Deploying AI in defense organizations

The value, trends, and opportunities

in collaboration with

IBM Center for
**The Business
of Government**

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Foreword

Artificial intelligence (AI) has radically redefined many aspects of everyday life. Organizations across both the public and private sectors are exploiting AI for a wide array of applications. For defense organizations, AI solutions also present significant opportunities to improve mission effectiveness.

In late 2020, we surveyed 250 defense technology leaders from around the world to understand how defense organizations are using AI and how this technology will shape military operations going forward. This report highlights insights from this research on the state of AI planning and adoption across defense organizations, as well as participants' perspectives on where AI can drive value.

In addition, we shared these insights with a roundtable of global defense experts, and those discussions provided additional input and context for this report. We gratefully acknowledge the contributions of all participants.

We hope this report provides leaders across the global defense community useful insights that can assist their organizations in realizing the promise and potential of AI. Stay tuned for future reports, where we will explore further insights on how defense organizations can leverage AI for mission success.
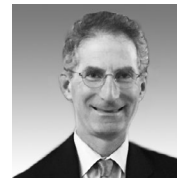
Daniel Chenok
Executive Director, IBM Center for the Business of Government
chenokd@us.ibm.com

Leendert van Bochoven
Global Defence and Intelligence Leader
L_van_Bochoven@nl.ibm.com
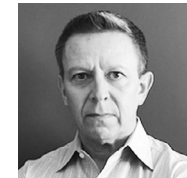
David Zaharchuk
Research Director, IBM Institute for Business Value
David.zaharchuk@us.ibm.com

The AI explosion

In the last few years, artificial intelligence (AI) adoption has become increasingly widespread. AI is changing how individuals perform their jobs, interact with one another, learn, and make decisions. At the same time, organizations' operational and business decision-making environments have been rapidly changing, with AI now enabling a growing number of decisions.

Organizations across both the public and private sectors are exploiting AI for a wide range of applications—from helping conduct talent screenings, to fraud detection, customer service, and other important mission-critical business functions. And according to our research, AI adoption across sectors is only expected to grow.[1]

AI also has potentially significant implications for national security and defense organizations. Many nations are investing in developing AI applications for a range of military functions. AI research is underway in the fields of intelligence collection and analysis, logistics, cyber operations, information operations, command and control, and for use in a variety of semiautonomous and autonomous vehicles. In fact, AI has already been incorporated into real-world military operations globally (including in Afghanistan, Iraq, and Syria).

While AI-enabled solutions present considerable opportunities for defense organizations to improve mission effectiveness, integrating these capabilities into operational environments introduces unique challenges and risks. To better understand how defense organizations internationally are using AI and AI-enabled solutions and how this technology will shape the industry and military operations going forward, the IBM Institute for Business Value (IBV) surveyed 250 technology leaders from global defense organizations (see "Study approach and methodology").

In addition to sharing insights on plans and strategies, as well as identifying opportunities and challenges, the surveyed defense leaders were asked to take a deep dive into related topics. These ranged from enabling cultures of innovation and experimentation, to the ethical applications of AI in defense, to the role of ecosystem partners in developing and delivering AI capability. Together, the executives painted a picture of their organizations' progress and plans to date, as well as opportunities for leveraging AI in the future.

AI has fundamentally altered how we think about, plan for, implement, and engage with IT systems. Successful organizations identify and prepare to take advantage of opportunities that align with AI's emerging capabilities. In doing so, they can learn valuable lessons from AI pioneers—in both the public and private sectors—including critical success factors and implications for their organizations' people, processes, and policies. In this research brief, we explore the state of AI planning, adoption, and the strategic importance to future mission success. We also look at mission and function areas where defense leaders expect AI to drive value for their organizations.

The state of AI adoption:
From the laboratory to the sandbox

Technological innovation has traditionally been critical to national defense. In the early years of World War II, Alan Turing and other pioneering British mathematicians demonstrated the potential of intelligent machines in breaking Germany's Enigma code. Since then, researchers across disciplines and around the world have pursued the promise and potential of AI. Despite periods of reduced funding and waning interest in AI research—commonly known as "AI winters"—AI-enabled solutions have moved out of the laboratory and into production environments. There, they can potentially shape the future of the defense industry and military operations.

Our research found that AI adoption is currently widespread across defense organizations globally. When we asked about their organizations' present state of AI adoption, leaders from all 250 defense organizations surveyed say they're at least considering its use (see Figure 1). While all have declared plans to adopt AI, half of the organizations have already implemented AI solutions, and another quarter have pilot projects underway. About a quarter of organizations indicate they're still stuck in the planning and evaluation phases.

During the roundtable discussion, participants identified several barriers to entry, as well as challenges that have hindered the progress of AI initiatives and the ability to scale them into production. They pointed to technical challenges (such as data quality and availability), capability gaps (such as access to skills), and change management issues (including education, awareness, and stakeholder buy-in).

Roundtable participants also noted the criticality of policy reform. There was general consensus that realizing the full potential and promise of new and emerging technologies will require comprehensive policy reform and transformation, not simply incremental or additive efforts to address existing policies.

