



Air National Guard intelligence analysts assigned to 181st Intelligence Wing, 137th Intelligence Squadron Unclassified Processing, Assessment, and Dissemination site test new domestic response artificial intelligence technology at Hulman Field Air National Guard Base, Indiana, November 2, 2019 (U.S. Air National Guard/L. Roland Sturm)

Artificial Intelligence

A Decisionmaking Technology

By Mark M. Zais

With the release of its first artificial intelligence (AI) strategy in 2019, the Department of Defense (DOD) formalized the increased use of AI technology throughout the military, challenging senior leaders to create “organizational AI strategies” and “make related

resource allocation decisions.”¹ Unfortunately, most senior leaders currently have limited familiarity with AI, having developed their skills in tactical counterinsurgency environments, which reward strength (physical and mental), perseverance, and diligence. Some defense scholars have advocated a smarter military, emphasizing intellectual human capital and arguing that cognitive ability will determine success in strategy development, statesmanship, and decisionmaking.² AI might complement that ability but cannot

be a substitute for it. Military leaders must leverage AI to help them adapt and be curious. As innovative technologies with AI applications increasingly become integral to DOD modernization and near-peer competition, senior leaders’ knowledge of AI is critical for shaping and applying our AI strategy and creating properly calibrated expectations.

War is about decisionmaking, and AI enables the technology that will transform how humans and machines make those decisions.³ Successful use of this

Colonel Mark M. Zais, USA, wrote this essay while attending the U.S. Army War College. It won the Strategy Article category of the 2020 Chairman of the Joint Chiefs of Staff Strategic Essay Competition.

general-purpose technology will require senior leaders who truly understand its capabilities and can demystify the hyperbole.⁴ Within current AI strategy development and application, many practitioners have a palpable sense of dread as we crest the waves of a second AI hype cycle, seemingly captained by novices of the AI seas.⁵ In-house technical experts find it difficult to manage expectations and influence priorities, clouded by buzzwords and stifled by ambitions for “quick wins.” The importance of AI-related education increases with AI aspirations and the illusion of progress. Without that education, we face a world where senior leaders use AI-enabled technologies to make decisions related to national security *without* a full grasp of the tools that they—and our adversaries—possess. This would be equivalent to a combat arms officer making strategic military land-power decisions without the foundations of military education in maneuver warfare and practical experience.

Educating Senior Leaders in AI

Strategic decisionmaking in a transformative digital environment requires comparably transformative leadership. Modernization of the military workforce should parallel modernization of equipment and technology. In the short term, senior leaders require executive AI education that equips them with enough knowledge to distill problems that need AI solutions and that provides informed guidance for customized solutions. With the ability to trust internal expertise, the military can avoid overreliance on consultants and vendors, following Niccolò Machiavelli’s warning against dependence on auxiliary troops.⁶ In the long term, military education should give the same attention to AI that is provided to traditional subjects such as maneuver warfare and counterinsurgency operations. Each steppingstone of military education should incorporate subjects from the strategic domain, including maneuver warfare, information warfare, and artificial intelligence.

As the military becomes more AI-driven, it will become more quantitative and automated. The allure of AI has

encouraged rebranding of existing computing methodologies (for example, *neural networks* has become *deep learning*), which has been useful in attracting attention and funding.⁷ Elevating the discourse of machine learning and deep learning to the senior leader level means domain knowledge must be elevated as well. This is critical when working with the private sector. For instance, when engaging with vendors or discussing machine learning applications, senior leaders should know what kind of machine learning (linear regression, logistic regression, decision trees, Naïve Bayes) is desired or already in use.

What does AI education look like for senior leaders? The definition of AI is gradually evolving and becoming broader. Today, almost any computerized system that solves a problem or informs a decision falls under the AI umbrella. The relationship between AI and data science is underpinned by a complex interdependence of many multidisciplinary skills and methods. As such, we cannot expect senior leaders to have a deep understanding of all the constituent AI disciplines and the continuously evolving technology. These leaders should, however, have broad enough knowledge to understand the relationships among data science, machine learning, and deep learning and to be familiar with the methods that each uses.

Senior leaders should also have similar understanding of the capabilities of related fields essential to AI solutions, such as data mining, data management, data architecture, and cloud computing.

Applying Knowledge to AI Strategy

To realize the potential of AI, senior leaders (both military and civilian) must make intellectual human capital central to DOD AI strategy. The level of AI knowledge that those senior leaders possess will determine their success in setting priorities in requirements and applying AI strategies. That will require a top-down AI strategy that is consistent with proven AI applications in industry. Three key indicators evince the progress of these leaders in achieving the mastery that their positions require.

First, they would stop searching for AI solutions to every problem. Business leaders identify the core business decisions they are trying to solve; likewise, military leaders should pinpoint critical decisions that affect an objective and assess the role that data play in those decisions. That analysis would show when the solution requires data-driven approaches, such as rule-based systems, advanced analytics, statistics, econometrics, optimization, simulation, machine learning, or deep learning—and when it does not. Knowledgeable leaders will accept that the best solution is not always an AI solution.

