental agencies, development started early in 2015.

However, the need to educate instructors in online learning is common across the ADL community. Soon, the Canadian Defense Academy and NATO Allied Command Transformation joined the Norwegian team, agreeing to collaboratively support English-language versions of the courses. By cooperating during the development process (versus merely sharing finished products developed by a single nation), the team has been able to shape the course content to support everyone. For instance, all of the film scenes used in the Norwegian-language version of the course were also re-shot in English at the same time—saving time, money, and frustration. Another benefit of the cost-share, both nationally (i.e., across multiple Norwegian agencies) and internationally, is that each contributing organization receives two state-of-the-art e-learning courses for a fraction of the total cost (see Figure 1). And because the courses were developed under the Norwegian Defense framework agreement with the vendor, they can now be freely shared across NATO, NORDEFCO, Partnership for Peace, and the ADL Global Partnership Network. This project exemplifies how a fruitful cooperation network contributes to reduced cost, increases capacity, and lays the groundwork for broad reuse and sharing.
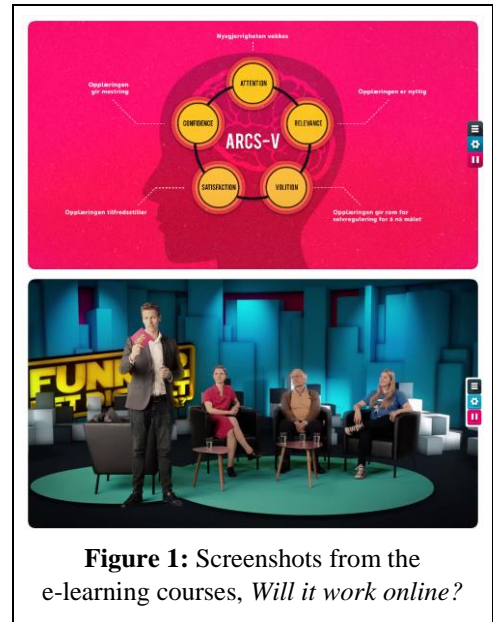

Figure 1: Screenshots from the e-learning courses, *Will it work online?*

RESEARCH: THE CURRENT SURVEY

Military education and training communities around the globe face a surprisingly similar set of challenges, and likely, have experience and lessons learned they can productively share with one another. Related to distributed learning, in particular, we sought to collect and synthesize the most critical needs—or most exciting emerging opportunities—related to the procurement, development, distribution, and evaluation of advanced distributed learning in the multinational military context. To do this, we conducted a survey of global distributed learning defense stakeholders from across participants and collaborators of the ADL Global Partnership Network.

Research: Data Collection Methods

Data collection involved three components: initial scoping, survey, and qualitative input.

(1) Initial Scoping

In December 2015, the ADL Global Partnership Network held one of its twice-annual co-located meetings, attended by 28 individuals, representing 15 different nations. Attendees discussed many topics, including areas of innovation in distributed learning, associated gaps, and opportunities. To identify those topics, the directors created an affinity diagram of their most critical ADL needs and/or focus areas (i.e., opportunities they are actively addressing or critical gaps).

Affinity diagrams are a brainstorming and categorization method (Tague, 2004). We created our diagram by asking each participant to write down his/her organization's ADL needs and focus areas; each person wrote down multiple ideas, with one idea per sticky-note. Participants placed the sticky-notes on a wall, in no particular order. Next, as a large group the participants moved the sticky-notes into conceptually similar

Figure 2. ADL Partnership Network Directors create an affinity diagram (December 2015)

categories (see Figure 2). After several minutes of this group-work, the facilitator read off the resulting categories and participants made final adjustments. Then each category was given a representative name. For instance, three sticky-notes marked "improve teaching quality," "get more pedagogy," and "more learning techniques" might form one pile, and ultimately, it might be dubbed, "Improve Pedagogy." Once everyone agreed to the organization and topic titles, each participant received three sticky-dots, which they used to "vote" on prioritization. Participants could arrange their dots in any combination, e.g., all on one category, across three different categories, and so on.

Ultimately, this created an ordered list of collective distributed learning priorities. The top ten were (in priority order): enhancing pedagogy (andragogy), using competencies, improving the project management and cultural around distributed learning, collecting more effective human performance data (e.g., via xAPI), improving legacy Learning Management Systems (LMSs), enhancing resource/information sharing, elevating learning analytics, using games, implementing mobile learning (m-learning), and effectively integrating video-based learning.

