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# Autonomous Weapons Need Autonomous Lawyers

BY COLONEL WALTER "FRANK" COPPERSMITH

With the arrival of autonomous weapons systems (AWS)[1] on the 21st century battlefield, the nature of warfare is poised for dramatic change.[2] Overseen by artificial intelligence (AI), fueled by terabytes of data and operating at lightning-fast speed, AWS will be the decisive feature of future military conflicts.[3] Nonetheless, under the American way of war, AWS will operate within existing legal and policy guidelines that establish conditions and criteria for the application of force.[4] Even as the Department of Defense (DoD) places limitations on when and how AWS may take action,[5] the pace of new conflicts and adoption of AWS by peer competitors will ultimately push military leaders to empower AI-enabled weapons to make decisions with less and less human input.[6] As such, timely, accurate, and context-specific legal advice during the planning and operation of AWS missions will be essential. In the face of digital-decision-making, mere human legal advisors will be challenged to keep up!



**Timely adoption of AI inside today's U.S. Air Force legal practice will be essential for attorneys trying to keep pace with clients and organizations now operating at Internet speed and cloud computing scale.**

Fortunately, at the same time that AI is changing warfare, the practice of law is undergoing a similar AI-driven transformation.[7] Traditional legal practice as characterized by rote document drafting and review is becoming obsolete[8] while AI is creating entirely **new categories of legal work**[9] and giving lawyers powerful tools with which to address previously intractable legal issues.[10] As the arrival of AWS demonstrates, timely adoption of AI inside today's U.S. Air Force legal practice will be essential for attorneys trying to keep pace with clients and organizations now operating at Internet speed and cloud computing scale. While the law will remain, at least for now, a fundamentally human endeavor, the JAG Corps will soon be operating in a world where its clients and fellow lawyers are influenced, enabled, or entirely operated by AI.

This article will address the AI-driven challenges and opportunities facing legal practitioners in the US Air Force and propose ways in which they can adapt to satisfy the needs of AI-enabled clients pursuing AI-executed missions. The article encourages the JAG Corps to actively embrace AI today, capturing a first-mover advantage in developing a warfighter-supportive legal AI suitable for adoption and integration by clients developing or operating AWS. Finally, the article also recommends the JAG Corps initiate a series of projects in AI across the breadth of current legal service delivery to stay relevant to clients in the AI era.



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## THE PACE OF INNOVATION

Legal practitioners busy “fighting fires” on behalf of senior Air Force leadership will be forgiven for not grasping the magnitude of the technology-driven change all around us. As a starting point, we should look at some key numbers about today’s technology. Since its public debut in 1991, the **Internet**, which connects just about everyone to everything, has grown to more than 3.9 billion users<sup>[11]</sup> and is available twenty-four hours a day via personal devices, including over **7 billion mobile phones**.<sup>[12]</sup> The **microprocessors** that power this technology have increased in speed and power over 4 million times in 40 years.<sup>[13]</sup> But it’s not just the technology; it’s what humans are doing with it. Every twenty-four hours, humanity creates enough new information to fill the equivalent of 685 billion copies of all seven of the Harry Potter books—that’s more information in a day than humanity created from the dawn of civilization until 2003.<sup>[14]</sup> The pace isn’t slowing. By 2020, the average desktop computer will have roughly the same processing power as the human brain; by 2050, the same computer will have more processing power than all of humanity combined.<sup>[15]</sup> As such, it should come as no surprise that in a few years our lives—and our military conflicts—will be dominated by systems, processes, and experiences that haven’t even been invented yet. Is it any wonder then that the practice of law is changing, and that such change will be dramatic and irreversible?