When it comes to execution, experience seems to matter. Approximately two-thirds of surveyed leaders with more than 5 years of experience working with AI say their organizations have AI solutions that have moved beyond the pilot phase. By comparison, in organizations where the technical leader has fewer than 5 years of AI experience, only about 1 in 4 report the same progress in implementing AI.

While AI is clearly a strategically important technology for many defense organizations today, many more see it as a critical capability in the future. Fewer than half (45%) of surveyed leaders indicate AI is very or extremely important to their organizations' strategy today. However, when they're asked about the importance of AI to their organizations' strategy in the next 3 years, that percentage jumps to 73%.

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Figure 1

AI adoption status

49% of defense organizations have already implemented AI solutions.
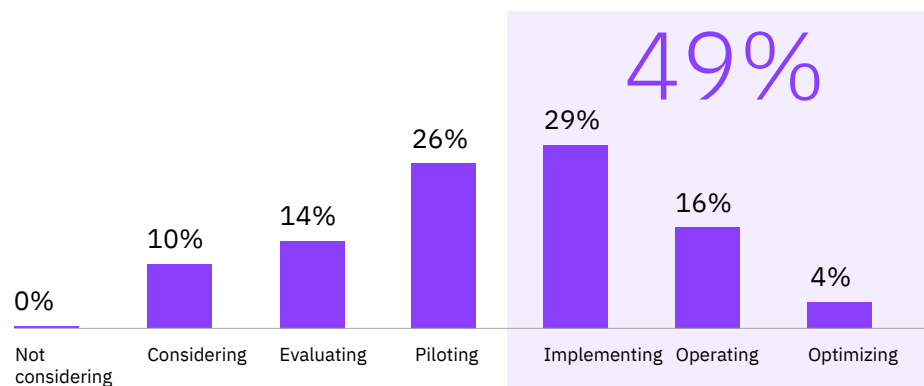
Moreover, the percentage of respondents who expect AI to be extremely important to their strategy increases fivefold, from 5% today to 28% in 3 years' time. And those organizations that recognize the importance of AI to their strategy are leading the implementation campaign. Nearly 3 in 4 leaders from organizations that have executed AI solutions consider AI critical to their strategy today.

Most organizations have formalized strategies or plans in place to address data, AI, and digital transformation more broadly (see Figure 2). Two-thirds of leaders report having a data and information strategy in place at their organizations. Approximately 60% of organizations have strategies or plans for both their digital transformations, and their AI and process automation journeys.

Organizations with combat and fighting arms missions report the greatest levels of formal strategy and planning for AI, process automation, and digital transformation. Nearly 90% of combat and fighting arms leaders say their organizations have a formal AI strategy, compared to 59% from combat support and just 44% from combat service support organizations.

And, not surprisingly, deliberate plans and frameworks for the ethical application of AI are more prevalent among combat and fighting arms organizations. More than half of combat and fighting arms organizations report having AI ethics frameworks in place, compared to only about 40% of noncombat-mission organizations.

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Figure 2

Formalized plans within defense organizations

59% of defense organizations have an AI strategy.

A data- or information-management strategy

67%

A digitization (or digital transformation) strategy

61%

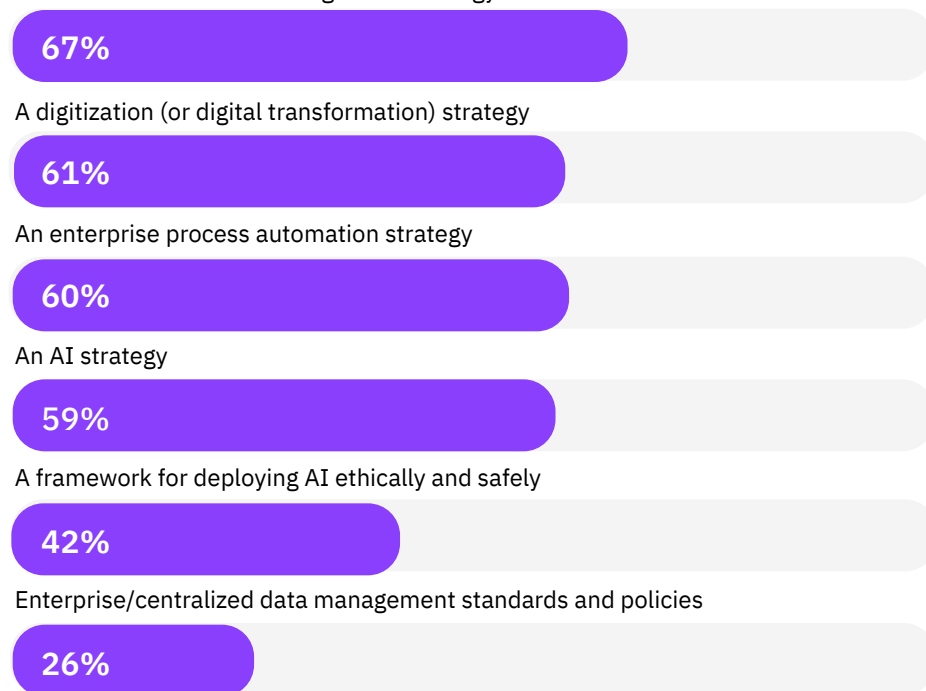An enterprise process automation strategy

60%

An AI strategy

59%

A framework for deploying AI ethically and safely

42%

Enterprise/centralized data management standards and policies

26%

Leaders have to make very difficult decisions when allocating investments and resources to their organizations' IT capability portfolios. Responses from global defense organizations cite investments in a variety of both foundational and exponential technologies (see Figure 3).