(2) Survey

Based upon results from the 2015 ADL Directors' meeting, including (but not limited to) the prioritized list of topics from the affinity diagram, we created a survey apparatus. The survey asked respondents to identify the distributed learning technologies used by their military learning organizations, and it also asked them to rank their top priorities for future distributed learning. The items comprising these two questions are shown in Tables 1 and 2, below. (The surveys responses are described later, in the Results section.)

Table 1. Survey Question #1. In your existing DL*, how much are each of these currently used?

Respondents rated each technology on a four-point Likert-like scale, ranging from Never (1) to Very Often (4). They also had space to write-in additional technologies not listed. (*DL refers to "Distributed Learning.")

• SCORM 1.2	• DL Team Simulation (on Web)	• DL Competency frameworks
• SCORM 2004	• DL (Serious) Games	• DL Badging (DL Credentialing)
• xAPI	• Mobile Learning (m-Learning)	• DL Qualification frameworks
• Self-made Videos (not just YouTube)	• eBooks	• DL Learner Dashboards for Learners
• Learning Management Systems	• DL Virtual Reality	• DL Learner Dashboards for Teachers
• Learning Record Stores	• DL Augmented Reality	• Blended Learning (DL + Live)
• DL Individual Simulation (on Web)	• DL Intelligent Tutors	

Table 2. Survey Question #2. What are your top priorities for future DL?

Respondents ranked these ten topics (from 1-10) and indicated "we are doing this" or "I wish we would do this."

- Improve the quality of pedagogy in DL
- Use competency frameworks in DL
- Improve DL project management and culture
- Integrate xAPI
- Improve old Learning Management Systems
- Increase ADL Partnership information sharing
- Improve learning analytics
- Use more/better mobile learning
- Use more/better video-based learning
- Use more/better DL (serious) games

(3) Qualitative Input

Finally, we asked participants to share information about their defense organizations' outlooks and usage of distributed learning. In addition to answering these questions, respondents were asked to directly contribute to this paper, in order to provide a truly multinational perspective to this article.

Research: Participants

Recall that participants hold leadership positions related to training, education, and/or distributed learning. As mentioned above, 28 individuals participated in the initial discussion and meeting activities, which informed survey development. The US-based ADL Initiative constructed the survey, and all of the ADL Partnership Directors, as well as other close collaborators, were asked to complete it. In the end, contributors from 13 organizations, representing 12 different nations/NATO (listed below) completed the survey and associated qualitative questions:

- Australian Defence College
- Canadian National Defence
- "Carol I" National Defence University (Romania)
- Serbian Ministry of Defense, Center for Simulations and Distance Learning
- Royal Danish Defence College
- Finnish Defence Forces
- Military Academy Halmstad (Sweden)
- New Zealand Defence College
- Norwegian Defense University College
- UK Headquarters Defence Academy
- NATO Allied Command Transformation
- US Office of the Assistant Secretary of Defense (Readiness)
- US Office of Personnel Management

NOTE: Results reflect respondents' expert opinions and do not constitute any nation/organization's official stance.
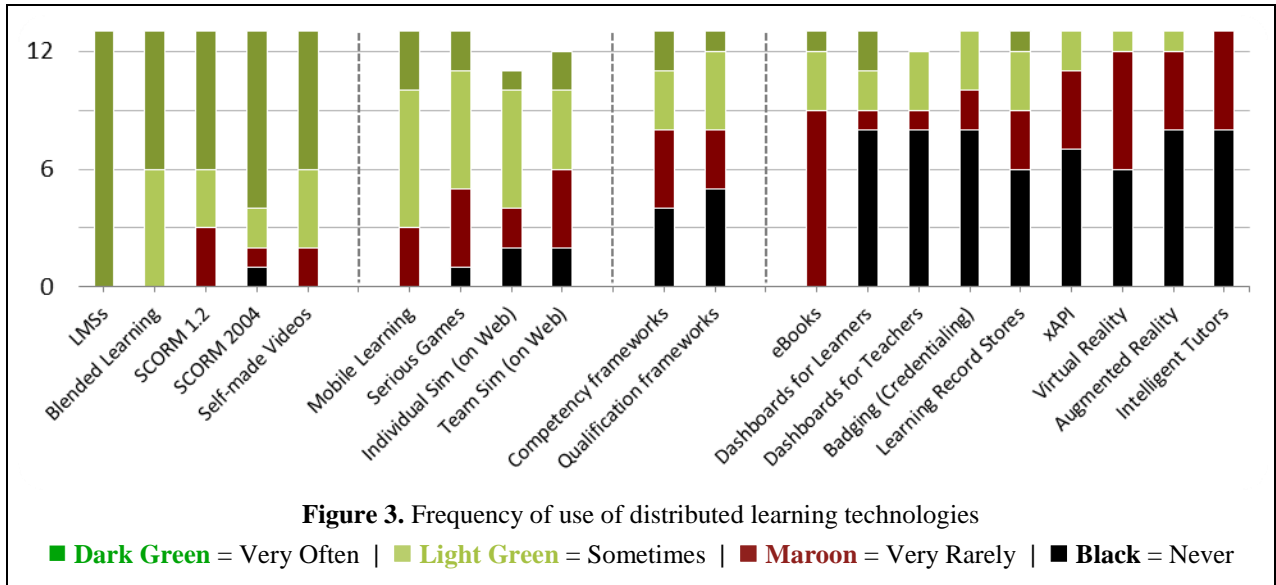
RESULTS