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## ARTIFICIAL INTELLIGENCE

Now into this technological mix we add recent developments in AI that put human civilization at the first step on the road to the next industrial revolution,<sup>[16]</sup> an event that will see untold millions of blue- and white-collar jobs replaced by thinking machines while simultaneously creating new disciplines, products, and in-demand skills.<sup>[17]</sup> To clear up a common misconception, AI is not about building machines that work exactly like the human brain; in fact, such an outcome would be highly limiting and would sacrifice the huge advantages in speed, data storage, and rapid learning that machines have over humans.<sup>[18]</sup> Rather, AI is about machines and software performing tasks that normally require human intelligence, cognition, or mental flexibility, at microprocessor speed.<sup>[19]</sup> Understanding this, it’s easy to see that AI is already all around us. From Netflix recommending a television show to active fraud defenses inside banking applications that turn off a stolen debit card merely by detecting an unexpected usage pattern, software is already learning about us and the world, influencing our decisions, or even making them on our behalf.



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AI is not a single technology; rather, AI is a basket of related and inter-connected functionalities that work together to supply “human-like” responses and reasoning.<sup>[20]</sup> Referred to as “cognitive technologies,” AI comprises the functions of *deep learning*, *natural language processing*, *machine vision*, *speech recognition*, and *expert systems*.<sup>[21]</sup> Among these, deep learning is the most transformative and is the core of what is considered modern AI. **Deep learning** is a method for software to learn by trial and error at a pace limited only by computer processing power and cloud storage (both effectively boundless and increasing).<sup>[22]</sup> Using unstructured data (80% of all the data that exists is unstructured)<sup>[23]</sup> and

operating without the need for explicit, step-by-step instructions, deep learning systems iteratively generate solutions, cull the weakest of the outputs, and repeat.[24] Ultimately, the outcome from millions of deep-learning iterations is a digital neural network similar to how humans think, which establishes patterns, relationships, and connections within otherwise unstructured data.[25]

One of the best examples of how powerful deep learning has become is **AlphaGo**, a deep-learning AI built by Google to play Go, a game of strategy long thought impossible for automation to tackle. Nonetheless, Google's AlphaGo defeated the world's Go champion, not by being taught how to play and win (as a chess bot might have done a decade ago), but by playing untold millions of games and deducing which strategies worked and which did not.[26] Incredibly, AlphaGo used unexpected moves developed through iteration and brute-force computation that the professional player had never seen. While this method of problem-solving may seem inelegant, the combination of ubiquitous Internet access combined with near-infinite cloud storage and computer processing capability available at minimal cost, makes deep learning an effective way to address problems not readily solved by deduction.



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All of this AI reasoning capability would be useless without the concomitant ability to observe and understand the world in real time. Natural-language processing, machine vision, and speech recognition are the sensors AI uses for ingesting and comprehending information from the same analog sources humans use: eyes and ears.[27] Improvements in speech recognition have brought to life the computer from Star Trek in the form of virtual digital assistants such as Siri (Apple), Cortana (Microsoft), and Echo (Amazon) who can understand spoken instructions with an error rate better than a human-staffed call center.[28] Machine vision, which

allows computers to recognize the objects in a photo, film or optical sensor, has unlocked the science-fiction-like ability of cars to drive themselves.[29] Natural language processing allowed IBM's Watson to defeat the world's greatest "Jeopardy!" champions, mastering not only simple sentences but also exceptionally complex word riddles.[30] Watson's second trick, reading and comprehending 70,000 oncology papers and providing medical diagnosis with an accuracy on par with experienced cancer physicians, seems almost simple by comparison.[31] The last component of our basket of AI is the expert systems that represent some of the first AIs constructed to model human expertise. Designed to ingest structured information, often via Q&A, expert systems apply rules-based decision-making to a set of facts, returning sophisticated analysis or document construction.[32] Of all AI, these are the most familiar to Air Force legal counsel, as products such as *DL Wills*[33] and *Turbo Tax*[34] are popular examples. Such systems are also some of the most useful for lawyers and those seeking legal help due to their specific focus and transparent nature. *Legal Zoom* has used hundreds of related expert systems to serve the needs of over two million clients, building the biggest brand in law services.[35]

### AI AND TODAY'S PRACTICE OF LAW

For years, lawyers have enjoyed a de facto monopoly on legal information and activities by locking up knowledge, expertise, and intelligence in lawyers' brains and in hard-to-access data stores (law libraries).[36] The now-dominant version of lawyering is face-to-face and consultative: a bespoke practice, built on hand-crafted solutions driven by individual creativity and service.[37] It's an experience played out daily across the JAG Corps, via situations as varied as meeting with legal assistance clients, drafting civil law opinions, administering military justice, and providing advice and guidance to commanders and first sergeants.