A majority of organizations are investing in foundational technologies such as mobile, Internet of Things (IoT), and automation solutions. Far fewer report investments in cloud computing, blockchain, and other exponential technologies. The most significant investments and adoption efforts in exponential technologies focus on robotics and AI. However, when it comes to strategic value from these investments, leaders report the greatest impact from AI.

Responses also show that, in most defense organizations, investments in and adoption of cloud computing significantly lag behind AI, process automation, and IoT. A cloud computing environment (on-premise and/or off-premise) can provide greater flexibility, agility, and cost savings by hosting data and applications in the cloud. AI capabilities running in a cloud environment have numerous benefits. They can better enable organizations to manage and draw insights from data, deliver improved user experiences, optimize workflows, and realize even greater value and mission impact from investments in AI.

Roundtable participants emphasized that mission success is not solely reliant upon AI or any single technology. Technology by itself does not deliver value. To be successful, organizations must think in terms of outcomes and mission and the people who have to execute that mission. As one participant noted, "We need to understand the various technologies and look at the combination that best supports the people who have to get the mission done. And there isn't just one."

When it comes to future investments in technology, leaders intend to continue allocating resources where they see value. AI was one of the leading IT investment areas for defense organizations in 2020—lagging only behind investments in IoT and mobile solutions.

On average, respondents report their organizations dedicated nearly 8% of their total IT budgets to AI in 2020. Over the next 3 years, leaders estimate average AI spending to increase more than 8%. These investments are significant, considering defense leaders expect their total IT budgets to increase an average of 14% over the next 3 years. Moreover, leaders anticipate an average increase of more than 30% in AI investments outside their organizations' traditional IT budget over the same period.

AI is clearly seen as a critical capability for defense organizations. As leaders make investment plans, multiple factors are driving their prioritization of AI solution types.

Figure 3

Technology investments

95% of defense organizations are focused on AI to deliver the greatest impact.
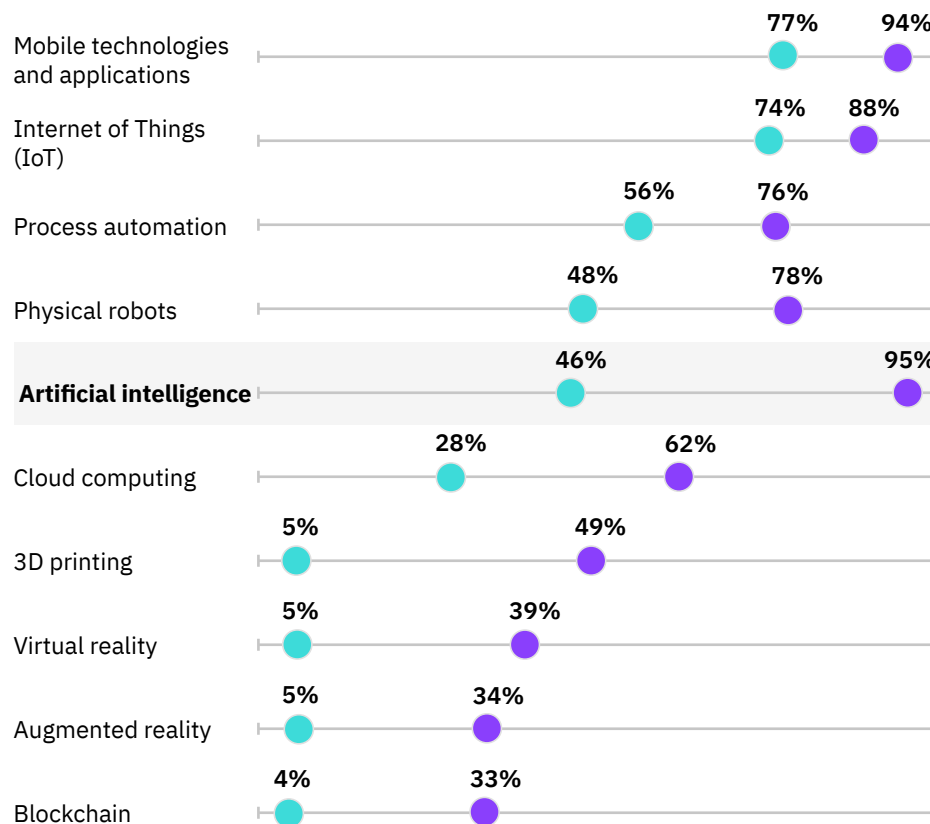
Technology	We have invested in and deployed this technology to enable our strategic goals.	This technology positively impacted our ability to deliver on our organization's mission.
Mobile technologies and applications	77%	94%
Internet of Things (IoT)	74%	88%
Process automation	56%	76%
Physical robots	48%	78%
Artificial intelligence	46%	95%
Cloud computing	28%	62%
3D printing	5%	49%
Virtual reality	5%	39%
Augmented reality	5%	34%
Blockchain	4%	33%

We have invested in and deployed this technology to enable our strategic goals.

This technology positively impacted our ability to deliver on our organization's mission.

Perspective: Expanding human capability with AI on Earth and beyond

As Sweden's leading provider of air traffic control (ATC) and associated services for civil and military aviation, LFV manages approximately 2,000 aircraft in Swedish airspace daily. LFV has partnered with IBM in conducting joint research on the use of AI in ATC. Together, they will explore whether autonomous ATC could be feasible in a controlled environment. They'll also investigate AI's potential to expand the capabilities of air traffic controllers.

One project they're pursuing is the Advanced Autoplanner, a proof-of-concept model that provides ATC instructions in a Swedish en-route sector in a safe, efficient way. ATC primarily aims to prevent collisions, organize and expedite the flow of air traffic, and provide information and other support to pilots. ATC already relies heavily on technology, but for safety reasons, humans are at its core because of their ability to manage complex situations.

The AI-enabled Advanced Autoplanner model uses a safety-first approach and operates in two phases. Phase one forecasts the future state of the airspace to determine safe actions that avoid future conflicts. Phase two provides the best course of action based on ranking safe actions determined by understanding common aircraft characteristics. The model has successfully separated aircraft and controlled them safely and efficiently through the sector. The program's future phases include testing complex conditions that exist in air traffic management, such as climbing and descending traffic, and varying wind conditions.[2]

AI helping humans in space

In 2018, Crew Interactive MObile companioN (CIMON) joined the crew of the International Space Station (ISS) and became the world's first flying, autonomous astronaut assistant featuring AI. The experimental prototype, CIMON-1, focused on understanding how technology can support astronauts, increase the efficiency of their work, and demonstrate cooperation between human and intelligent machines. Enabled with AI based on IBM Watson technology[3] and designed for human-machine interaction, CIMON can show and explain information, instructions for scientific experiments, and repairs.

The German Aerospace Center commissioned the program and the AI assistant, developed by Airbus, with funding from the German Federal Ministry for Economic Affairs and Energy (BMWi). In 2019, the German Aerospace Center launched the next-generation experiment, CIMON-2, to the ISS. CIMON-2 expands the capabilities of the prototype. It can evaluate astronauts' emotions and respond to situations appropriately. So CIMON-2 can transition from a scientific assistant to an empathetic companion, as needed. CIMON-2 is expected to support the ISS crew for up to 3 years.[4]

Priority mission and function areas

To gain deeper insight into what is motivating defense organizations' AI investments, we asked respondents to indicate the relative importance of various business and mission drivers to their organizations' adoption of AI. Leaders cited mission effectiveness and improved decision making as the top value drivers for defense organizations' AI investments.

While AI and automation capabilities are often associated with personnel and staffing efficiencies, this does not appear to be the case for most defense organizations. When asked to rank the relative importance of various value drivers, fewer than 1 in 5 prioritized either headcount reduction or redeployment over improved mission effectiveness and improved decision making. Yet the value AI can provide in extending personnel capabilities is being realized nearly everywhere (see "Perspective: Expanding human capability with AI on Earth and beyond").

Leaders also appear less concerned about deploying AI capabilities for cost reduction. In head-to-head tradeoffs between mission effectiveness and both operational and capital cost reduction, a majority of leaders prioritized mission effectiveness. Similarly, most leaders also prioritized improved decision making over cost-reduction objectives.

With a focus on mission effectiveness and improved decision making, defense leaders see myriad defense-specific applications where AI can drive value—ranging from combat service support mission functions to combat itself (see Figure 4). Most leaders see the greatest potential value from AI-enabled solutions in the area of intelligence, surveillance, and reconnaissance (ISR). This is followed closely by applications to autonomously enabled vehicles, such as fighter aircraft, drones, ground vehicles, and naval vessels (see "Perspective: AI at sea"), and cyberspace operations. Only about one-third of leaders see significant potential value in medical and health services, information operations, and military logistics.

Figure 4

Defense ops where AI can drive value

Leaders see the greatest potential value from AI-enabled solutions in the area of intelligence, surveillance, and reconnaissance.

Intelligence, surveillance, and reconnaissance

52%

Semiautonomous vehicle enablement

49%

Autonomous vehicle enablement

46%

Cyberspace operations

46%

Command and control

39%

Medical and health services

34%

Information operations and deep fakes

33%

Military logistics

32%

Perspective: AI at sea

ProMare

In 2020, IBM and research nonprofit ProMare launched the Mayflower Autonomous Ship (MAS)—an AI- and solar-powered marine research vessel that traverses oceans while gathering vital environmental data. Fully autonomous, MAS is designed to provide a safe, flexible, and cost-effective way to collect data in the ocean. The vessel could transform oceanography by working with scientists and other autonomous vessels to help understand critical issues such as global warming, microplastic pollution, and marine mammal conservation.

MAS is expected to set sail across the Atlantic in 2021. The transatlantic voyage likely will take a similar route as the original Mayflower, which made the same crossing 400 years ago. ProMare is coordinating the scientific studies and collaborating with IBM Research and other leading scientific organizations.[5]

US Navy

To help outfit its fleet with the newest capabilities as economically as possible, the US Navy is piloting an autonomy lab that helps test and integrate new advances in autonomy software with existing unmanned vessels. The pilot program, called the US Navy Rapid Autonomy Integration Lab (RAIL), aims to help the Navy quickly and effectively develop, update, and maintain autonomy software. RAIL began in 2020 and is expected to be formalized in fiscal year 2022, depending on funding.
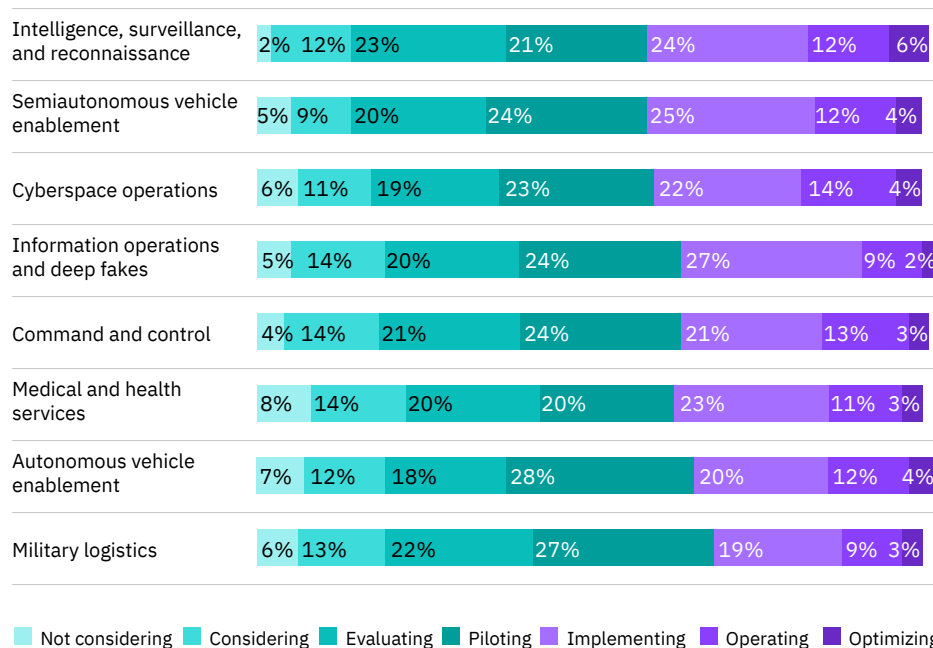
It could take a couple of years to lay the groundwork for the creation of common control and combat systems for both unmanned surface vessels (USVs) and unmanned underwater vehicles (UUVs). Then, the RAIL concept plans to build on those efforts to provide infrastructure, tools, and processes to develop, test, certify, and deploy new and updated autonomous capabilities. RAIL's first project reportedly will integrate software code for new autonomous behavior recently developed by a third-party vendor onto a UUV.[6]

For the most part, where leaders indicate the greatest value in defense applications is consistent with where defense organizations are focusing implementation efforts (see Figure 5). At least 40% of organizations report solutions in production (implementing, operating, or optimizing) for ISR, semiautonomous vehicle enablement, and cyberspace operations. Most organizations are at least piloting solutions in these areas. While respondents report fewer implementations focused on fully autonomous vehicle automation and military logistics, more than a quarter of defense organizations are actively piloting AI-enabled solutions in these areas today.

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Figure 5

Progress in adopting AI

At least 40% of defense organizations report solutions in production for ISR, semiautonomous vehicle enablement, and cyberspace operations.

	Not considering	Considering	Evaluating	Piloting	Implementing	Operating	Optimizing
Intelligence, surveillance, and reconnaissance	2%	12%	23%	21%	24%	12%	6%
Semiautonomous vehicle enablement	5%	9%	20%	24%	25%	12%	4%
Cyberspace operations	6%	11%	19%	23%	22%	14%	4%
Information operations and deep fakes	5%	14%	20%	24%	27%	9%	2%
Command and control	4%	14%	21%	24%	21%	13%	3%
Medical and health services	8%	14%	20%	20%	23%	11%	3%
Autonomous vehicle enablement	7%	12%	18%	28%	20%	12%	4%
Military logistics	6%	13%	22%	27%	19%	9%	3%

Note: Due to rounding, percentages may total slightly above or below 100%.

For defense organizations, the potential value of AI is not limited to military-specific applications. Many opportunities exist for these organizations to leverage AI-enabled solutions for business and noncombat-focused applications. Defense leaders surveyed identified IT and information security as functional areas where they expect AI to drive the greatest value (see Figure 6).
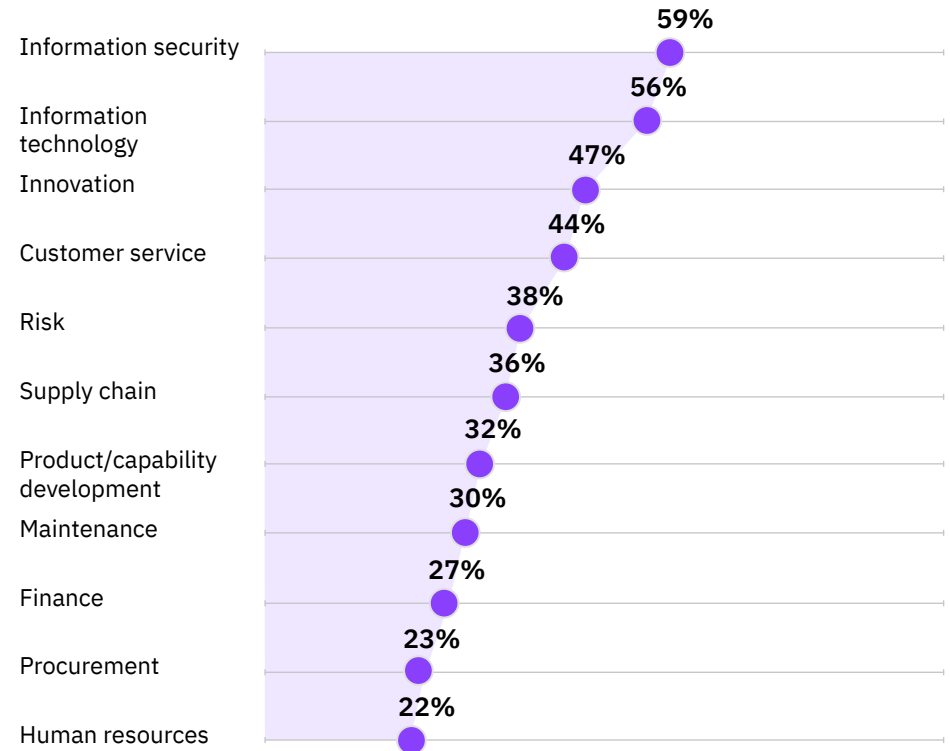
Interestingly, in previous research, we found that CEOs across industries also ranked IT and information security highly (first and third, respectively) as functional area priorities for their organizations' use of AI. In the area of information security, AI can enable faster, more reliable detection of fraud or other activities within volumes of structured and unstructured data. It can accelerate threat detection and reduce resolution time—and thus free up personnel to focus on more mission-critical activities. When applied to the IT domain, AI can help accelerate solution design and amplify employee expertise. It also can support faster, more efficient planning, development, and testing of enterprise software, and can enable greater agility.[7]

But defense leaders surveyed did not necessarily see eye-to-eye on the potential value of AI for defense organizations in some functional areas. Despite successful implementations by other industries in critical areas such as human resources (HR) and maintenance, very few leaders identified them as potential areas of value for defense organizations (see Figure 6).

Figure 6

Business and noncombat-specific AI applications

Defense leaders see AI-enabled solutions for IT and information security as driving value.

Information security	59%
Information technology	56%
Innovation	47%
Customer service	44%
Risk	38%
Supply chain	36%
Product/capability development	32%
Maintenance	30%
Finance	27%
Procurement	23%
Human resources	22%

As such, many defense organizations may be missing out on essential capabilities that can help improve both mission effectiveness and decision making. For example, real-time unstructured data from inside and outside the organization, coupled with advanced analytics and AI, can identify superior talent and inform workforce decisions across the enterprise (see "Perspective: The value of AI in HR and recruitment").[8]

Operations and maintenance are two more areas of significant potential for defense organizations (see "Perspective: The value of AI in operations and maintenance"). Predictive maintenance helps organizations evaluate the condition of their in-service equipment to figure out when maintenance is needed—helping to prevent unexpected and potentially mission-critical equipment failures. AI models can help translate equipment sensor data into meaningful, actionable insights for proactive asset maintenance.

During the roundtable discussion, participants expressed surprise that defense leaders appear to significantly undervalue combat support and combat service support opportunities. Group members agreed that these domains hold substantial opportunities for AI. As one participant aptly pointed out, "Those are the areas in which the tech is most mature and the risk is significantly lower, in terms of deploying AI solutions against those functions."

The roundtable participants further emphasized that the potential gains, such as efficiency and savings, could be astronomical—and could free up resources to reinvest in other defense-specific applications, such as autonomous vehicles. But participants also recognized the challenge of investing in the cost reduction of support functions. Long-term savings often requires significant up-front costs that leaders in government organizations find difficult to absorb.

Perspective: The value of AI in HR and recruitment

Forum Engineering

Japanese firm Forum Engineering specializes in providing temporary staff for technical and engineering companies. But its traditional matchmaking process was slow, subjective, and often inaccurate. So the company turned to AI, employing an AI-enabled solution to sift through its internal structured and unstructured data to pinpoint the most appropriate candidates for each post.

By taking into account factors such as personality, interests, and customer feedback on individual workers, Forum Engineering is now 6 times faster at filling vacancies with suitable candidates.[9]

A US-based healthcare company

With exponential growth on the horizon, a US-based healthcare company realized it needed to compete for talent more effectively. Specifically, it needed a better way to source, screen, and hire 20,000 of the new employees it adds annually, while at the same time keeping a neutral investment in talent acquisition cost. The talent acquisition team decided to deliver improved outcomes by reimagining talent processes with workflows using automation, AI, and human intelligence. By embedding AI in workflows, the company has been able to segment job requisitions based on analytics, market conditions, and labor supply, with allowances for pricing and experience variables.

The company can now sort 97% of requisitions by complexity and type with no manual intervention. It's also enjoying a 50-point increase in hiring manager satisfaction and a 30% average reduction in staff time per hire.[10]

IBM

The IBM HR function concluded that to meet skill-demand challenges, it needed to put skills at the center of the employee journey so employees could thrive in a culture of continuous learning. To do this, HR is using exponential technologies to create more intelligent workflows. AI-enabled skills inference fuels personalized learning recommendations via the IBM Your Learning platform, which is used by 98% of IBM employees every quarter.

Employees can easily find personalized learning, as well as job recommendations based on their skills, and access the most popular material based on peer experiences. They can also register for targeted learning channels and explore the skills needed for in-demand roles.[11]

Perspective: The value of AI in operations and maintenance

US Army

The US Army has committed to tapping AI to help simplify soldiers' work. As part of that commitment, its Logistics Data Analysis Center (LDAC) focuses on data analytics to provide decision support analysis, tools, data, and acquisition support. LDAC provides operations research and systems analysis capabilities to the US Army Materiel Command (AMC), the keeper of the Army's logistics data.

To test the capabilities of AI, LDAC (then Logistics Support Activity [LOGSA]) implemented a proof-of-concept model to deliver maintenance information on a portion of the Army's Stryker vehicle fleet. LDAC used IBM AI capabilities to analyze data generated by the 17 transmission sensors built into every Stryker vehicle. A small cadre of maintenance warrant officers taught IBM Watson how to interpret the data. AI was used to examine millions of data points, looking for early signs that engines might be facing trouble.

One simple but telling outcome: Watson noticed instances when transmission fluid got too hot, even at slow vehicle speeds. Remarkably, a human could see the temperature display, but not necessarily capture the vehicle's speed. By noticing the correlation, the AI-enabled solution could potentially reduce transmission failures—a significant win and possibly large savings, considering the Army spent $11 million to replace 120 transmissions in 2014.

In addition to saving money, the AI-enabled solution helps reduce the risk that commanders face as they prepare to take vehicles into combat situations. It can also be used to inform the supply chain, and to inform training programs related to maintenance capabilities.[12]

Volvo Group

An unplanned standstill is one of the biggest problems that can affect a haulage firm. To reduce their number requires the abilities to predict maintenance needs and tailor servicing for each individual truck. The critical need for predictive maintenance to fulfill the uptime commitments on its trucks led Volvo to invest in a new predictive analytics platform for vehicle information residing in its enterprise data warehouse.

This solution makes it possible for Volvo to improve preventive maintenance and predict component failure while a truck is on the road or in the shop. Volvo applies machine learning techniques to automatically discover patterns and learn from the vast amount of data it collects. The company can now identify the necessary parts and provide repair instructions, even before a truck arrives for service—reducing diagnostic time by up to 70% and lowering repair time by more than 20%.

Additionally, Volvo has consolidated under one roof the people and systems needed to monitor and respond to vehicle issues in real time, including 24/7 support through the company's Action Service roadside assistance program and ASIST service management platform.

Both process changes allow Volvo to remain committed to its core values of quality, safety, and environmental care.[13]

MARTA

As one of the 10 largest public transit agencies in the US, the Metropolitan Atlanta Rapid Transit Authority (MARTA) serves 1.7 million residents, provides transit to more than 500,000 passengers a year, and employs 5,000 people. Its infrastructure is equally impressive: Over 338 railcars provide service via 38 stations, and 550 buses carry passengers along 101 routes. The authority oversees 6 million square feet of facility-related assets, such as administrative buildings, railway stations, rail yards, and supporting equipment.

Managing these assets is a major undertaking—and a high priority. Fueled by a strong interest in using innovative technology to drive growth, efficiencies, and cost savings, the MARTA facilities team wanted to see if predictive maintenance could improve the reliability of its life-safety systems. MARTA chose to focus first on tunnel ventilation systems, given their complexity and criticality.

MARTA worked with IBM to launch a predictive maintenance proof-of-concept model to improve the asset reliability of this system. The solution uses machine learning to look for patterns in asset data, usage, and the environment, and correlates them with known issues to help predict failures.

After completion of the pilot project, MARTA moved into full production with the predictive maintenance solution deployed in its tunnel ventilation system.

One benefit the team anticipates from the implementation is the ability to address asset maintenance issues when needed, rather than relying on manufacturer recommendations, which can result in over-maintenance. MARTA would like to expand the program to include operation-critical and operational support assets.[14]

Key takeaways for exploiting AI's game-changing potential

AI has the potential to provide transformative value to defense organizations across mission areas and around the world. From rapidly analyzing terabytes of data in intelligence reports, to allowing commanders to make faster and more informed decisions, to helping identify veterans at risk of suicide, the value of AI to national defense is potentially limitless.

Organizations can exploit that value with a few key tactics:

– **Build awareness and understanding.** While computing capabilities and limits continue to evolve, many of the fundamental success factors seldom change. In terms of system implementation and user interaction, AI-enabled systems are fundamentally different than the traditional programmable systems most users are accustomed to using. Organizations often experience a learning curve as they begin to understand this fact and determine how to best apply this new capability. To bend that curve, they will need leaders with experience in using AI and building a cadre of employees with AI expertise.

– **Explore a wide range of opportunities.** As organizations explore opportunities for leveraging this capability, they should take a broad view that includes combat support and combat service support applications. As one leader from a global defense organization explained, "90% of the valuable applications [of AI] are outside the firing line."[15] HR management and maintenance operations are two areas worth considering.

– **Prepare the organization for the journey to AI.** It's important to remember that realizing your organization's vision for AI is a journey—and that journey will evolve over time. This guiding principle should be constantly reinforced within the organization. An active change management plan must underpin organizational strategies for leveraging AI.

Our esteemed roundtable panelists underlined the criticality of change management and the need for increased awareness at all organizational levels around digital transformation, and new and emerging technologies. They placed particular importance on the development and education of current and future leaders. Roundtable experts opined on the need for focused education and awareness campaigns to boost digital proficiency. As one innovative example of this, future military leaders at US service academies are being engaged to define systems that will be needed in 5 to 10 years, when these individuals will help lead defense organizations.

We hope this report will add to current and future leaders' digital knowledge and help further their efforts to use AI to advance the critical-mission objectives of defense organizations globally. Stay tuned for future reports, where we will explore more insights on how defense organizations can leverage AI for mission success.

Study approach and methodology

The IBM Institute for Business Value (IBV), in cooperation with Oxford Economics, surveyed 250 executives from global defense organizations. Respondents included 250 CIOs (49%) and CTOs (51%) from the following Five Eyes intelligence alliance and North Atlantic Treaty Organization (NATO) nations: Australia, Belgium, Canada, Czech Republic, Denmark, France, Germany, Netherlands, New Zealand, Norway, Poland, the UK, and the US.

Executive respondents were screened to help ensure they were familiar with both AI and their organizations' strategies and plans for investing in and implementing AI capabilities in the future. These leaders represent organizations from a broad range of mission functions, including combat and fighting arms (18%), combat support (44%), and combat service support (37%) organizations.

In March 2021, the IBM Center for the Business of Government convened a roundtable of experts and stakeholders to discuss and reflect on the insights from this research and what it means for the future of AI in defense (see Appendix). They discussed both the opportunities and challenges that organizations face in exploiting the full potential of AI-enabled capabilities. The roundtable discussions provided additional input and context for this report.

Appendix: Roundtable participants

Defense

David Bray, Director, GeoTech Center and Commission, Atlantic Council, and former CIO, Federal Communications Commission

Stephanie Culberson, Director, International AI Policy, US Department of Defense, Joint Artificial Intelligence Center

Gordon B. "Skip" Davis, Deputy Assistant Secretary General, Defense Investment Division, NATO

RAdm Casper Donovan, Director General, Future Ship Capability, Royal Canadian Navy

Andrew Hunter, Director, Defense-Industrial Initiatives Group, and Senior Fellow, International Security Program, Center for Strategic and International Studies

BGen Patrice Sabourin, Director General, Canadian Armed Forces

Dr. Michael D. Street, Head, Innovation & Data Science, NATO Communications and Information Agency

Jacqueline Tame, Acting Deputy Director, US Department of Defense, Joint Artificial Intelligence Center

MGen Robert Wheeler, former Deputy CIO, US Air Force

IBM

Dan Chenok, Director, IBM Center for the Business of Government, IBM Client Centers

Terry Halvorsen, General Manager, IBM Client & Solutions Development Federal and Public Sector, and former CIO, US Department of Defense

Leendert van Bochoven, IBM Global Defence and Intelligence Leader

David Zaharchuk, Research Director, IBM Institute for Business Value

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