Survey Question #1: Current Usage of Distributed Learning Technologies

The first question asked respondents to indicate the frequency with which their defense organizations *currently* use various distributed learning technologies. Figure 3 summarizes these results; in it, the items have been sorted to better visualize the trends, from most frequently used (left) to least frequently used (right).

Popular technologies continue to fall within traditional e-learning definition, i.e., LMSs, SCORM-enabled browser-based content, videos, and blended learning. Most respondents also reported some use of m-learning. Just over half of the respondents indicated their defense organizations have embraced the use of web-based individual, collective, or game-based simulations; however, that means nearly half do not typically use these technologies. This may be because, as one respondent indicated, e-learning and instructional simulations are overseen by different departments, which may indicate that these technologies tend to be used separately rather than in an integrated manner.
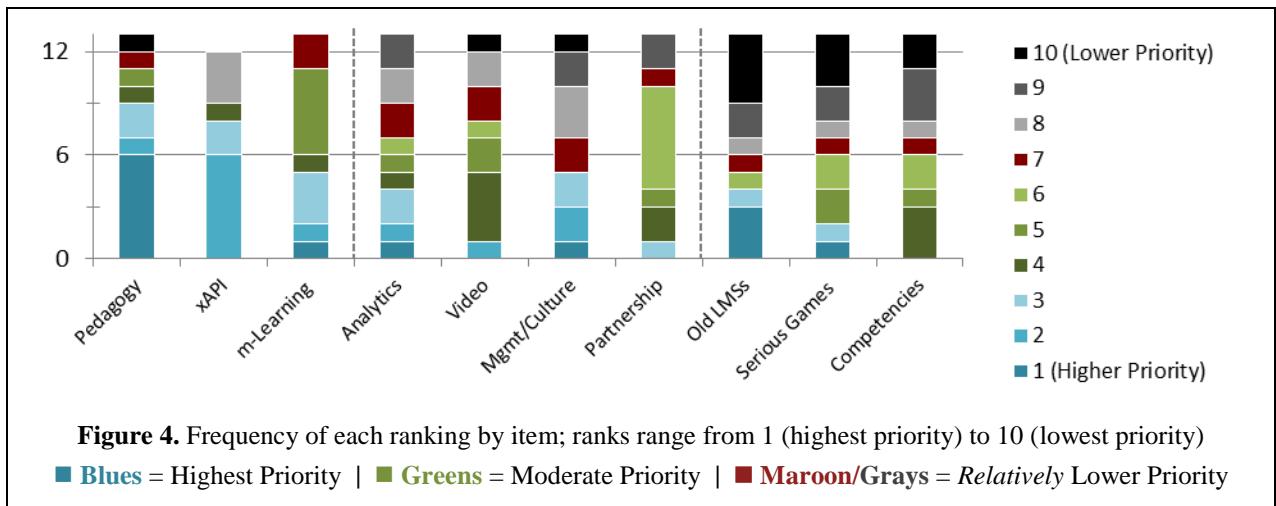
Competency and qualification frameworks received mixed responses. This likely reflect a larger trend, where European nations have largely adopted the use of multination qualification frameworks, which other nations, such as the US and Canada, have been slow to institutionalize. Finally, the results show that the responding defense organizations have yet to implement a number of emerging technologies, including eBooks, learner performance dashboards, instructor dashboards, badging, and learner record stores. Currently, the least frequently used technologies included xAPI, virtual reality, augmented reality, and intelligent tutors in a distributed learning context.