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The AI-enabled legal office of tomorrow will be different. Legal research, contract drafting, and document review, the routine work that makes up the bulk of the practice of law (especially the work done by junior attorneys), is on track to be entirely replaced by AI-enabled systems.[38] Lawyers won't perform the daily blocking and tackling of legal work, but will rely instead on the legal version of an automatic pilot to address these important, but rudimentary and boring tasks.[39] Lawyers will instead be responsible for making sure the AI (potentially one of a suite of specialized capabilities) has received the appropriate training (or validation), has access to data of sufficient quality and quantity, and is subject to appropriate monitoring and confirmation.[40] The impact on the practice of law from the arrival of AI is stark. In 2016, experts predicted that in five years anywhere from 20 to 50% of all legal work would be fully replaced by AI.[41] In December 2017, a report from the Consultancy Group McKinsey states that 22% of a lawyer's job and 35% of law clerk's job can be automated.[42]



**While there will be an investment in time in teaching the AI, not only will such effort be less work than obtaining a law degree, but once it's trained the AI can scale effortlessly to handle multiple issues and clients simultaneously.**

Lawyers are familiar with many now commonplace technologies that have improved the efficiency and quality of legal work. WebFLITE[43], Westlaw[44], and Lexis-Nexis Advance[45] are just a few examples. However, none has the potential to disrupt the way lawyers do business as much as AI. Consider the case of specialized software using deep learning to extract topic-relevant information from unstructured data, delivering it in a particular, easy-to-use format, and then using that information to guide decisions or to take a particular action.[46] If that sounds familiar to legal practitioners, that's because AI can be described as "thinking like a lawyer"—a skill that law students develop via the case method. Except that in this example it is software—and not lawyers—that will identify the relevant facts, define the issues, derive the rules, and then counsel a client on a deci-

sion. While there will be an investment in time in teaching the AI, not only will such effort be less work than obtaining a law degree, but once it's trained the AI can scale effortlessly to handle multiple issues and clients simultaneously.[47]

AI will also let attorneys perform tasks that weren't possible or even imaginable a few years before.[48] AI will create a new "normal" of practicing law by: predicting case outcomes with statistically significant accuracy based on data and not just on intuition[49]; conducting document and evidentiary review in seconds instead of weeks[50]; performing digital conflict resolution without a mediator or judge[51]; and making sense of unfathomably large data sets to spot risks to the organization in a proposed course of action.[52]

Examples of these technologies are already in the field, giving a huge advantage to the early adopters. *LONald*, a robotic contract attorney, conducts automated research into land registry records, identifying key information across voluminous unstructured data spread throughout multiple government databases.[53] The same research and analysis used to identify discrepancies with pending real estate deals that once took a team of associates two weeks is now completed in about two seconds.[54] Further, as senior attorneys evaluate *LONald's* output, they are able to further refine the algorithm powering the AI, meaning that *LONald* gets smarter in direct correlation to the amount of data it processes: a huge first-mover advantage.[55]

*Kira Systems' AI* undertakes mergers and acquisition due diligence, focused specifically on identifying and analyzing company documents.[56] The law firm of Clifford Chance saw the value early and created a special version of the software using their unique and in-demand expertise: in effect, distilling lawyer savvy into a digital product and taking it to speed and scale via AI.[57] It's not merely AI; it's an *AI* by *Clifford Chance*. [58]