Second, they would manage expectations so as not to be trapped by a hype cycle that leads to disillusionment.⁸ AI leaders need to understand that a return on investment will be slow and, perhaps, disappointing.⁹ That will be particularly true when new applications are launched without needed supporting infrastructure and data architecture. That support may require multiple data sources, teams of people, and integration of data before the AI application can begin making predictions and evaluations. Knowledgeable leaders will understand the differences between expectations of deliverables for AI and those for information technology (IT). Whereas IT delivers known services, AI and data science engage in discovery, which is inherently unpredictable, unless a previously solved problem or previously used data is involved in the science. Like any discovery process, they may not produce desired solutions.

Third, senior leaders must build a workforce that supports AI to a scale needed to support the DOD enterprise. Military Services and subordinate organizations must transform their workforces to be proficient digital-data practitioners, able to leverage human-machine opportunities across all warfighting functions. An AI-ready workforce includes leaders who know about not only the domain but also the limits of their knowledge. That self-awareness will allow them to assemble internal staffs that have a deeper understanding of mathematical modeling needed to lead data scientists and engineers. These staff capabilities are critical

to building infrastructures and identifying manageable projects that can be benchmarked against existing ones. Complex organizations require four to five data engineers for every data scientist in order to create the data pipelines essential to the applications.¹⁰ If senior leaders do not understand these needs, then they need senior advisors with that technical knowledge and training to converse with them.

How does the military scale its AI workforce to support the enterprise? Currently, large businesses struggle to hire enough data scientists. DOD faces the same challenge, with organizations as large and as geographically distributed as any global multinational corporation; however, assuming there is the top-level commitment of resources, acquiring and retaining qualified data personnel may seem more daunting than reality. Whatever the size of the organization, all projects start with a small team, which can then grow with the number and complexity of the problems addressed with AI. One industry expert has described the scaling issue like this: “A big company is a bunch of little people all working in a company.”¹¹

Conclusion

In some ways, the current evolution of AI is similar to the rapid growth of the DOD cyber community over the last decade. The mantra of “we need to do more AI” evokes comparisons to ambitious cyber goals that outpaced workforce growth and capabilities. In the case of cyber technology, military culture change was slow; leaders who had thrived under earlier, simpler rules and understanding for the world were criticized for neglecting the professional military education needed to achieve a high level of cyber conceptualization.¹² Time will tell whether the current DOD AI modernization strategy will yield similar results. There is no doubt that the warfighting environment is rapidly changing. AI, like information warfare and space, will require a commitment to the development of intellectual capital to ensure that the workforce and leadership are prepared to succeed in these fast-moving domains. The successful

adoption of AI technologies requires leaders who can direct the strategy—and not rely only on outside experts and DOD AI research centers. JFQ

¹² Johnna T. Wynne, *Wired Fast and Thinking Slow: Cyber Technology and the U.S. Army* (Fort Leavenworth, KS: School of Advance Military Studies, 2016).

Notes

¹ *Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity* (Washington, DC: Department of Defense, 2019), 14.

² Everett S.P. Spain, J.D. Mohundro, and Bernard B. Banks, “Intellectual Capital: A Case for Cultural Change,” *Parameters* 45, no. 2 (Summer 2015), 77–91.

³ Tom Upchurch, “How China Could Beat the West in the Deadly Race for AI Weapons,” *Wired*, August 8, 2018, available at <<https://www.wired.co.uk/article/artificial-intelligence-weapons-warfare-project-maven-google-china>>.

⁴ Wim Naudé, “AI’s Current Hype and Hysteria Could Set the Technology Back by Decades,” *The Conversation*, July 24, 2019, available at <<https://theconversation.com/ais-current-hype-and-hysteria-could-set-the-technology-back-by-decades-120514>>.

⁵ Alok Aggarwal, “Resurgence of Artificial Intelligence During 1983–2010,” *Scry Analytics*, January 20, 2018, available at <<https://scryanalytics.ai/resurgence-of-artificial-intelligence-during-1983-2010>>.

⁶ Niccoló Machiavelli, *The Prince*, ed. and trans. David Wootton (Indianapolis: Hackett, 1995), chapter 13.

⁷ Samira Pouyanfar et al., “A Survey on Deep Learning: Algorithms, Techniques, and Applications,” *ACM Computing Surveys* 51, no. 5 (September 2018), available at <<https://dl.acm.org/doi/pdf/10.1145/3234150>>.

⁸ Jackie Fenn and Marcus Blosch, “Understanding Gartner’s Hype Cycles,” *Gartner*, August 20, 2018, available at <www.gartner.com/en/documents/3887767/understanding-gartner-s-hype-cycles>.

⁹ Sankar Narayanan, “How to Measure the ROI of AI,” interview by Daniel Fraggella, *Artificial Intelligence in Industry*, December 3, 2019, podcast audio, 3:20, available at <<https://emerj.com/artificial-intelligence-podcast>>.

¹⁰ Jesse Anderson, “Data Engineers vs. Data Scientists,” *O’Reilly*, April 11, 2018, available at <www.oreilly.com/radar/data-engineers-vs-data-scientists/>.

¹¹ Charles Martin, “How to Get Started with an Effective AI Strategy,” interview by Daniel Fraggella, *Artificial Intelligence in Industry*, June 28, 2019, podcast audio, 6:35, available at <<https://emerj.com/artificial-intelligence-podcast>>.