Figure 3. Frequency of use of distributed learning technologies
■ **Dark Green** = Very Often | ■ **Light Green** = Sometimes | ■ **Maroon** = Very Rarely | ■ **Black** = Never

Survey Question #2: Ranking of Priorities

The second question asked respondents to rank-order the ten emerging science and technology topics previously identified as "priority areas." (Refer back to Table 2.) In addition to ranking these, respondents indicated whether their organizations "*are* doing this" or if they "*wish* we would do this." See Figure 4 and Table 3, below; in these, the items have been sorted to better visualize the trends, ranging from higher priority (left) to lower priority (right).

Consistently, the highest priority items included, roughly in rank order, increasing the quality of distributed learning **pedagogy** (andragogy), integrating **xAPI**, and integrating high-quality **m-learning**.

Figure 4. Frequency of each ranking by item; ranks range from 1 (highest priority) to 10 (lowest priority)
■ **Blues** = Highest Priority | ■ **Greens** = Moderate Priority | ■ **Maroon/Grays** = *Relatively* Lower Priority

The second tier of priority included improving the use and quality of **learning analytics**, integrating more high-quality **video**-based learning, improving the **management and culture** around distributed learning (e.g., helping decision-makers understand and value it, ensuring efforts are coordinated across organizations), and improving information and resource sharing across the ADL **Partnership Network**.

The third tier of priority included upgrading **old LMS** technologies, using more high-quality web-based **serious games**, and, finally, integrating **competency frameworks** into distributed learning systems. (Note that even though these items were ranked lower than others on this list, the original response set was already reduced down to a set of discrete focus areas; thus, all of the topics should be considered an area of interest, in general.)

Table 3. Follow-up to ranking of top priorities: *are* pursing this or *wish* we would pursue this

Numbers indicate the frequency of marked responses per cell. Not all respondents replied to each item.

	Pedagogy	xAPI	Mobile Learning	Learning Analytics	Video-based Learning	Management and Culture	Partnership Sharing	Upgrade Old LMSs	DL Serious Games	Competency Frameworks
We **are** doing this	**11**	2	**9**	3	**10**	**10**	8	**12**	8	6
I **wish** we would do this	2	**11**	4	**10**	3	3	5	1	3	**7**

QUALITATIVE RESPONSES

This section summarizes the open-ended survey question results; we used a descriptive coding method (Saldaña, 2012) to analyze the qualitative data. Responses were anonymized to let contributors provide frank commentary.

Question #1: Generally, what do people in your DoD/MoD think about Distributed Learning (DL)?

Participants' responses to this question generally emphasized common themes, paraphrased as:

- Distributed learning is viewed positively, but not fully understood nor used to its full potential
- Poor quality distributed learning (generally due to poor pedagogy/andragogy) has caused issues
- Distributed learning saves resources
- Attitudes toward distributed learning are increasingly positive, but still have room for improvement

First, nine of the thirteen responding organizations to this question explicitly indicated that their defense organizations view distributed learning positively. However, nearly as many respondents ($n = 7$) qualified this positive outlook by saying that their organization's decision-makers lack full understanding of it or that distributed learning is not used to its full potential. (These descriptive counts do not imply that other respondents replied conversely; rather, others did not explicitly comment on these themes.) Representative comments include, "growing acceptance [of DL], but still no true concept of its potential" and "it is generically supported but poorly understood." Additionally, the following comment summarizes this theme quite well: "It's considered an important part of the future education and training system, but we still struggle to convince leadership in the Armed Forces. Get them to understand that we have to invest to harvest all the benefits."

Second, four respondents directly indicated (and several others implied) that poor instructional quality created issues, many of which are being addressed through increased efforts to advance e-learning pedagogy/andragogy. For instance, "we moved to DL in 2005 however the majority of the courseware was 'online PowerPoint' or 'death by page turner.' A concentrated effort has been made to develop our online instructors and to target IMI [Interactive Multimedia Instruction] levels 2 and 3."