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Clients directly benefit by access to AI-enabled legal self-help. **DoNotPay** in the United Kingdom is a free to access chat bot (a program which carries out a simulated conversation with human users) which has successfully fought over 200,000 parking tickets.[59] Clients who couldn't or wouldn't spend the time or money to get legal help for a parking ticket can instead communicate with an AI-lawyer who will in turn generate a customized appeal suitable for submission to the appropriate governmental authority.[60]

The most ambitious effort to date is **ROSS**, a virtual attorney powered by IBM's Watson cognitive engine.[61] Used by law firms as a *professional support lawyer*, **ROSS** ingests natural language questions from senior counsel, then uses algorithms developed via deep learning to sift through the law and legal precedents, gathering information, drawing inferences, and returning an evidence-based answer.[62]

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## There are more legal focused AIs coming online every day.

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There are more legal focused AIs coming online every day. **Premonition** analyzes public data in order to identify the best lawyers for a particular case.[63] **Lex Machina** applies analytics to intellectual property (IP) transactions and litigation, bringing together court records and other public data to predict case outcomes.[64] Clients seeking an AI's apparent neutrality find it in **LISA**, an AI lawyer that advises both sides of a matter simultaneously while drafting non-disclosure agreements.[65] Globally operating organizations benefit from **Leverton**, a contract review AI that is language-agnostic, creating summaries from deep learning about what clauses mean, not just how the language is expressed.[66] Victims of crime can get help from **LawBot**, an AI that provides injured individuals with an assessment of their situation and guidance on getting legal help or going to the police.[67] Even the exercise of professional judgment is subject to replacement by **TrademarkNow**, an AI that takes the heavy lifting out of trademark search, analysis, and protection by calculating how close trademarks

are to one another, a feat once entirely within the purview of experienced IP counsel.[68]

## AWS AND THE AI-ENABLED CLIENT

At the start of World War II, common wisdom was that the Germans would face an extended military campaign in France; instead, the German army marched down the Champs-Élysées in less than six weeks.[69] The decisive factor was not technology, but rather German doctrine that leveraged the unique advantages that aircraft, tanks, and radio provided when working together.[70] AWS present American war planners with an opportunity to use rapidly developing AI technology in similarly disruptive ways. Doing so is not merely an option. Rather, as more and more defense materiel comes from the commercial sector, the U.S. military's technological edge is steadily eroding, putting at risk our ability to counter numerically superior enemies with qualitatively better American forces.[71]

Unsurprisingly, AWS are a critical component of the Pentagon's third offset strategy.[72] The *third offset strategy* is about using innovative technology to detect adversary patterns, empower decision-makers, and act quicker than our foes.[73] Incredibly, in the face of this initiative, humans could become the limiting factor, especially as AI-enabled technology expands further into front-line combat and strategic decision-making roles.[74] For example, an AWS in a fighter plane will readily get inside a manned opponent's OODA loop[75] as a result of the AI going faster and with greater precision than what human pilots do intuitively.[76]

Looking beyond a specific physical implementation like an aircraft, AI systems can also reduce the cognitive burden on Air Force leadership, taking on data management tasks in which machines have the processing power advantage. For example, in the Joint Planning Process,[77] teams of Airmen with expertise in strategy, plans, and operations develop and wargame courses of action on behalf of senior military leaders.[78] Soon, each of these supporting players will be augmented or replaced by AI, speeding their analysis, and increasing visibility of decisive options. Nevertheless, given the breakneck pace of AI decision-making, commanders may

soon find themselves with no choice but to begin to cede some of their decisions over to these very same AI, skipping the weak, human link. Such is already the case in cyber. Attacks via cyberspace on U.S. Air Force networks happen faster than any human can respond.[79] AI defensive cyber-systems, operating in accordance with leadership guidance, act within milliseconds of detecting an attack. Only long after the response has been executed do commanders and analysts have the opportunity to evaluate the AI's decisions and actions.