Third, two respondents explicitly highlighted the cost savings associated with distributed learning, saying, for example, "we are the 'good boys' who are saving money." And finally, three respondents indicated that the attitudes

of end-users, i.e., instructors and learners, toward distributed learning are increasingly positive but still have room for improvement; for example, one response stated "Distributed Learning is viewed and received quite well by MoD staff. The attitude of openness is much higher from students / trainees and less from teachers / instructors."

Question #2: How is DL developed or otherwise acquired in your DoD/MoD?

Participants' responses to this question generally emphasized common themes, paraphrased as:

- Most defense organizations use hybrid methods, but roughly one third primarily use a single approach
- Most organizations conduct (at least some) in-house development
- Many organizations use contracted external vendors
- Some organizations also use creative solutions, such as internships or academic partnerships

Seven of the thirteen responding organizations to this question explicitly indicated that they use hybrid approaches to acquire their distributed learning, typically a combination of in-house development and contracts with external vendors. Representative comments include "it's a mix between in-house development and contracted development," and "both in-house and out-of-house—have many vendors, not just one." Perhaps surprisingly, five other respondents indicated that their organizations primarily use a single acquisition approach; however, they use different "sole source" methods. Three organizations almost exclusively employ in-house development, another relies on external vendors, and a third delegates the responsibility to individual course instructors. As an example, one respondent replied "90% developed by vendors," while another said "99% of the e-learning courses…are made by ourselves." Finally, while most organizations rely primarily upon internal development resources and/or external contracts, a few respondents offered creative solutions, such as development "…in collaboration with partnered tertiary institutions (especially universities)," "…internships…," or "our concept is to train the trainer, so, our instructors are to make e-learning themselves."

Question #3: How is DL delivered in your DoD/MoD?

Participants' responses to this question generally emphasized common themes, paraphrased as:

- Roughly half of respondents use an enterprise LMS, while the others employ multiple LMSs
- Several respondents explicitly mentioned using different networks (e.g., high and low security)
- Organizations employ diverse array of LMS brands
- All organizations use traditional e-learning, but many are also exploring new technologies and methods

Responses to this question varied widely, demonstrating that organizations use many different methods and technologies. All respondents reportedly use e-learning (as one would expect from our participant sample!). However, roughly half use an enterprise LMS, while the others use two or more systems. Organizations use many different LMS brands, including ATutor, Blackboard, Illias, Itslearning, Janison, Moodle, and Saba; and a few respondents mentioned that they split their e-learning offerings between unclassified and more secure networks. Additionally, responses included a diverse array of "other" technologies and techniques, including m-learning, video-based learning, eBooks, blended learning, collaborative (social) learning, and micro-learning. Responses showed no trend towards a single technology, beyond e-learning; however, this was likely due to the open-ended nature of the questions rather than a real phenomenon.

Question #4: Is your DoD/MoD increasing or decreasing its (1) use of and (2) investment in DL?

Participants' responses to this question generally emphasized common themes, paraphrased as:

- All respondents indicated that distributed learning *usage* is increasing
- Most (but not all) organizations are increasing *investments*, but resources remain a challenge for some

All thirteen of the responding organizations indicated that their use of distributed learning is increasing, and in two-thirds of cases, the organizations are providing additional resources to support this increased use. For example, one respondent wrote this: "The use of and investment in distributed learning is increasing. …Our Government's White Paper has committed to investing 25% of Defence capability expenditure to 2025-26 in the enablers that are essential to the operation and sustainment of Defence, including ICT [Information and Communications

Technologies] and Science and Technology." Another wrote: "We are currently in the middle of preparing for the roll out of [*our LMS system*] 2.0 which will see the addition of new dev tools, enterprise virtual classroom, learning portal, PLAR [Prior Learning Assessment and Recognition] tool, etc. We also continue to invest and grow our Learning Support Centre capabilities."

However, not all organizations are increasing resources in conjunction with increased use. Just under half of the respondents indicated that funding presents a problem. Saying, for instance: "MoD tries to increase the size of DL, [but] investment is problematic in [*our country*]. We try to find cost-effective solutions (e.g., joint/cooperative projects, etc.)." Two others wrote, for example, "in the last period of time, in [*our*] MoD the use of DL system increased but the dedicated investments remain very low," and "increasing use—funding still a challenge!"

DISCUSSION: INTERESTING FINDINGS

We undertook this research project to collect and synthesize experiences from around the globe related to advanced distributed learning in the multinational military context. Admittedly, we began this project with much ambiguity about what we might uncover, and consequently, we used a coarse research methodology, relying heavily upon expert inputs and open-ended qualitative questions. Despite this, we have identified and begun prioritizing various distributed learning focus areas, and we believe these initial results can inform more robust research methodologies in the future. Some of the notable findings from this initial study are listed below.