AI will also influence the substance of Air Force decision-making by bringing deep learning capabilities to bear. As an example, AlphaGo's defeat of the world's greatest Go champion came as a shock: AlphaGo had played a professional player merely five months before the final showdown and it was clear that AlphaGo had numerous strategic weaknesses.[80] However, in the time between those first games and the championship, AlphaGo was "always improving, playing itself millions of times, incrementally revising its algorithms based on which sequences of play result in a higher win percentage." [81] Knowing this, AlphaGo's eventual victory almost seems a foregone conclusion. In the very same way AlphaGo learned to play a 2,500-year-old human game at a championship level in only a few months, military AI will do the same, contributing to the design and execution of strategy and operations and performing with an expertise that will rapidly exceed that of human leadership. The U.S. Air Force conducts military exercises and training to ensure that its Airmen and equipment are physically and mentally ready to fight; our AI will train as well, but at a pace of millions of times a day.



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AI will also have a substantial role in gathering and understanding the intelligence that underpins our strategic choices.[82] Today, a data analyst has to laboriously pour

over mountains of intelligence reports in an effort to find actionable information.[83] Conscious and unconscious bias as to relevance and the importance of a piece of data or validity of a source can have a dramatic influence on the guidance provided to decision makers.[84] Further, there's a limit to how much an individual can read and understand under the tight time constraints of real-world operations. As the "Internet of Things" and always-on devices combine, the volume, velocity, and volatility of the "big data" generated will expand beyond what any human could comprehend.[85] As such, AI will be deployed against these enormous datasets, using unbiased[86] mathematical formulae, with the goal of sifting through the noise to find and surface the critical signal when it is most needed.[87]

Looking ahead, future AI implementations will move beyond autonomous mission *execution* to autonomous mission *performance*; a shift from blindly executing a pre-programmed plan to an AI-driven consideration of mission goals.[88] While traditionally the human brain was the most powerful tool to find optimal solutions in unforeseen situations, upcoming AI-enabled capabilities will readily adapt to dynamic environments via experiential deep learning.[89] Over time, such AI will learn to detect novel situations more quickly and accurately than even their human programmers.[90] Mission-essential flexibility, and the emergent behaviors that will result, will require that programming go beyond mere system operation, and into the laws and tactics that allow the AI to operate itself.

## **AUTONOMOUS HORIZONS—THE U.S. AIR FORCE DESIGN FOR AI**

In 2015, the U.S. Air Force published *Autonomous Horizons*, a publication outlining the Chief Scientist's vision for how Airmen will work with developing autonomous systems.[91] At its core, the goal is for the U.S. Air Force to deploy "autonomous systems that will work synergistically with our [A]irmen as part of an effective human-autonomy team," where functions and situational awareness transition flexibly, getting maximum performance from both human and machine.[92] The human-autonomy team will take full advantage of the best of both partners, recognizing that humans are great at thinking on the fly but that AI

is better at processing large volumes of data, quickly and consistently.[93] As such, the U.S. Air Force envisions deep-learning systems helping Airmen bring order out of chaos via human-machine collaboration, one of the key elements of the aforementioned third-offset strategy.[94]

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In accord with this vision of human-autonomy teams, the U.S. Air Force will be building AI that will respond to situations that were not anticipated, across a wide range of operating conditions, environmental factors, and functions.[95] These AI will be capable of self-direction beyond simple rules-based approaches. Teaming with an AI that is adaptable and mission-focused, rather than merely following rules-based automation, raises unique considerations of trust:[96] not only how to get Airmen to have confidence in AI in the middle of complex, unpredictable and contested environments,[97] but also how well the human partner understands the AI's reasoning both before, during, and after working together.[98]

## **DEPARTMENT OF DEFENSE ARTIFICIAL INTELLIGENCE STRATEGY**

As the Department of Defense woke up to AI, a myriad of organizations began developing and deploying artificial intelligence though without an express plan to coordinate development, share lessons learned, and avoid duplication.[99] At the announcement, the acting assistant secretary of Defense for R&D noted that on some of the first weekly calls to discuss AI, over 40 organizations and 150 people were represented, all actively building one or more AI solutions.[100] To address the challenge, in late 2018 DoD launched its AI plan with the release of the **Department of Defense Artificial Intelligence Strategy**. [101] The unclassified summary noted that the US must adopt AI “to maintain its strategic position and to prevail on future battlefields.”[102]

The Chief Information Officer put the problem another way: “[w]e’ve got to move at a lot faster pace and then do this at scale.”[103] The “this” he is referencing is not merely AI, but rather DoD’s leveraging of “real talent” and “real capability” to build out AI technology that will co-exist with current solutions, using common tools and processes and integrated with existing capabilities.[104] The central organization within DoD that will execute AI solutions is the Joint Artificial Intelligence Center (JAIC), a stand-alone organization that is designed to ensure that DoD effectively and ethically builds out AI capabilities.[105] Moreover, JAIC’s mission is to accelerate delivery of AI solutions, establish a common foundation for DoD AI development, synchronize and coordinate DoD AI activities, and recruit world-class AI personnel.

## **PRESIDENTIAL EXECUTIVE ORDER ON AI**

The President released **Executive Order (EO) 13859** on 11 February 2019 on “Maintaining American Leadership on Artificial Intelligence.”[106] While the long-term impact of the EO is yet to be seen, the plan is intended to enhance national and economic security by directing federal agencies to make data and computing resources more available to artificial intelligence experts.[107] Similarly, it also obligates federal agencies to establish guidance so that new AI technologies are developed in a safe, trustworthy way. Importantly for DoD and its legal counsel, the EO solicits input on AI from federal agencies and then requires those same agencies to build a set of policies around their priorities.[108]

## **THE WAY FORWARD**

The law is a set of rules: a complex mix of obligations, permissions, and prohibitions that govern human conduct. Composed of a generally consistent structure (at least as compared to unstructured data), the statutes, legal opinions, and judicial decisions that make up *the law* have a linguistic organization comparable to machine-readable code.[109] AI are similarly rules-based decision engines and it matters not whether those rules are crafted by human lawyers or developed iteratively via deep learning.[110] Accordingly, AI has a huge advantage in understanding and applying the law, especially when compared to other, less organized

or structured disciplines and situations.[111] This is an advantage that the JAG Corps should exploit to the fullest during the Air Force's transition to AI. But how to do it?

This article recommends that the *U.S. Air Force develop a deep-learning AI focused on operations law competency, whose capabilities are directed at supporting AWS, AI-enabled operations clients, and their human legal advisors for the purposes of training, planning, and mission execution.*



**As Air Force legal counsel, we must rethink how we provide operations law guidance and to what extent AI will challenge our concept of what is within the rules.**

The AI-enabled pace of the next battlefield will be as, if not more, shocking to us today as combined German arms were at the start of WWII. AI at least partially (if not entirely) outside the control of humans in actual combat roles is on our doorstep, notwithstanding current policy. These AWS will upend current notions of planning and executing military operations. Accordingly, as Air Force legal counsel, we must rethink how we provide operations law guidance and to what extent AI will challenge our concept of what is within the rules.

In future conflicts, U.S.-operated AI programmed based on the rules of engagement (ROE) and operating in accordance with the law of armed conflict (LOAC) will be an accepted fact; embedded ROE instruction along with algorithmic execution will enable LOAC to be observed more consistently.[112] In such a case, international humanitarian law (or even U.S. law) may treat the failure to use AI in this manner as unethical or even illegal, making the concept of actual human control a problematic issue to be solved.[113] In such a case, the *failure* to embed legal rules deeply into AWS may be a LOAC violation.[114] Given these facts, AI legal counsel (or, at a minimum, AI-enabled counsel) may prove to be the only way in which legal guidance can be provided to an AWS in a timely, useful context within the nascent legal guidelines for AI. Furthermore, while today's

judge advocates would certainly outperform AI in providing actionable, legal guidance, it is only a matter of time before AI lawyers catch up to the best humans have to offer. Similar to what we saw with AlphaGo, the passage of time works to the advantage of AI. As compared to human counsel, AI will learn faster and ingest more information, blending together the wisdom of senior lawyers along with data from decades of operational experience. Moreover, a legal AI will prove to be far more adaptable than existing processes. Changes to the operating environment, including changes to the ROE, can be implemented inside a guiding AI with immediate effect across a warzone, reducing the chance of error for humans and AWS alike. AI could also quickly identify conflicted or missing authorities, flagging the issue for human evaluation.

How could such a system be developed? During the Iraq and Afghanistan wars, DoD collected incredible amounts of data; in one example, detailed information on the more than 20,000 combat air sorties that took place in Iraq and Syria, on average, each year from 2015-2017.[115] For each of these sorties, the data collected, including outcomes and operating conditions such as in-force ROE, can be processed by a deep-learning engine. Subsequently, the AI would understand the legal framework in which the operations were conducted, be able to compare it to the behavior of the participants, and extrapolate toward future operations. Such functionality would work across multiple weapon and AI-enabled platforms, with the AI utilizing the relevant portions of ROE for different missions, loadouts, and vehicle and sensor capabilities. Recognizing that a particular AWS possesses unique operational capabilities, is located in a different AOR with different ROE, and adjusting guidance accordingly will be entirely within the AI's ability.

The AI legal advisor will also prove to be more capable than human lawyers at operating as fast as the AI-enabled battlefield. With the expectation that AIs will be both embedded with U.S. and allied systems as well as fielded by adversaries, only an AI lawyer will be in an equivalent position to respond to the unexpected, emergent behavior such AIs will exhibit in contested space.



Nonetheless, U.S. Air Force lawyers will continue to have an essential role, operating, validating and refining the legal AI—a tool that gives them broad situational awareness, an incredible grasp of history, and an understanding of the law that is second to none. Combined with AIs embedded into both the planning process and the weapon systems, our performance as legal counsel—both qualitatively and temporally—will be dramatically improved by use of legal AI, supporting the enhanced decision making needed on tomorrow’s battlefield.

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At the same time, there will be risks from increasing our reliance on unproven technology, especially as it relates to developing trust within the human-autonomy teams. Trust arises when Airmen have an understanding of how their AI partner is making a decision. However, this is not easily achieved when the AI is using a deep-learning neural network.[116] Deep learning operates by discovering otherwise invisible patterns and correlation across the contents of data sets.[117]

As such, unlike traditional expert systems or simple (if brittle) automation, even the programmers may not understand how the neural network reached a decision.[118] Worse, the data sets involved are too unwieldy to manage with conventional data tools, making after-the-fact analysis impossible.[119] If the AI provides an unexpected output, Airmen won’t necessarily know whether the AI is working properly and presenting them with an innovative solution, or whether the system is simply making a mistake. As such, the neural networks will ultimately need more than trust; they will require *faith*[120] that they are operating as intended.[121] How will we work with machines that operate in ways their creators don’t entirely understand? By programming the AI

to operate within our broad mission intent, and ensuring the system reaches back to human decision-making when exceptions arise.[122]