E-Learning continues to play a critical—and expanding—role in military training and education. All respondents indicated that their organizations' use of distributed learning is growing. Its expansion is also evidenced by the reported investments in infrastructure upgrades, process improvements, instructional quality initiatives, and ongoing efforts to integrate new techniques and technologies. Largely, "conventional" motivations continue to drive this expansion, including the desire to reduce costs, increase efficiency, reduce "nights out of bed" (i.e., time away from home units and associated travel costs), and make use of "spare" time on operations or at sea. Encouragingly, part of the increase is just starting to be driven by a growing understanding of how people learn and the distinct advantages quality distributed learning can offer.

Instructional technique—not technology—remains the number one focus area. Not only was "improve the quality of pedagogy in DL" ranked as the topmost area of emphasis in our survey, nearly all respondents also indicated their organizations are actively working towards this objective. In general, there remains a shortfall of suitably qualified and experienced personnel who can design and deliver quality distributed learning, and of developers who understand both learning technologies and related pedagogy/andragogy. However, the prior negative experiences learners, instructors, and managers had with distributed learning (usually derived from legacy, poor-quality, mandated e-learning) are slowly improving—assisted by pockets of very good practice, growing organizational appreciation of the value of instructional technique, and numerous quality-improvement projects.

Organizations are working to improve relevant culture and management. About one-third of respondents ranked "improving the management and culture surrounding distributed learning" among their top priorities, while the others ranked it among their lowest (possibly because they are already taking action towards this goal). In fact, two-thirds of respondents indicated their organizations are making such organizational improvements. For example, the Australian Defence Organisation is actively addressing its legacy Defence Learning Environment, which consists of bespoke and fragmented systems with "pockets of innovation" but no overarching interoperable framework. To improve this, a Directorate of Learning Capability Development was raised within the Australian Defence College to establish a Defence Education and Training domain that enables an enterprise learning capability to support high-quality, anytime/anywhere, learner-centered education and training.

Organizations value distributed learning, but do not yet realize its full potential. The survey revealed that organizations view distributed learning positively, but do not fully understand (or exercise) its full potential. As mentioned three paragraphs above, organizational leaders tend to view distributed learning as a pragmatic resource-saver (*which is good!*), but appreciation of its distinct instructional benefits is only beginning. For example, in addition to its more conventional benefits, distributed learning readily supports bite-sized micro-learning and just-in-

time learning. Incorporation of new technologies (such as m-learning or xAPI) also increases its unique instructional value—making it more than just a "cheap alternative" and instead a uniquely valuable asset in its own right.

Mobile learning may be at a tipping point, poised for rapid increase in use. Nearly all responding organizations reported using m-learning "very often" or "sometimes." This seems to suggest that m-learning culture, policies, infrastructure, and capabilities are reaching a level of maturity. Yet a majority of respondents also ranked m-learning in their top-five focus areas; indicating they are (or are thinking about) actively investing new resources into this area. In fact, two-thirds of respondents indicated their organizations are currently working to enhance their m-learning offerings. Together, this implies we will see rapid increases in operational m-learning in the near future.

Similarly, game-based distributed learning may see an uptake in use. Like m-learning, the infrastructure to support web-based serious games appears to be widespread, with more than half of responding organizations using them at least "sometimes." Also, serious games were ranked as a high-to-moderate priority area by about half of the respondents and roughly 60% are actively investing in this area. Thus, a significant number of organizations appear to have the interest in, and infrastructure to, support growth in game-based distributed learning.

Despite widespread interest, organizations are making little progress with xAPI. One of the most conflicting survey results concerns the use of xAPI, an e-learning specification that supports performance data management and interoperability. Over 80% of respondents currently use xAPI "very rarely" or "never," but it was ranked among the topmost priority areas. Yet, only two of the surveyed organizations are actively working to integrate it. Perhaps once organizations can see case studies and learn implementation lessons from the early adopters, such as the Serbian Armed Forces, they will make more progress towards the operational implementation of xAPI.