While this sophisticated, deep-learning AI is in development, the JAG Corps should move forward by implementing AI for some of our traditional legal services. The launch of WebFLITE in the 1990s had a dramatic effect on our day-to-day operations and even now is the focal point of knowledge management, organization, and administration for the entire JAG Corps. AI has the potential to do this and more, both by collecting the wisdom of judge advocates (much as WebFLITE does today) and by making this experience and advice readily available directly to judge advocates and our clients. How? *By pre-packaging legal expertise on a host of topics—military justice, legal assistance, contracts, and more—into AI built around natural language processing, we can make military law available to anyone. As an example, consider The Military Commander and the Law,[123] but add a natural language interface, a responsive AI, and 24/7 availability. It’s not a question of whether the AI can serve as a lawyer, but instead, how legal-centric AI will help our clients and commanders by making complex matters routine. Air Force Instructions—helpfully written in a machine-readable structure—are ripe for similar AI support. Clients accessing these technologies will appreciate the ability to dispose of matters quickly, with less need for personalized legal intervention. The JAG Corps will benefit from increased productivity and the ability to weigh in on more important issues using the same resources.*

AI-enabled support can enhance the *quality* of legal service as well. The collective expertise of a community of the best legal minds, distilled via AI, can outperform even the most talented individual. Further, legal advice from an AI is infinitely scalable and can be delivered concurrently to an unlimited number of parties; such scalability benefits clients and leverages machine learning. The more the AI does, the more it learns, and the more competent it becomes. Bringing AI into the JAG office will institutionalize this advantage.



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Even in this AI-enabled world, attorney responsibilities towards clients and outcomes will remain the same; the change is only to the manner of doing legal work. Our expertise will still be sought in those areas the AI can't support, or when an issue exceeds its understanding. Nonetheless, our paramount mission is to help commanders and clients meet their legal challenges the best we can, not hold onto outdated working and manpower practices.

## CONCLUSION

Over a century ago at Kitty Hawk, two bicycle mechanics started the age of air travel with a canvas-covered flying machine that invented the future in about 80 seconds. Fifty years later, jets were routinely taking millions of passengers across the oceans, and not one, but two world wars had been fought from the sky. Much like those brothers on a North Carolina beach, AI is on the verge of rapidly overturning our understanding of warfare and how we practice law in support of those who fight.

AWS will be a reality. If unleashing AI-enabled weapons means victory, they will be used to devastating effect to target more precisely, act more quickly, and be more flexible than any human warfighter. Even so, the first day of AI war won't look like war at all.[124] Each side will be gathering up information—a data collection blitzkrieg—to feed the massive AIs running their respective war efforts. Whoever collects the most data in the least time wins.[125]

The United States must lead this revolution. Nevertheless, in a world where IBM's general counsel has stated that their Watson AI could pass the bar exam,[126] lawyers may prove resistant to adopting AI until it's too late. While it is understandable to want proof that a new system is more effective than existing practice, the danger is that *in AI, being second is the same as being last*. Early adoption is key. AI systems learn by doing.

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The emerging U.S. Air Force legal practice that teams AI-enabled thinking machines and legal counsel will be entirely different from that which has come before. Air Force JAGs will be partnering with AIs driven by algorithms that are so complex and working with data sets that are so large that we won't be able to understand how they operate. We'll be using data as fuel[127] to power deep learning systems to create weapons, design strategies, and maneuver at the speed of light. We will participate in wargames against AIs that actively mimic adversary behavior. We will train U.S. forces and the AI weapon systems they fight alongside, each capable of improvising on their own. In areas like cyber, we'll work with commanders to delegate even more authority to AI because the need to respond in milliseconds to protect critical systems makes autonomy the only reasonable solution. But ultimately, judge advocates will remain some of the most trusted advisors to U.S. Air Force leadership. As such, it falls to us to guide the U.S. Air Force in preparing for the arrival of the age of AI.

## ABOUT THE AUTHOR

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## EXPAND YOUR KNOWLEDGE:

### EXTERNAL LINKS TO ADDITIONAL RESOURCES

- **Bernard Marr Website:** What Is Deep Learning AI? A Simple Guide With 8 Practical Examples, <https://bernardmarr.com/default.asp?contentID=1572>
- **Center for Strategic & International Studies (CSIS):** Assessing the Third Offset Strategy (Mar 16, 2017) <https://www.csis.org/analysis/assessing-third-offset-strategy>
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## ENDNOTES

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