Similarly, there is interest in improved learning analytics but little progress. The xAPI specification enables improved learner tracking and associated analysis. So, it is not surprising that (like xAPI integration) respondents ranked learning analytics as a relatively high priority area but also largely indicated they are *not* currently working on related initiatives. Correspondingly, about 70% of respondents reportedly "very rarely" or "never" use learner performance dashboards (for teachers or learners). Likely, organizations could benefit from projects enabling combination of "open learner models" (i.e., learner/teacher dashboards), enhanced learning analytics, and xAPI.

Partnership sharing is important. Increased information and resource sharing across partnership networks also ranked as a mid-level priority, and, qualitatively, many respondents remarked that such collaboration helps them with—or, sometimes, is absolutely critical for—their capability development. For example, the Romanian Armed Forces formalized their use of distributed learning in 2005 and, originally, developed most of the infrastructure through support from agencies outside of the MoD. Similarly, the Romanian distributed learning personnel gained competence through hard work, study, and importantly by leveraging experience from the NATO Training Group, Partnership for Peace, and ADL Global Partnership Network, which they later joined in 2009. Today, the Romanian ADL team actively supports research, organizes a prominent European e-learning conference (eLearning and Software for Education), and has become the e-learning provider for the European Security and Defence College.

As another example, the Serbian Armed Forces established their Simulations and Distance Learning Center in 2010. Norway, with its mature distributed learning infrastructure, worked closely with their Serbian partners to share lesson learned, ICT equipment, and ultimately to assist in the establishment of the fully operational Serbian ADL Center. Today, the Serbian Armed Forces are pioneering new research and development (e.g., in xAPI) and are returning the favor to Norway by developing e-learning courses for Norwegian Defense as well as working with Norway (and other nations) to support ADL capability development with the Ukrainian Armed Forces.

As these, and many other, examples demonstrate: *partnerships work*. Multinational military operations have become the new "normal." Correspondingly, international collaboration in education and training helps prepare national forces for the coalition battlespace. Such collaboration also builds capacity across partner nations, creates efficiencies, elevates effectiveness through information and resource sharing, and kindles the human-to-human relationships that form the bedrock of open communication, interoperability, and long-term global stability.

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REFERENCES

Canada National Defence. (2008). *Canada First Defence Strategy.* http://www.forces.gc.ca/en/about/canada-first-defence-strategy.page

Carter, A. (2016, Feb 12). "An Update on How We're Leading the Counter-ISIL Coalition." Blog post on Whitehouse.gov. https://www.whitehouse.gov/blog/2016/02/12/leading-counter-isil-coalition

The Global Coalition. (2016). Official website of the coalition against Daesh. http://theglobalcoalition.org/

Her Majesty's Government [UK]. (2015). *National Security Strategy and Strategic Defence and Security Review 2015: A Secure and Prosperous United Kingdom (Cm 9161).* https://www.gov.uk/government/publications/national-security-strategy-and-strategic-defence-and-security-review-2015

Ministry of Defence [UK] (2015). *International Defence Engagement Strategy, Defence Engagement 2014/15.* https://www.gov.uk/government/publications/international-defence-engagement-strategy-2014-to-2015

NATO Allied Command Transformation, Joint Force Trainer. (2014) *e-Learning Concept* (Release 4). http://www.act.nato.int/e-learning-concept

New Zealand Defence Force (2005) *Defence Force Orders for the Mutual Assistance Programme (DFO 67).*

NORDEFCO ADL Forum of Expert (FoE). (2016). NORDIC ADL Conference Survey report.

NORDEFCO. (2014). The NORDEFCO MCC Action plan 2015-2018. Published by NORDEFCO at http://www.nordefco.org/files/141211_NORDEF%20MCC%20AP2015-18_final.pdf

NoD ADL office. (2006). ADL regulations. *Published by NoDUC in 2006.*

Norwegian Ministry of Defense (MoD) (2012). Forsvarsdepartementets Iverksettingsbrev for langtidsperioden 2013–2016, jf. Prop.73 S (2011–2012). *Publised at www.regjeringen.no*

Saldaña, J. (2012). *The coding manual for qualitative researchers.* Sage. ISBN 1446247376.

Spirtas, M., Moroney, J. D., Thie, H. J., Hogler, J., & Young, T. D. (2008). *Department of Defense Training for Operations with Interagency, Multinational, and Coalition Partners.* RAND National Defense Research Inst.: Santa Monica, CA.

Tague, N.R. (2004). *The Quality Toolbox* (Second Edition). ASQ Quality Press.

US Department of Defense. *Quadrennial Defense Review.* (2014). http://archive.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf