

Third Annual Edition

The Defense Innovation Readiness Gap Series: Realizing Partnership Potential

February 2024

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The Munich Security Conference (MSC) is the world's leading forum for debating international security policy. In addition to its annual flagship conference, the MSC regularly convenes high-profile events around the world, publishes the annual Munich Security Report, and engages in manifold other activities to draw attention to pressing security challenges and possible solutions.

MSC's Security Innovation Board is tasked to connect the worlds of technological innovation and political decision-making in order to recognize the chances and challenges related to technological progress and come up with clear policy priorities earlier and in a more coordinated manner.

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The Defense Innovation Readiness Gap Series: Realizing Partnership Potential

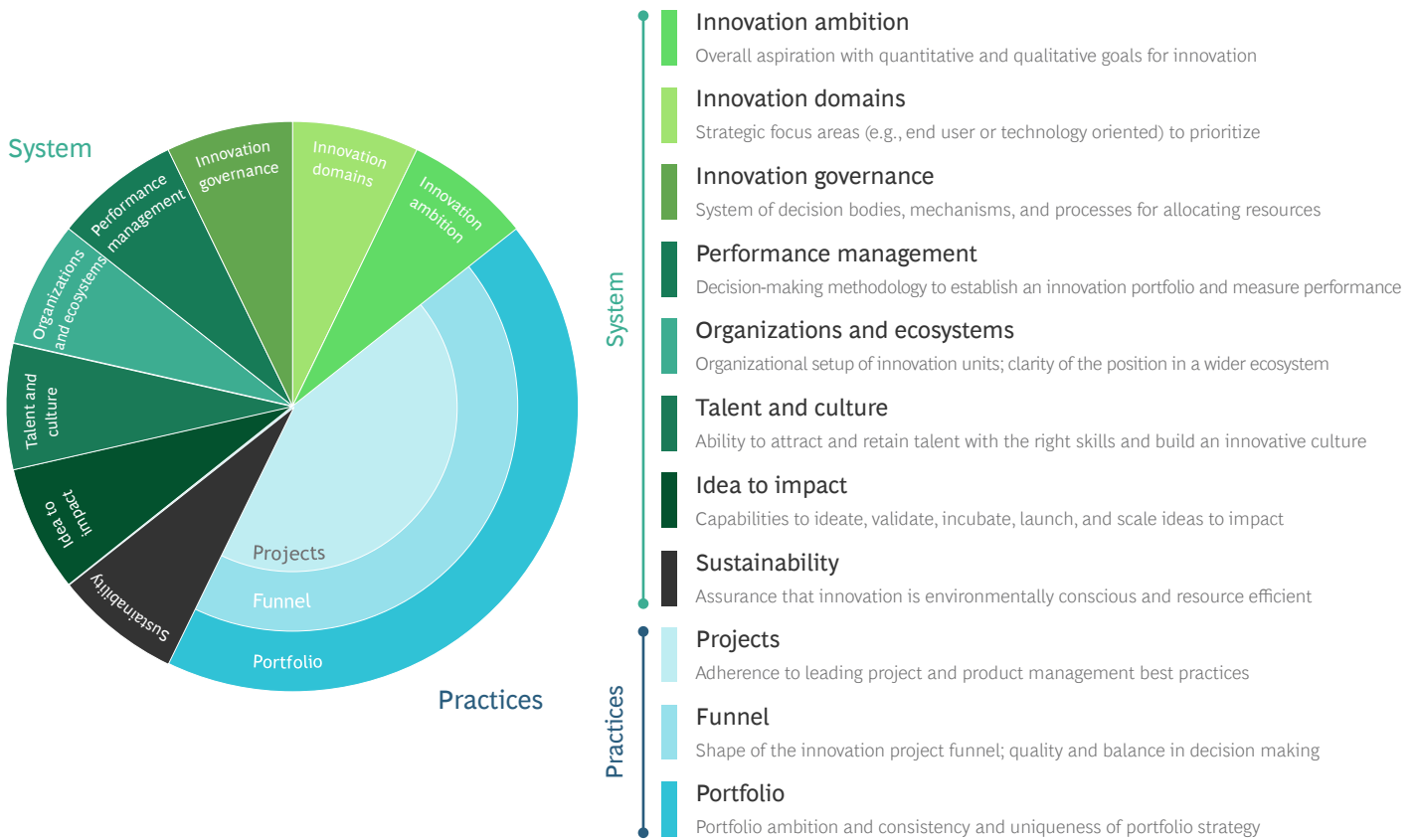
Introduction

Since 2021, the Munich Security Conference (MSC) Innovation Board and Boston Consulting Group (BCG) have joined forces to conduct a comprehensive review of global defense innovation readiness. Each year, we survey and interview officials within ministries of defense (MoDs), the EU, and NATO to understand the current state of their innovation readiness as gauged by their performance across 11 key innovation dimensions. (See Exhibit 1.) On the basis of our findings, we provide concrete actions that MoDs can take to improve in the areas that they identify as critical.

Two years ago, our results quantified, for the first time, the defense innovation readiness gap—the gap between ministries' aspirations for innovation and their ability to generate results. In 2023, we found that the defense innovation readiness gap had widened year-over-year: MoD innovation readiness decreased by an average of 8 points across 10 of the 11 readiness dimensions. This year, in the report's third installment, we surveyed 59 MoDs, the EU, and NATO. We found that the defense innovation readiness gap mostly recovered from the drop observed in 2023, with an average increase of 8 points across 11 readiness dimensions from last year. (See Exhibit 2.)

Exhibit 1

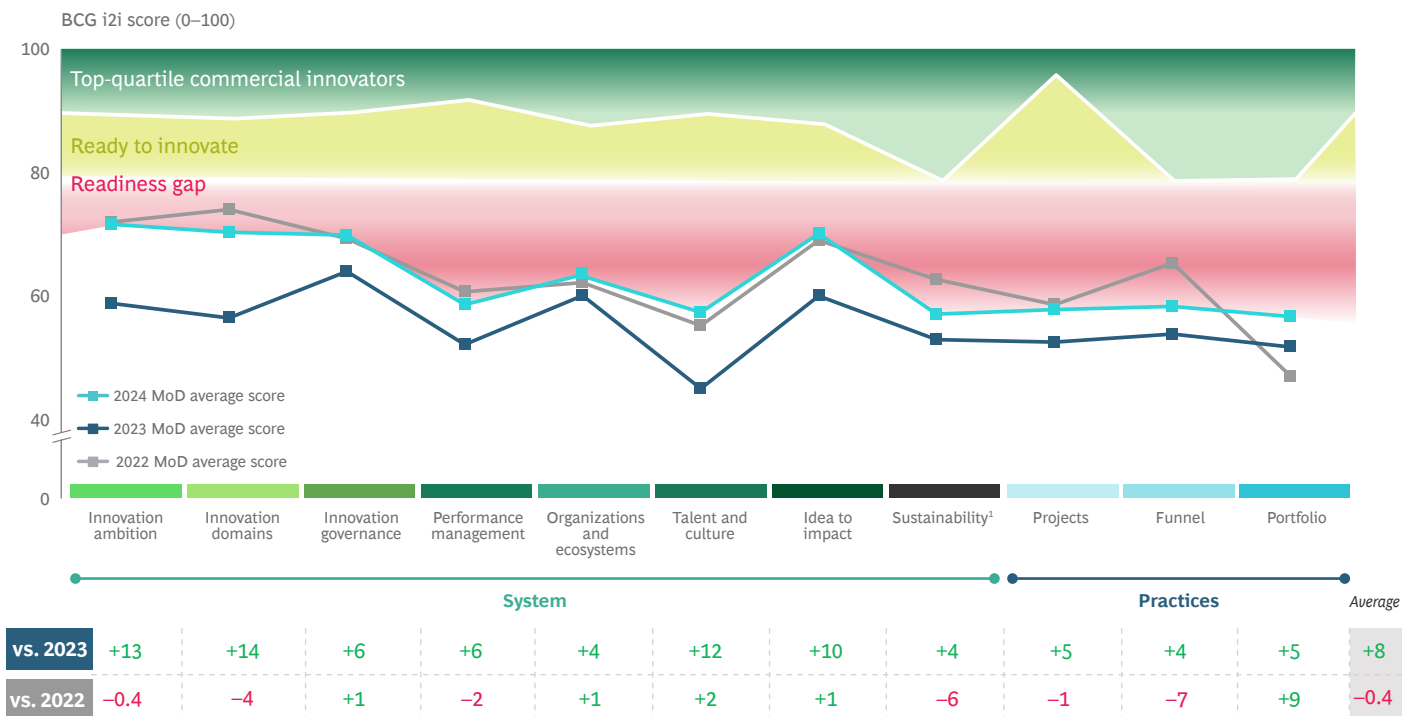
The 11 Dimensions of Innovation Readiness



Sources: BCG Most Innovative Companies Survey, 2024; BCG analysis.

Exhibit 2

MoDs Report Recovery in Innovation Readiness After Decline Last Year, with Bright Spots in Talent and Culture and Portfolio



Sources: BCG Defense Innovation Survey, 2022, 2023, and 2024; BCG Most Innovative Companies Survey, 2024; BCG analysis.

Note: The BCG i2i benchmark reveals an organization's relative strength on a 100-point scale that reflects best-practice maturity. Organizations that earn a score of 80 or above are deemed ready to realize their innovation aspirations. Displayed figures are rounded to the nearest integer, unless within the range (-0.5, 0.5), in which case they are rounded to the nearest tenth. All calculations are conducted on unrounded data.

¹The commercial benchmark for sustainability is imputed from BCG's sustainability work.

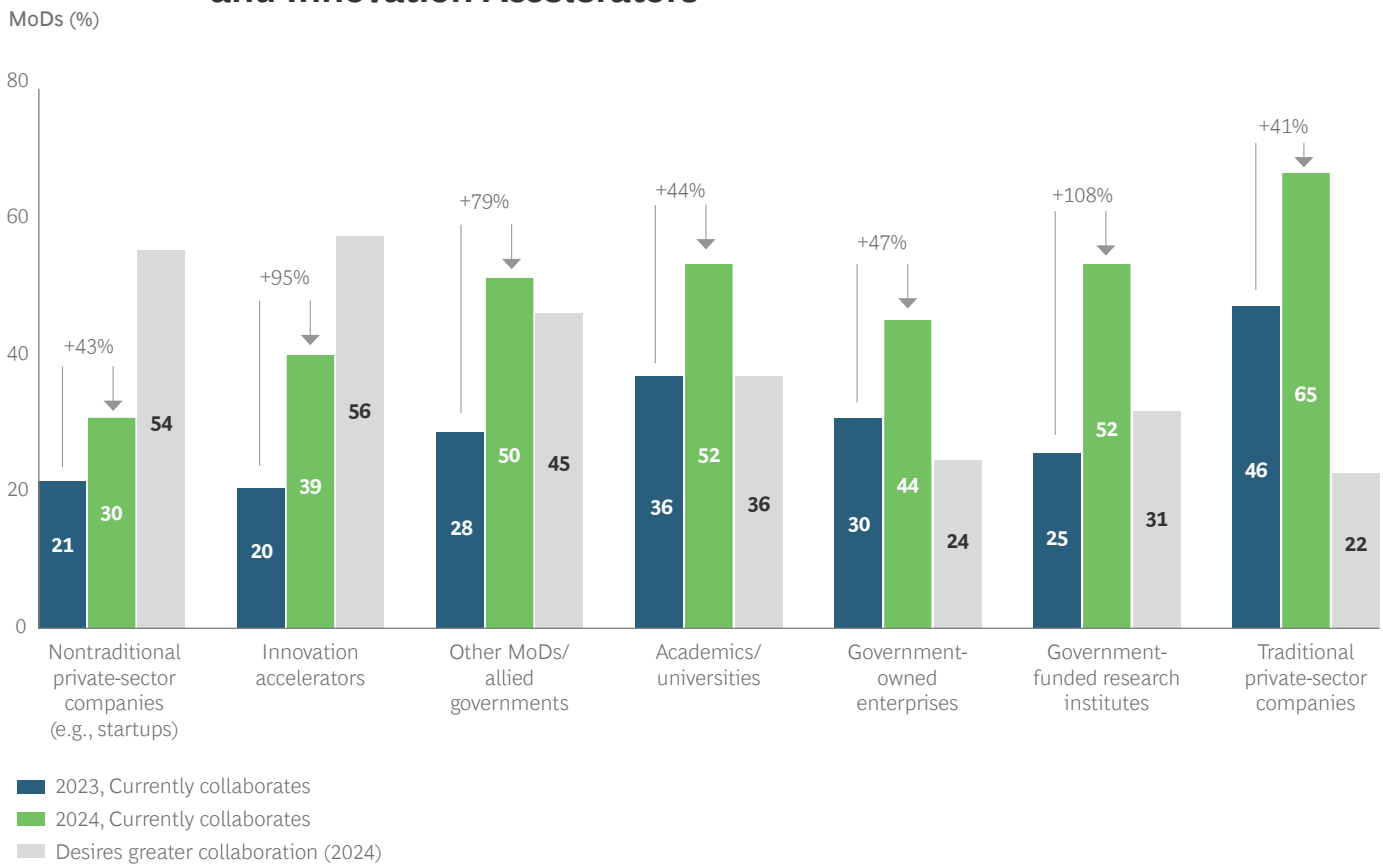
This improvement brings ministries within 1 point of their 2022 innovation readiness, yet there remains a 17-point average gap to the 80-point commercial standard for readiness. (See the Appendix, “Survey Methodology.”)

Four drivers of this year’s results are especially noteworthy:

- 1. Greater Leadership Commitment.** Survey results show that 56% of MoD respondents, versus 44% last year, see innovation goals as a strategic priority for top leadership.
- 2. Focus on Partnership.** Most respondents (90%) have defined policies, processes, and mechanisms to leverage innovation from other countries, up from 63% last year.
- 3. Better Value Proposition for Talent.** This year, 46% of MoD respondents note that their innovation team and its setup are designed to be an attractive destination for the best talent, more than doubling last year’s 18%.
- 4. Remaining Readiness Gap Across All Dimensions.** Survey results revealed gaps of 20 points or more to threshold readiness across six dimensions, with the largest gaps in portfolio management (23 points), talent and culture (22 points), and project management (22 points).

As 2024 begins, MoDs continue to highlight innovation as a critical defense priority and are working to reduce the innovation readiness gap. A primary lever that they are using to close the gap is collaboration with international allies and partnerships: 84% of respondents report teaming with allies or international partnerships on at least half of their innovation efforts. In addition, MoDs report meaningful increases in collaboration across the entire innovation ecosystem—including with industry, academic organizations, and innovation accelerators. (See Exhibit 3.)

Exhibit 3 MoDs Increased Their Involvement with All Types of Collaborators and Reported an Increased Appetite for Working with Startups and Innovation Accelerators



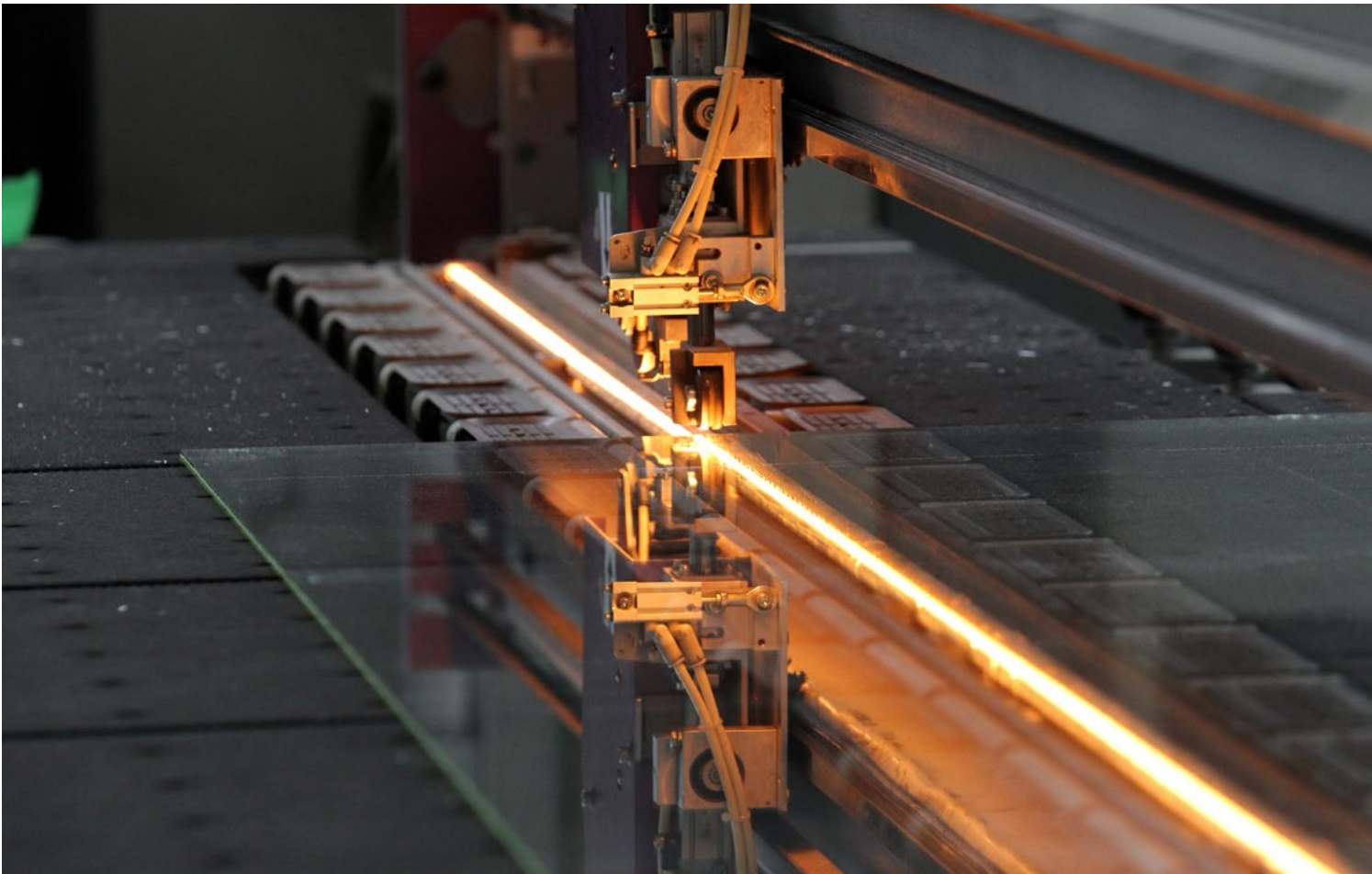
Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG analysis.

Note: "Currently collaborates" includes all survey respondents who indicated that the entity is "typically" or "almost always" involved in their innovation projects. "Desires greater collaboration" includes all respondents who indicated that "more" or "significantly more" partnerships are needed.

When interviewed, leading defense officials frequently expressed frustration with the perceived limited success of their innovation efforts in delivering tangible outcomes. These officials pointed to a shared vision for their innovation partnerships: international collaborations that rapidly develop new sources of military advantage for their participants. Of particular importance to MoDs is their partnerships' ability to truly innovate and not default to status-quo methods of ideation, technology development, procurement, and delivery.

Accordingly, in this year's Defense Innovation Readiness Gap report we focus on five concrete actions that MoDs can take to enhance their partnerships and drive tangible innovation outcomes. These actions highlight key differentiating steps that make higher-performing partnerships more effective at innovation than others. They are as follows:

- 1 Build on unique capabilities.** Distribute workshare and value on the basis of partners' differentiated strengths.
- 2 Establish an orchestrator-led governance model.** Designate a single party with primary responsibility, and build a supporting control tower.
- 3 Cultivate open and effective cooperation.** Establish regular information exchange, IP sharing, and modular open systems to maximize benefits for all partners.
- 4 Build resiliency into innovation processes.** Team with users and technical experts to validate timelines and embed risk-management best practices.
- 5 Make industry and civil society organizations a force multiplier.** Leverage the private sector, nontraditional players, academia, and nongovernment agencies to access next-generation technologies and top talent.



Action 1

Build on Unique Capabilities

Distribute workshare and value on the basis of partners' differentiated strengths.

Many partnerships fail because they are not based on a solid understanding of what each partner can offer. Survey results show that MoDs struggle to connect innovation partnerships to their own goals and their partners' broader capabilities. In terms of their own goals, 82% of respondents report that their organizations have clearly defined or articulated goals for innovation, yet only 23% say that these goals drive impact in their day-to-day innovation projects. In this year's survey, 88% of respondents report that linkages between innovation focus areas and mission strategies, goals, or needs have not been established sufficiently to yield tangible outcomes. On a related note, 62% of respondents indicate that they have not implemented clearly defined value criteria for their innovation projects. (See [Exhibit 4.](#)) Officials identified this lack of clarity on their own innovation goals, focus areas, and path to value as a primary challenge to partnering effectively.

With regard to partnerships themselves, the survey suggests that there are additional opportunities to leverage innovations from other countries. For example, 90% of respondents report that policies, processes, and mechanisms exist to leverage innovation from other countries, yet only 7% report effectively implementing these policies, processes, and mechanisms to drive impact. (See [Exhibit 5.](#)) To address these areas, leaders can focus on turning participants' unique strengths into tangible value.

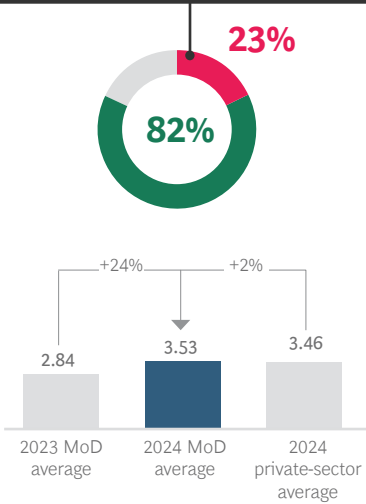
Planning fundamentals during the preliminary stages of forming a partnership should include a partner engagement strategy based on differentiated strengths, an actionable set of innovation goals, trackable governance standards, clear incentives to collaborate, and an agreed-upon cadence for reviewing innovation initiatives. Countries have unique strengths, tied to the innovation model they follow. (See ["Five Innovation Models and Their Roles in Partnerships."](#))

A steady focus on value prepares partnerships for success in the primary innovation phases, which include sourcing, curation, prioritization, solution exploration, hypothesis testing, incubation, integration, and scaling. Upstream of those key phases are innovation phases that involve all aspects of basic and applied research, and downstream are innovation phases that include development, production, and continuous improvement, including the upgrade cycle. Strategic partnership selection, quantifiable cost/benefit analyses, and rational workshare arrangements can help ensure that partners' incentives for program success are aligned, leading to joint innovation breakthroughs, increased access to new technologies, mutual IP-sharing benefits, and strengthened working relationships with partner nations. The recommendations below highlight best practices for value-focused partnerships.

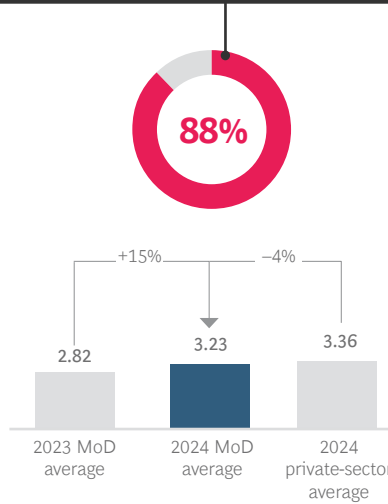
Exhibit 4

MoDs Report Challenges in Linking Innovation Goals to Value

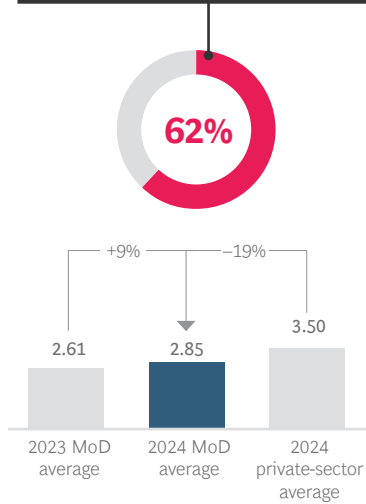
82% of respondents report that their organizations have clearly defined or articulated goals for innovation; **23%** say that these goals drive impact in their day-to-day innovation projects



88% of respondents report that linkages between innovation focus areas and mission strategies, goals, or needs have not been established sufficiently to yield tangible outcomes



62% of respondents report that they have not clearly defined or implemented measurable value criteria for their innovation projects

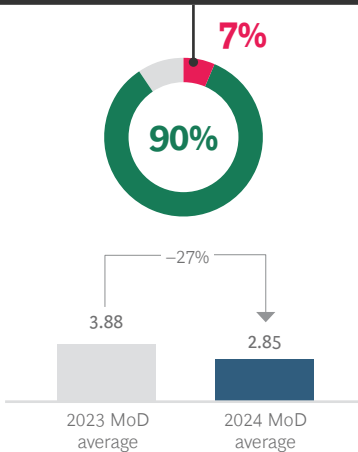


Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG Most Innovative Companies Survey, 2024; BCG analysis.

Exhibit 5

Policies, Processes, and Mechanisms to Leverage Innovation from Other Countries Exist but Are Not Implemented Effectively

90% of respondents report that policies, processes, and mechanisms exist to leverage innovation from other countries; **7%** report that they are effectively implemented to drive impact



Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG analysis.

Recommendation 1A

Identify partners' comparative advantages and capabilities, and build a business case for partnership.

MoDs engage in routine evaluations of their core defense strengths and priorities, but often they fail to apply the resulting information to their partnership strategy. As a result, they miss opportunities to maximize their gains from partnership. To improve, evaluate existing and potential partners on the basis of their ability to address known gaps. Factors may include differentiated expertise, production capacity, supply chain logistics, IP risks, financial positioning, historic innovation success, prior relationships, and regulatory expectations, among others.

After identifying potential partnerships, develop a holistic business case for the most promising opportunities, outlining both parties' contributions and expected benefits. Business cases should include a balanced analysis of long-term costs, benefits, and strategic advantages, ensuring alignment with each partner's goals. The objective should be to create mutual value over the entire innovation life cycle, encompassing financial gains and strategic benefits. For instance, it should capture the positive externalities of jointly developing a modular platform that can enable combined operations and future co-development of additional capabilities. Initially, the business case should focus on the largest anticipated contributions and benefits in terms of value rather than attempting to enumerate all possible outcomes at the outset.

Recommendation 1B

Scope the work, quantify value drivers, and define workshare on the basis of partners' differentiated strengths.

Clearly define objectives for your partnership on the basis of shared goals and unique advantages. Analytically and objectively determine key sources of value to drive shared goals. Regarding workshare, partnerships must establish how members will divide the work and the value it generates. Effective division of workshare is straightforward, proportionate to benefits derived, predictable over time, and logically and clearly tied to discrete work products. Yet, in the case of workshare, for instance, other considerations related to national industry often result in a suboptimal split.

Consider the many possible differentiators—including technical, industrial, and relational strengths—that a partner may have, and ensure that each partner's contributions are in line with the identified value propositions. Avoid prioritizing work acquisition for domestic industries or existing production lines without taking into account effectiveness or technical proficiency, since doing so can lead to an inefficient division of labor. (See [“The Global Combat Air Programme \(GCAP\) Aims to Divide Workshare Based on Capabilities, Addressing Issues That Adversely Affected Earlier Partnerships.”](#)) If expertise and capabilities are highly concentrated at the outset, consider cross-training and skill-sharing initiatives as ways to deepen and enhance the partnership over time.

Recommendation 1C

Define a roadmap that includes quantified goals, regular milestones, and sub-initiative owners with a specific focus on mitigating and overcoming potential barriers.

With a high-level understanding of workshare allocation in place, shift your attention to more detailed execution planning. Although many partnerships engage in planning processes and performance reviews, they may fail to address requirements such as go/no-go decisions and future contingencies in sufficient detail. To avoid common pitfalls of roadmap development, assemble a holistic, forward-looking plan based on specific milestones and success criteria. Study successful prior partnerships to increase the accuracy of projected timelines. Regular progress reviews give partners an opportunity to update the roadmap to reflect significant changes, so that it remains a useful document, rather than a one-time planning exercise that gets shelved as conditions evolve.

The Global Combat Air Programme (GCAP) Aims to Divide Workshare Based on Capabilities, Addressing Issues That Adversely Affected Earlier Partnerships

In the early 1980s, Germany, Italy, Spain, and the UK sought to replace their aging fleet of fighter jets with a modern, fourth-generation fighter jet. The Eurofighter Typhoon program was launched to deliver cutting-edge capabilities such as short takeoff and landing and beyond-visual-range operations.

The partner countries divided workshare on the principle of *juste retour* (“fair share”) rather than competitiveness, resulting in a suboptimal distribution of labor, with complex and inefficient work allocation arrangements. For instance, at least five companies across four countries participated in producing the fuselage. Protracted disagreements over workshare contributed to more than six years of program delay.

The Global Combat Air Programme (GCAP) aims to overcome such challenges by dividing roles on the basis of partner capabilities. Compared to past aircraft programs, the UK, Italy, and Japan have adopted a more specialized and strengths-based approach in their collaboration on GCAP. The UK, given its depth of recent experience in fighter jet development, is leading design. Teams are divided by function: BAE, Mitsubishi, and Leonardo Italy will develop the airframe; Rolls-Royce, IHI, and Avio Aero will work on the engines; and Leonardo UK, Mitsubishi Electric, Leonardo Italy, and Elettronica will collaborate on the electronics. Although the program is still in its early stages, rational division of workshare is a concrete step in the right direction.








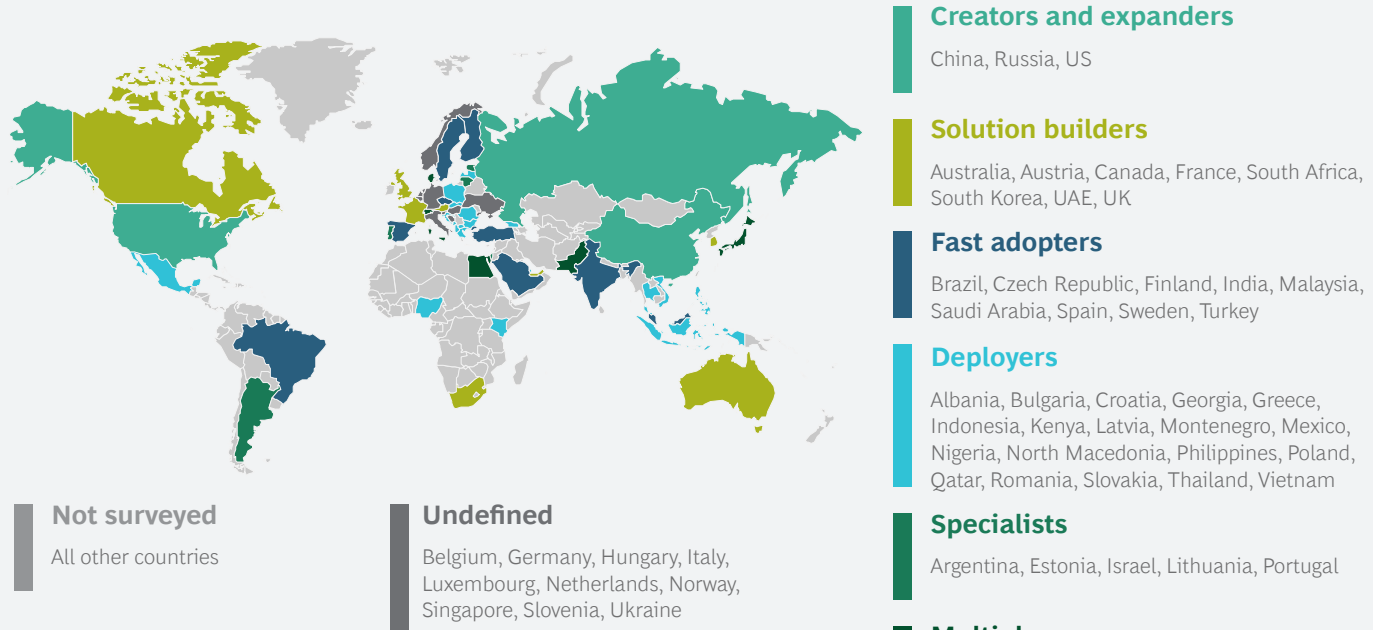
Five Innovation Models and Their Roles in Partnerships

In our 2022 analysis, innovation practices of MoDs were classified across 40 key indicators and then grouped into five innovation models, drawing from BCG research into private-sector innovation and applying the models that are most relevant for the defense context. (See the exhibit.)

Each innovation model has corresponding resources and practices that an MoD can leverage to support its innovation strategy, and that inform their role in partnerships.

Innovation Models Demonstrate a Range of MoD Strategies

				
Creators and expanders	Solution builders	Fast adopters	Deployers	Specialists
Focus on “big bet” efforts to create new capabilities	Base innovation on end-user needs and feedback	Rapidly tailor and scale others’ innovation practices	Maximize value from other nations via procurement	Develop a specialized focus in key technology domains
Comparative advantage				
Significant private and public capital	Superior end-user insight	Rapid learning and agility	Procurement and nation partnership	Superior insight into a few domains
Measurable outcomes				
Enhanced capabilities in disruptive technology	Measurable outcomes	Speed of adoption and number of continuous improvement initiatives	Technologies and equipment imported, purchased, and fielded	Patents and perceived leadership in selected areas
Role in partnership				
Drive benefits through scale and capabilities	Drive differentiated end-user insight across geographies	Accelerate testing and learning by fielding capabilities fast	Help drive scale by providing a market for innovations	Provide domain-specific talent and know-how



Sources: Fact base of 40 publicly available key indicators; BCG analysis.

Action 2

Establish an Orchestrator-Led Governance Model

Designate a single party with primary responsibility, and build a supporting control tower.

Complex innovation partnerships require objective, transparent, and flexible governance structures. In the survey data, governance and performance management emerge as frequent pain points: 46% of respondents report that decision-making bodies do not make decisions effectively and lack paths to resolve issues, and 41% do not agree that the governance structures for their innovation partnerships are established effectively. Many MoDs also face internal governance challenges: 72% of respondents report that they have not defined clear innovation metrics or key performance indicators (KPIs). (See Exhibit 6.)

The absence of an effective approach to governance, performance management, and organization can lead to delayed decisions, reduced accountability, and instability related to political friction. As a result, many innovation partnerships fall short of their objectives. The right governance structure prioritizes long-term success and consistent collaboration among stakeholders, and at the same time is adaptable enough to accommodate evolving processes, circumstances, and objectives.

The most effective partnerships empower an orchestrator—a dedicated, fully accountable party with the authority to make high-level decisions and manage engagement among partners. This approach is superior to traditional governance models such as unitary leadership by one partner, which risks alienating other partners, and consensus-style leadership, which lacks meaningful accountability to ensure a program’s success. (See “The NH-90 Program Lacked Focus Without an Orchestrator” and “A Requirement for Unanimous Decisions Delayed Development of the Eurofighter.”) Instead, the orchestrator is responsible for balancing delegation, consultation, and decisiveness. To enable effective leadership, the orchestrator should receive support from a control tower that centralizes all decision criteria, data, and performance metrics required to guide partnership success. Together, the orchestrator and the control tower provide a stable foundation and transparent information flow to support innovation.

The NH-90 Program Lacked Focus Without an Orchestrator

The NATO Helicopter Management Agency (NAHEMA) was established to govern design and development of the NH-90, a dual-mission aircraft that was intended to serve as both a tactical transport helicopter for armies and an anti-submarine warfare helicopter for navies.

However, insufficient governance led to problems with the program. Conflicts over financing and deliverables led to development delays of more than seven years. A lack of clarity over design authority and operational requirements resulted in more than 23 national variants of the NH-90—and early challenges prompted the UK to exit the program in 1987. The proliferation of national variants, in turn, has created cascading challenges with regard to maintenance and parts availability, limiting program success. Two customer countries have recently either canceled contracts (Norway) or retired the helicopter early (Australia).

A Requirement for Unanimous Decisions Delayed Development of the Eurofighter

The NATO Eurofighter and Tornado Management Agency (NETMA) provides the primary governance of the Eurofighter program. NETMA’s Joint Steering Committee consists of two-star representatives from each of the four partner nations and is responsible for contractual compliance as well as workshare distribution. However, the committee requires unanimous decisions. As a result, changes in political support for the program in any of the partner nations resulted in ongoing delays.

Recommendation 2A

Designate a single orchestrator as the accountable party, and support it with a well-defined operating model that includes decision rights and escalation paths.

The orchestrator typically consists of a small to medium-size team with clear decision authority and influence over financing, and with a mandate to ensure alignment and effective cross-organizational collaboration. Its exact makeup will vary depending on the size, complexity, and topical focus of the partnership. The orchestrator should serve in the interest of the partnership, rather than that of any individual MoD. It does more than serve as a traditional program management office, and its responsibilities extend beyond coordinating stakeholders and monitoring progress. At the outset of the partnership, top leadership should give the orchestrator power to take action on several important fronts including:

- Exercise authority over key decisions with budget flexibility and executional autonomy.
- Facilitate interactions among high-level officials within and across partner MoDs.
- Identify warning signs that appear in KPIs.

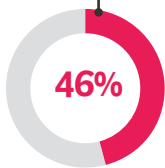
- Proactively escalate issues as they arise.
- Make tough decisions needed to redirect initiatives that have gone off-track.

Once the orchestrator is in place, create a best-in-class operating model—a clear and rational map of how individuals and resources in participating organizations will interact with each other to deliver value. This mapping should encompass resources from partner governments alongside other stakeholders, including industry participants and program offices within partner MoDs. It should specify which individuals will act as owners of which components of the process or product, and it should clearly identify where decision rights lie. (See “The F/A18 Benefits from Systematic Performance Management and Communication.”) To enable a single, integrated effort across collaborators, the orchestrator should pay special attention to surfacing and resolving interoperability challenges.

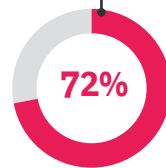
Exhibit 6

MoDs Identify Difficulties in Establishing Effective Governance Structures and Performance Management, Including in Partnerships

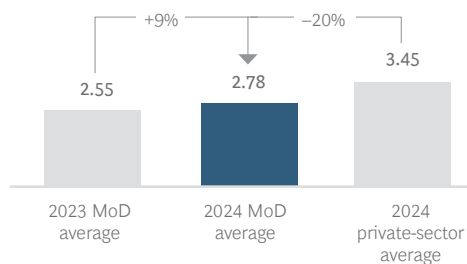
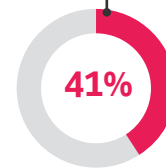
46% of respondents report that decision-making bodies do not make decisions effectively and lack paths to resolve issues



72% of respondents report that they have not implemented clearly defined innovation metrics or KPIs



41% of respondents do not agree that their partnerships establish effective governance structures



Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG Most Innovative Companies Survey, 2024; BCG analysis.

Recommendation 2B

Set up a governance control tower to objectively measure progress on the basis of quantifiable, value-based KPIs. Centralize all data necessary for decision making to a single source of truth. Top-line metrics and indicators should be readily available, and participants should have the option to delve deeper on topics of interest as needed for specific innovation centers or efforts. The control tower should streamline the way it provides data, including through the use of automated alerts and dashboards, to enable officials to identify partnership issues proactively. As the team designates additional accountable individuals for specific aspects of the program, KPIs should cascade to their level. The control tower and the metrics it incorporates should evolve with the innovation. Process-focused metrics are suitable during concept sourcing and curation, but they should become more concrete in later phases as the partnership shifts from ideation and design to product development and outcome realization.

To enable the orchestrator to fully utilize the control tower in decision making, the partnership's leaders should establish the control tower early and proactively incorporate it into the decision-making process. Partnerships that try to “build the plane as they fly it” often run into disagreements that arise from a lack of objective data or clearly defined authority. From day one, the orchestrator should designate a responsible party to monitor and escalate aberrations in KPIs, explicitly empowering and requiring this party to report on risks via established work planning or steering sessions.

Recommendation 2C

De-average operational metrics to ensure that individuals understand their role and contribution to broader innovation goals. In order to make this a reality, define a focused set of KPIs for each individual program and team, with established performance reviews and communication processes that leverage these metrics and incentivize work that adds value to top-level objectives. Using the roadmap discussed in [Recommendation 1C](#) on page 10, ensure a practical and logical deconstruction of the top-line KPI metrics, which will cascade to every level of the organization.

Over the partnership's life cycle, consistently conduct progress reviews structured on the basis of these KPIs, tracking accountability for milestone completion instead of percentage completion. Best-in-class organizations use binary completion gates to ensure that deliverables are tangible and demonstrable.

The F/A-18 Benefits from Systematic Performance Management and Communication

The F/A-18 strike fighter faced significant operational issues throughout the 2010s, with nearly half of the fleet in need of service by 2018. However, by adopting more effective leadership methods, problem solving approaches, and governance, the US Navy **dramatically increased the fleet's readiness**. This began with establishing a detailed baseline of performance and a transparent and target-based gap closure plan aimed at the most consequential performance drivers. Once the baseline was in place, the leadership team assembled a performance driver tree and used regular operating reviews to ensure progress, clear barriers, and share lessons learned.

Previously three senior officers were accountable for F/A-18 readiness, a key outcome for multiple naval functions. But under the revised management structure, the Navy designated a single individual, the “Air Boss,” as the person accountable for all fighters across all stakeholder communities. The Navy then named supporting individuals as accountable to the Air Boss for various components of the performance driver tree. It also leveraged best practices from commercial airlines—for example, by creating a maintenance operations center to integrate, prioritize, and rapidly resolve key stakeholder issues.

Action 3

Cultivate Open and Effective Cooperation

Establish regular information exchange, IP sharing, and modular open systems to maximize benefits for all partners.

Jointly developing innovative military equipment and technology entails sharing sensitive data and managing proprietary information. Most partnerships include some form of technical agreement, but often such agreements are insufficiently granular or robust, failing to address specific data types, interfaces, and data governance protocols. Many do not set practical rules regarding access to information, expectations for data sharing aside from data access, or adherence to other, existing data standards or agreements.

Lax standards can put advanced defense technology in the wrong hands. Yet excessive controls, although based on legitimate national interests, can inadvertently limit information sharing and data exchange and ultimately hinder partners' ability to turn their innovative ideas into real-world impact. Counterproductive measures may take the form of draconian export restrictions, undue concerns about future competition, or an overreaction to a lack of agreed-upon standards.

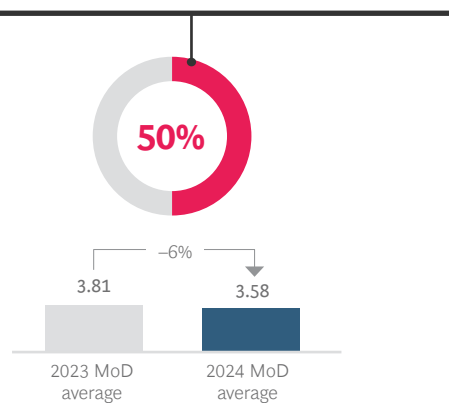
MoDs have encountered difficulties in setting up open innovation ecosystems. In our survey, 50% of respondents report that they have not established interoperability standards for platforms in the field today, and 40% report a lack of interoperability standards with their key mission partners. (See Exhibit 7.) The existence of comprehensive defense export regulation regimes, such as the US's International Traffic in Arms Regulations (ITAR), requires would-be partners to create special export rules to enable information sharing and collaboration.

Historically, MoDs have expressed ambition for building modular platforms and technologies that they can apply flexibly in the field to enable and accelerate innovation. MoDs strongly affirm the importance of open architecture and modularity, but implementing these principles in international partnerships can be challenging, given national differences in systems.

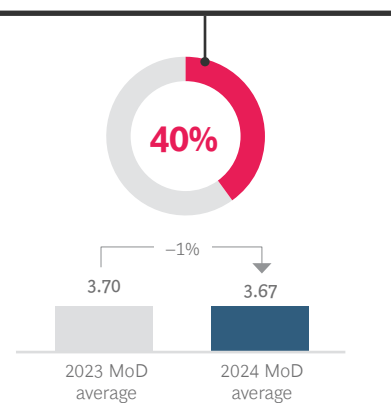
Exhibit 7

MoDs Report a Lack of Interoperability Standards, Including with Key Mission Partners

50% of respondents say that they have not implemented interoperability standards for platforms in the field today



40% of respondents say that they have not implemented interoperability standards with key mission partners



Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG analysis.

Best-in-class partnerships establish mechanisms that allow all participants to derive value from the collective work products of the collaboration. Technologies that facilitate secure information sharing are pivotal to cooperative efforts, as they can enable the construction of a secure communications backbone for a partnership. But technological solutions cannot succeed on their own. Partners must complement them with successful organizational change, iterative ways of working, and up-to-date policies and procedures.

Recommendation 3A

Develop an overarching agreement that enables information sharing. Partners should align in advance on a set of operational and legal arrangements to facilitate collaboration. These agreements should establish general principles for data security, data rights, and regulatory compliance to ensure alignment with each partner country’s laws, along with measurable success criteria for information flows. (See “AUKUS Shows the Importance of Clear Information Sharing Agreements.”) Agree on norms and actions for transparency in both inter-organizational communication and workflow monitoring.

Rather than developing bespoke agreements from scratch to cover new partners or partnerships, build a repository of terms and conditions from which to pull and adapt language for agreements. These repositories help ensure consistency, promote common practices across a partnership portfolio, and reduce the need for duplicative efforts. Regularly review these agreements and update the contractual terms as needed. A best-in-class agreement provides clarity on core issues and does not overwhelm with detail or add unnecessary sophistication. It provides the minimum level of technical specification required to make progress, and iterates from there, rather than attempting to anticipate all conceivable issues in a way that limits customization down the line.

AUKUS Shows the Importance of Clear Information Sharing Agreements

The military security partnership of Australia, the UK, and the US (AUKUS) focuses on joint development of advanced defense technologies, including nuclear propulsion systems, cyber solutions, artificial intelligence, quantum computing, hypersonic flight, and radar capabilities. Such an undertaking requires deep sharing of information and IP, which has presented challenges in the past.

To facilitate collaboration, the US and Australia have agreed on and coordinated to introduce complementary legislation that will permit greater information sharing. Australia has included exemptions for the US and UK in a proposed law limiting universities and industry from sharing defense technology with foreigners. Likewise, the US included language in its National Defense Authorization Act (NDAA) to streamline its sharing of advanced technologies by extending a Canada-level ITAR exemption to Australia and the UK, reclassifying AUKUS partners as “domestic sources” for the purposes of the US Defense Production Act. In addition, the NDAA requires a quarterly determination of the barriers to AUKUS export regime compatibility, as well as articulation of steps needed for alignment. These steps help enable greater information sharing and collaboration between Australia and the US by creating an area free from ordinary export control licensing requirements.

AUKUS demonstrates that sensitive defense agreements may require policy changes—including new legislation—to facilitate the sharing of technology IP that is critical to successful innovation.

An Agreement on Standards Paved the Way for Greater EU-NATO Cyber Cooperation

Sharing data between the EU and NATO has been a challenge. As a German Marshall Fund report highlights, "The EU does not have a culture of securing information, and NATO often shows little willingness to share classified information with the EU."¹ Despite the close collaboration between the EU and NATO, ensuring that the data used in joint projects is secure has been a challenge. Events such as the 2007 cyberattacks on Estonia, which exhibited a high level of sophistication and exposed new network vulnerabilities, have underscored the need for improvement.

The EU-NATO Joint Declaration of 2016 recognized four areas of cooperation regarding cyber defense: missions and operations, training and education, exercises, and standards. That agreement has improved collaboration between the EU and NATO and led to subsequent agreements. In 2021, for example, the EU proposed an EU-NATO cyber threat information hub and task force for cybersecurity. In 2023, NATO and EU officials again conducted joint high-level staff meetings with a focus on strengthening cooperation and intensifying the EU-NATO relationship on cybersecurity and cyber defense.

1. German Marshall Fund, *EU-NATO Cybersecurity and Defense Cooperation: From Common Threats to Common Solutions* (December 15, 2017).

Recommendation 3B

Regularly update technical standards, policies, and procedures for IP sharing, open architecture, and new technology design, incorporating total cost of ownership (TCO).

Best-in-class partnerships build modularly, using core platforms so that they can develop and upgrade to more targeted solutions seamlessly on common foundations. Accordingly, partners should formalize technical standards that incorporate open architecture principles including modularity, interoperability, shared intellectual property (IP) norms, speed, and trust. These standards should include explicit limitations on how individual partners can use, sell, or adapt innovations, while also emphasizing transparency and secure information sharing. (See "An Agreement on Standards Paved the Way for Greater EU-NATO Cyber Cooperation.")

Partners should also understand the cost implications of IT and IP decisions over the life of the innovation effort. Participants should keep all parties informed of their peers' developments and be able to verify for themselves how the partnership will handle sensitive information shared across secure channels. Typically, this occurs as part of a regular annual or biannual planning and budgetary review process, if not more frequently.

Recommendation 3C

Agree on ownership of the IP, and specify the rights of the owner.

Past projects have at times become embroiled in disagreements as partners belatedly try to determine which one owns the IP generated from the collaboration and who is eligible or ineligible to buy the resulting technology or equipment. To avoid such disputes, partners should set rules governing IP ownership and commercialization early, clarifying the scope of value that arises from the partnership and which partner or partners are entitled to realize that value. These rules should be linked to the distribution of value spelled out in the initial business case.

Action 4

Build Resiliency into Innovation Processes

Team with users and technical experts to validate timelines and embed risk-management best practices.

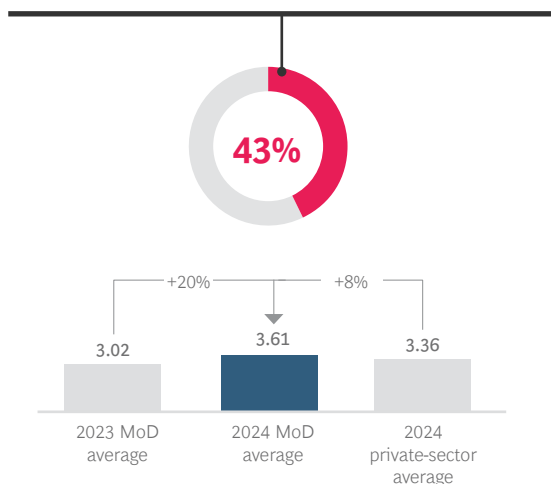
Complex defense innovations typically have long development timelines, which increases the risk that the effort will lose focus over time. In terms of process, defense innovation work poses unique challenges—and international partnerships often magnify the complexity, requiring geographic, financial, and political coordination, and introducing additional risks and interdependencies. It can also be difficult to “wind down” or course-correct projects that do not initially succeed. To ensure that your MoD can pivot effectively, embrace a “learn fast” mindset grounded on rapid testing and iteration. Although similar to the concept of “fail fast,” “learn fast” emphasizes that learning is the desired result of rapid prototyping and testing, and can occur without failure.

In addition to learning, MoDs must focus on proactive planning based on resiliency and risk management to keep programs on track. According to survey respondents, however, the long development processes in many defense programs do not incorporate user input until late in the design process—when technology gets tested. In our survey, 43% of respondents report that they do not proactively and directly incorporate user feedback or needs in idea validation, and 56% report a lack of implemented approaches, methods, and systems in their ministries to source ideas from end users. (See Exhibit 8.) In contrast, best-in-class innovation partnerships apply an agile, iterative approach, constantly soliciting and integrating real-world input from real-world users during the design phase.

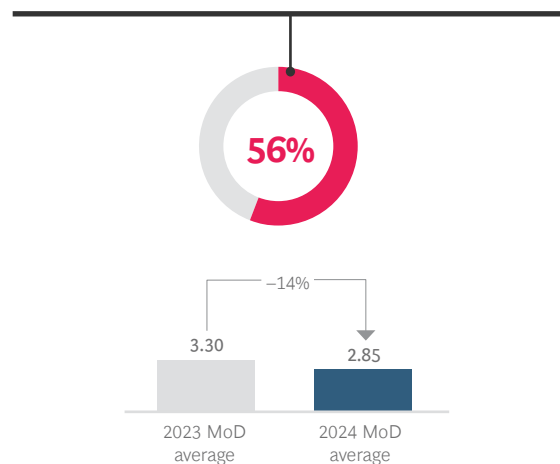
Exhibit 8

MoDs Can Engage More Closely with End Users to Generate and Test New Ideas

43% of respondents report that they do not proactively and directly incorporate user feedback or needs in idea validation



56% of respondents report a lack of implemented approaches, methods, and systems to source ideas from their end users



Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG Most Innovative Companies Survey, 2024; BCG analysis.

Anduril Approaches Defense Innovation with Agility

Defense technology company Anduril Industries aims to bring the speed and disruptive attitude of technology companies to the defense industry. *The Economist* writes: “Rather than waiting for government contracts, Anduril creates what it thinks defense departments need and uses iterative manufacturing and a lean supply chain to make products quickly and relatively cheaply.”¹ This approach, emphasizing a direct connection to the user base, has enabled the company to quickly scale production of high-tech products such as Ghost UAVs and Sentry surveillance towers.

The US Army Uses Digital Twins to Increase Operational Availability and Reduce Sustainment Costs

In the Future Vehicle Lift initiative, engineers use robust digital simulations to predict maintenance requirements, extend the operational lifespan of equipment, and ensure that the program meets stringent reliability and performance benchmarks. This approach aims to reduce downtime, boost operational readiness, enhance operational availability and lower sustainment costs, enabling the Army to respond rapidly to evolving threats.

1. *The Economist*, “AI-wielding tech firms are giving a new shape to modern warfare” (February 23, 2023).

Recommendation 4A

Gather insights from all stakeholders—including end users—early and iteratively in the development process. Adopt the commercial best practice of soliciting input from end users (including operators, mechanics, and maintenance teams) across the product life cycle and from other stakeholders (such as regulators and military leaders) throughout the design and development process. Build cross-functional teams that include technologists, requirement owners, and on-the-ground users, and consider additional ways to incorporate broader stakeholder groups such as by scheduling regular “town halls,” user days, and live demonstrations.

Empower your teams to apply agile development principles, which focus on producing minimum viable products (MVPs) and treat early setbacks as opportunities to assess platform requirements and adjust designs as needed. (See “[Anduril Approaches Defense Innovation with Agility](#)” and “[The US Army Uses Digital Twins to Increase Operational Availability and Reduce Sustainment Costs](#).”) Leverage the increasing commoditization of defense hardware to more rapidly test, iterate, and field platforms and systems within your network. Failing to prioritize requirements identified through end-user insights and rapid testing, iteration, and fielding can distract participants from critical objectives.

Recommendation 4B

Embed an anticipatory risk management approach to ensure that the innovation process is resilient. Although smart risk management is a challenge for many organizations, public-sector organizations are particularly prone to avoiding rather than taking advantage of risk. This is because they often have greater incentives to avoid failure than to pursue bold advances through innovation. Consequentially, public-sector agencies tend to take limited, reactive, and unduly negative views of the risks inherent in developing and testing new ideas. This can result in [unanticipated obstacles and missed opportunities](#).

To turn risk avoidance into effective risk management, try to identify risks early and accurately on the basis of input from end users. Develop a cross-partnership risk function, and consider incorporating this function within the orchestrator’s remit to monitor uncertainty across the project and to foster calculated, productive risk taking in strategic areas. A resilient process should aim to de-risk execution by focusing on the biggest risks first, using hypotheses and end-user input to identify and prioritize potential risks. Ensure that the responsible party for risk has a seat at the table in determining when risks exceed the prospective benefits of the associated opportunity.

Recommendation 4C

Proactively prevent “requirements creep” and overspecification.

Plan for the long life cycle of collaborative defense programs by prioritizing key actions, while moving less critical and less feasible requirements into plans for future updates. Start small and scale over time, even if many desirable features have yet to be integrated, including MVPs where appropriate. Stage the update cycle in tranches, and distinguish clearly between responsibility for sustainment versus distinct improvement efforts. Regularly review the modernization plan, and prioritize on the basis of feedback from end users and industry.

Avoid overspecification of requirements. Analytically quantify requirements tradeoffs, and ensure that requirements link directly to operational outcomes. Engage industry to identify when potential requirements exclude the use of existing commercial off-the-shelf (COTS) or potential novel solutions, and systematically remove those barriers. Resisting overspecification ensures that MoDs can benefit from the scale, practical insights, and cost efficiencies associated with common solutions. Planners put their innovations at risk of schedule delays, cost overruns, and cancellation when they overspecify requirements.

Recommendation 4D

Aggressively drive innovation throughout your innovation ecosystem, including with regard to existing equipment, production technologies, and supporting functions.

Your entire team should embrace nontraditional thinking and flexible decision making. Consistently promote innovation-focused values and objectives to reiterate the focus on innovation, including among teams whose primary task is to work with existing equipment and production technologies. Establish a process to review existing equipment for potential uses that fulfill unmet needs thinking creatively about how to adapt or re-engineer on-hand hardware for innovative use cases. Revise production technologies that have historically struggled to rapidly scale to meet the demand for innovations.

Embed an innovative mindset in acquisition, HR, IT, finance, and all other support functions, with tailored approaches to suit each function. In acquisition, consider alternative contract schedules or sourcing strategies if traditional paths aren't a good fit. Be mindful that a by-the-book acquisition strategy can close off potential areas of innovation before the design and execution phases even begin. Create incentives for constantly improving contracts alongside the imperative to maintain legal and regulatory compliance. This extends to acquisition (including procurement), HR, IT, and all other support functions, though it takes different forms in each function. For HR, for example, direct hiring authorities enable rapid onboarding of innovative talent. For IT, agile development cycles permit faster tooling for core teams. For finance, flexibility in funding allocation supports rapid software updates. Similar practices can extend to other functions, including workforce planning and training. Regularly distill innovation best practices that core teams have cultivated, and disseminate them to other functions.

Action 5

Make Industry and Civil Society Organizations a Force Multiplier

Leverage the private sector, nontraditional players, academia, and nongovernment agencies to access next-generation technologies and top talent.

Survey respondents report a need for collaborations with nongovernmental actors. MoDs have made strides in attracting innovators, yet talent remains a key gap. Average scores on talent and culture have risen by 34% and by 25%, respectively, versus the 2023 results. Nevertheless, absolute gaps remain on both dimensions: 54% of respondents report that their innovation teams are not set up to attract the best talent, and only 34% report having an innovative culture that encourages risk taking and does not punish failure. (See Exhibit 9.) Multiple officials indicate that working with experts outside of their organizations is a source of innovative new ideas and can improve execution.

Compared to partnerships that consist exclusively of public-sector participants, private-sector companies often contribute greater flexibility, freedom to maneuver, and risk appetite, leading to an enhanced capacity to develop innovative technologies. MoDs can leverage these benefits by understanding the landscape of private-sector innovation, but they need to proceed strategically in attracting innovative collaborators while maintaining cost-effectiveness.

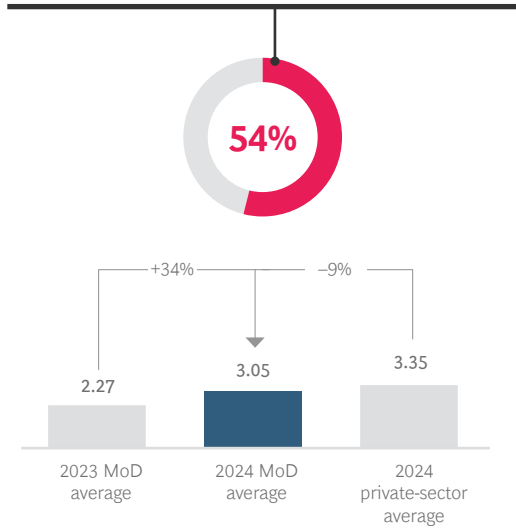
Incorporating dual-use technology into design plans can incentivize collaborators to participate, thereby fostering innovation. MoDs recognize the importance of dual-use technology but do not consistently integrate it into their design plans: 91% of respondents cite dual-use technologies as an explicit priority in their partnerships, yet 56% have not implemented a process or mechanism to leverage dual-use technology. (See Exhibit 10.)

Challenges that complicate efforts to expand private-sector engagement include the need to assess the full spectrum of innovative firms and individuals, the task of building tolerance to the risks associated with new or smaller-scale innovators, and the requirement of allocating the necessary time and resources across multilateral innovation efforts. To mitigate these challenges, MoDs should actively assess their partnership portfolio, creatively integrate nontraditional innovators in suitable roles across the project, and use dual-use technology to de-risk private-sector participation.

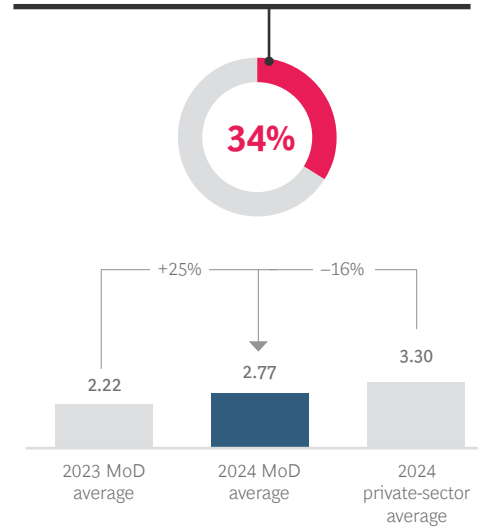
Exhibit 9

MoDs Cite a Need for Improved Talent and Culture

54% of respondents report that innovation teams are not set up to be an attractive destination for the best talent



34% of respondents report having an innovative culture that encourages risk taking and does not punish failure

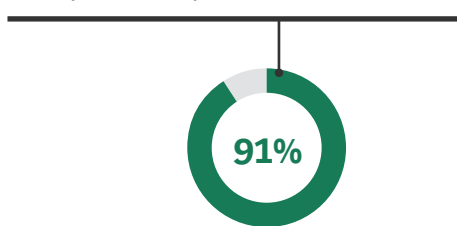


Sources: BCG Defense Innovation Survey, 2023 and 2024; BCG Most Innovative Companies Survey, 2024; BCG analysis.

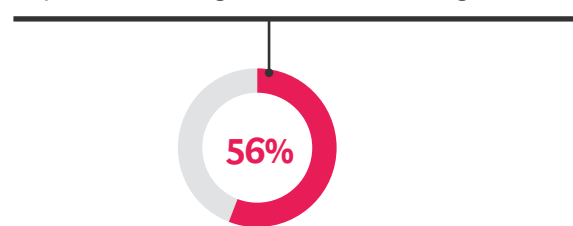
Exhibit 10

MoDs See an Opportunity to Further Leverage Dual-Use Technologies

91% of respondents describe dual-use technologies as an explicit priority in their partnerships



56% of respondents state that their MoDs have not implemented a process or mechanism in place to leverage dual-use technologies



Sources: BCG Defense Innovation Survey, 2024; BCG analysis.

Recommendation 5A

Create the infrastructure needed to systematically engage diverse innovators, including nontraditional vendors.

To ensure that MoDs are accessing the full range of potential innovations, they should continually work with their partners to locate and connect with innovative organizations and individuals. Connecting with innovative talent is especially important: our work with commercial organizations demonstrates that the most innovative organizations consistently differentiate themselves from others by their ability to attract innovative talent. Several key actions can help achieve this objective:

- Extend talent strategies beyond recruiting to include programs such as fellowships, research incubators, and consultation arrangements.
- Ensure that outreach efforts include nontraditional collaborators such as startups, private equity investors, logistics companies, universities, research organizations, and think tanks.
- Regularly host or participate in industry events, technology accelerators, and hackathons. (See "A US Army Competition Incentivizes International Collaboration.")
- Leverage existing startup incubators to nurture future innovations, and use your position within this body to ensure that funding priorities are defense-relevant.
- Scan the global market to identify geographically specific talent pipelines, innovation hubs, and funding pools.
- Share information on new technologies and capabilities to ensure that all partners are at the cutting edge and can effectively hire talent and negotiate optimal terms and conditions.

A US Army Competition Incentivizes International Collaboration

The US Army's 2022 xTechInternational competition identified promising technologies that global innovators are developing. Winners included:

- Fire suppression for lithium-ion batteries (VEDA, North Macedonia)
- Closed-loop water reuse (SPACEDRIP, Estonia)
- Biosynthesis of rare earth cerium nanoparticles (Biociencia, Chile)

The program enables critical technology innovators throughout the world to partner with the US to develop and implement key pieces of future-focused technology, offering cash prizes totaling \$480,000 to successful teaming partners. A US Army technical director praised the results as enabling Army to "tap into a talent pool of innovators around the globe that offer truly novel solutions to Army challenges."¹ It provides a clear example of how MoDs can support innovation throughout the world, identify potentially overlooked sources of talent and insight, and help support the creation of a truly global open innovation ecosystem.

1. xTech, "US Army awards businesses cash prizes in international competition" (August 18, 2022).

Recommendation 5B

Speak the language of industry to solicit private-sector participation. Public-sector organizations often assume that immediate financial compensation is the primary lever to attract industry, but this is not strictly the case. Other, longer-term financial incentives—such as branding opportunities, access to government customers, or the opportunity to prove technology in a defense context—can be just as valuable to the overall business proposition from the perspective of potential partners in industry. Look for opportunities to go beyond short-term transactional relationships by using mechanisms that support long-term collaboration and increase trust, such as building incentives into contracts to reward realizing mutual benefits and sharing risk over a longer period. To attract private-sector partners, combine financial incentives, risk management support, market access, technology sharing, and opportunities for branding into a single integrated package. Stress the opportunity for industry to engage with your partnership, acquire inroads into partner nations’ markets, gain access to cross-border industry partnerships, and leverage the full suite of your partnership’s technology and insights.

Recommendation 5C

Proactively identify dual-use technologies, and remove barriers to their use. The concept of dual-use technology in defense is not new but many innovation partnerships still do not make full use of it. Mitigate risk for industry collaborators by intentionally incorporating dual-use technologies in your design plans, including proactively building tight safeguards, depending on the specific use case, to further de-risk adoption. (See [“Dual-Use Technologies Can Reduce Industry Partners’ Cost Risk and Incentivize Their Participation.”](#)) Avoid overly specific requirements that can preclude dual-use solutions. Engage with experts to implement integrations with existing platforms, where beneficial. In evaluating proposals that involve building net-new technologies, review the proposals with technical experts and industry collaborators to determine whether similar functionality already exists—and pursue this inquiry down to the level of individual subcomponents to see whether they might be compatible with existing systems. If not, assess the usefulness of proposed features to other applications beyond the project.

Outline acceptable use cases and associated guardrails for dual-use technologies up front, providing alternatives for industry even in the case of program complications. Align on export control strategies and partners’ approaches to regulating dual-use technology, ensuring that industry can operate flexibly once work is underway.

Dual-Use Technologies Can Reduce Industry Partners' Cost Risk and Incentivize Their Participation

The Johns Hopkins Applied Physics Laboratory (APL) has designed a Deep Space Advanced Radar Concept (DARC), which will become the largest-ever radar tracking system and enable greater visibility in deep space. In developing DARC, APL relied heavily on commercially available components to reduce technical risk and validate the system’s design at a proof-of-concept level. After APL achieved success there, the US government implemented more sophisticated, customized operational solutions where required.

Similarly, the European Medium Altitude Long Endurance Remotely Piloted Aircraft System project (EuroMALE RPAS, or Eurodrone) selected the Catalyst engine, a piece of COTS hardware made by US-owned Avio Aero, over a potential bespoke solution proposed by France’s Safran. Procurement decision makers cited lower developmental risk and better in-service economics as the decisive factors, in spite of pressure to use the more customized European solution.

Aerospace Companies Find New Buyers for Legacy Products, Demonstrating the Importance of Maximizing End-of-Life Value

Bell originally produced the UH-1Y Venom (“Super Huey”) line of helicopters for the Marine Corps, making a final delivery to the USMC in the 2018 fiscal year. Three years later, Bell restarted the UH-1Y line after receiving interest from other countries, such as the Czech Republic.

To the extent possible, forecasting the evolution of demand for innovations over time and proactively updating these forecasts in response to production problems and market developments can improve the accuracy of revenue projections and inform end-of-life planning. It is critical not to end planning for innovative products after the first production run.

NATO’s Standalone VC Fund Is Making Big Bets on Deep Tech

In 2022, 23 NATO allies launched the NATO Innovation Fund (NIF), the world’s first multi-sovereign venture capital (VC) fund. With a substantial €1 billion endowment, this fund has a 15-year investment horizon and targets early-stage startups working on emerging and disruptive technologies (EDTs), as well as other VCs that focus on dual-use technologies. NIF concentrates on nine key EDTs: AI, autonomy, quantum, biotechnologies and human enhancement, hypersonic systems, space, novel materials and manufacturing, energy and propulsion, and next-generation communications networks.

Although NIF launched only recently, it reflects a commitment by NATO to embrace the ethos and approach of venture capital. This is embodied in its clear focus on large bets over the long run, which historically have been difficult for governments to sustain over time, and in its recognition that financing is only one aspect of nurturing small, innovative ventures such as startups.

Recommendation 5D

Manage your industry portfolio across the full life cycle of your innovations. Continuously optimize your partnership’s portfolio by identifying new areas and opportunities, tracking the lifespan of industry agreements, and budgeting on a TCO basis. Actively gauge and solicit future demand by identifying new applications and customers for your innovations, beyond the initial set of buyers. Anticipate and prevent obsolescence; for instance, in the wake of upgrades to cutting-edge platforms and systems, base-level versions often experience high demand from forces in other markets. (See “Aerospace Companies Find New Buyers for Legacy Products, Demonstrating the Importance of Maximizing End-of-Life Value.”)

Regularly review industry teaming arrangements, and ensure that they align with your strategic goals. Seek to balance and diversify your partnership’s portfolio across technologies, life-cycle stages, and sources of financial and operational risk. Do this by pursuing multiple innovation projects at different stages in parallel, both to mitigate risks from challenges within individual projects and to surface insights that are applicable across initiatives. Consider the impact of such innovations on your defense priorities, and ensure that your partnerships cover a mix of quick wins and strategic long-term investments. Integrate the results of your evaluations into existing strategic planning cycles. Pay special attention to duplicative efforts, and either rationalize or sequence them. Refocus or dissolve industry engagements that have outlived their usefulness.

Recommendation 5E

Embrace the private equity (PE) and venture capital (VC) boom in defense. Private equity and venture capital are playing a growing role in defense innovation, given the strain on military budgets around the world and the limited risk appetite of traditional sources of capital in response to various regulations. As the pace of technological change accelerates, lines between technology companies and defense companies are blurring. For example, tech companies and defense leaders alike view innovations in artificial intelligence, machine learning, autonomy, and computer vision as priorities.

Work with your partners to leverage VCs as “scouts” for promising startups working on dual-use technologies and strategically co-invest to nurture tomorrow’s critical technologies. Create funding streams within your partnership that complement rather than preclude private capital (See “NATO’s Standalone VC Fund Is Making Big Bets on Deep Tech.”) Host regular “investor days” to emphasize the defense priorities that are top-of-mind for partner MoDs.



Conclusion

MoDs recognize partnerships as a key lever to use in closing the defense innovation readiness gap, but they face difficulties along the path to delivery. Innovation efforts take years to manifest substantive results and impact mission readiness.

The five actions outlined in this paper provide practical recommendations to improve innovation partnerships' chances of success, ensure effective multilateral innovations, and enhance countries' collective security posture.

Appendix: Survey Methodology

MSC and BCG developed these recommendations from the results of an in-depth survey and analysis of 59 ministries of defense (MoDs), with participating countries on every continent except Antarctica. We also analyzed the defense innovation activity of the EU and NATO in this context.

Survey respondents included senior ministry leaders; members of innovation units; and representatives of user and operator groups, testing groups, and acquisition communities within the ministries. In order to assess their ministry's readiness to innovate, we asked respondents to fill out a BCG benchmarking instrument, the Innovation-to-Impact Readiness Assessment (i2i). The i2i assessment consists of about 40 questions that illuminate aspects of the 11 dimensions of innovation readiness. In total, these 11 dimensions describe two broad categories of each ministry's approach to defense innovation: elements of the innovation system (how a ministry is organized and governed to support innovation at scale) and innovation practices (how people navigate processes and systems within the ministry in the course of their daily work to achieve innovation outputs). Scoring is based on a 100-point scale that reflects best-practice maturity. A score of 80 or higher indicates that an organization is ready to realize its innovation aspirations. (See Exhibit 2 on page 5.)

Analyzing the survey responses enabled us to gauge the progress of each ministry along the overall path of innovation readiness. We averaged the results for all MoDs to develop our view of the overall readiness of ministries in aggregate and to measure the size of the innovation gap. We then compared the results from the new survey to the results from the previous year to assess the progress of MoDs' innovation readiness over the past year, comparing average scores for each survey response in each year on a five-point scale. We also compared the results to private-sector benchmarks from the current year, to see how far behind (or ahead of) the private sector the MoDs were. These benchmarks—which we gathered this year from 1,023 private-sector respondents representing 19 industries—have been part of BCG's [Most Innovative Companies](#) research for more than 15 years.

We next interviewed numerous public- and private-sector leaders worldwide to validate our findings and to assess the progress that MoDs have made over the past year and the key innovation issues that lie ahead.

Future studies will continue to track MoDs along their path to innovation readiness.

Checklist:

Are Your Partnerships Ready to Innovate?

This report aims to provide MoDs with concrete actions that they can take to make their partnerships more effective and close the defense innovation readiness gap. To that end, we have distilled key tactical steps that MoDs can follow, in alignment with each action presented above.

1 **Build on unique capabilities.** Distribute workshare and value on the basis of partners' differentiated strengths.

- Regular planning cadence addressing existing and potential partnerships
- Specific, objective success criteria to determine your partnership needs
- Integrated roadmap to your long-term partnership goals, including anticipated roadblocks and mitigation strategies
- Detailed business case outlining the key capabilities that you expect to gain from partnership, along with the corresponding contributions that you expect to make

2 **Establish an orchestrator-led governance model.** Designate a single party with primary responsibility, and build a supporting control tower.

- Single accountable orchestrator for the overall partnership with a clear mandate
- Partnership governance control tower
- Transparent organizational chart, clearly outlining funding, reporting, and informal relationships
- Single accountable individual for each project deliverable or requirement
- Quantifiable, value-based key performance indicators (KPIs), leveraging quantitative and qualitative data, to objectively measure progress
- De-averaged metrics cascaded through all levels of the organization, driving key value-based KPIs (defined above)

3 **Cultivate open and effective cooperation.** Establish regular information exchange, IP sharing, and modular open systems to maximize benefits for all partners.

- Clear collaboration strategy to integrate IP sharing, open architecture, and new technologies throughout the partnership
- Single technical agreement for the partnership, outlining specific standards for technology sharing, contributions, and usage
- Regular incorporation of total cost of ownership (TCO) considerations and functional interdependencies as changes are made to the technical agreement

4

Build resiliency into innovation processes. Team with users and technical experts to validate timelines and embed risk-management best practices.

- ❑ Specific list of quick wins to achieve over 6 to 12 months, such as:
 - Standardization of technical architecture principles for partnership members
 - Standing up a governance control tower in the first iteration
 - Definite initial success criteria for partnership
- ❑ Long-term program goals, decomposed into monthly and quarterly increments
- ❑ Comprehensive and regular integration with technology users and subject matter experts
- ❑ Holistic risk management approach propagated throughout the organization, including acceptance of 'learning fast' and ensuring the ability to rapidly pivot, as needed, to address critical innovation areas
- ❑ Conscious risk management plan for the dual risks posed by requirements creep and overspecialization

5

Make industry and civil society organizations a force multiplier.

Leverage the private sector, nontraditional players, academia, and nongovernment agencies to access next-generation technologies and top talent.

- ❑ A list of potential industry, academic, and nontraditional innovation collaborators, segmented by likelihood of partnership and value estimation
- ❑ Regular engagement with and participation in industry events and technology accelerators
- ❑ Integration of dual-use technologies, where possible, in the design plan to de-risk industry participation
- ❑ Portfolio management approach to teaming arrangements, dissolving arrangements that no longer provide value and allocating resources to those that do
- ❑ A specific, tangible approach to teaming with private equity and venture capital firms to leverage their growing role in defense innovation and the global innovation ecosystem
- ❑ A detailed, methodical approach to identifying and attracting talent from all relevant backgrounds, including:
 - Comprehensive, defined value proposition for employees and partners, covering financial as well as nonfinancial rewards (remote vs. onsite, vacation policy, on-the-job training, etc.)
 - Detailed talent strategy incorporating sourcing from industry, academia, the military, nonprofits, and other high-potential industries

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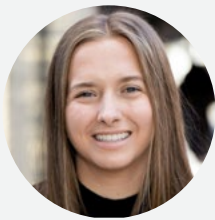
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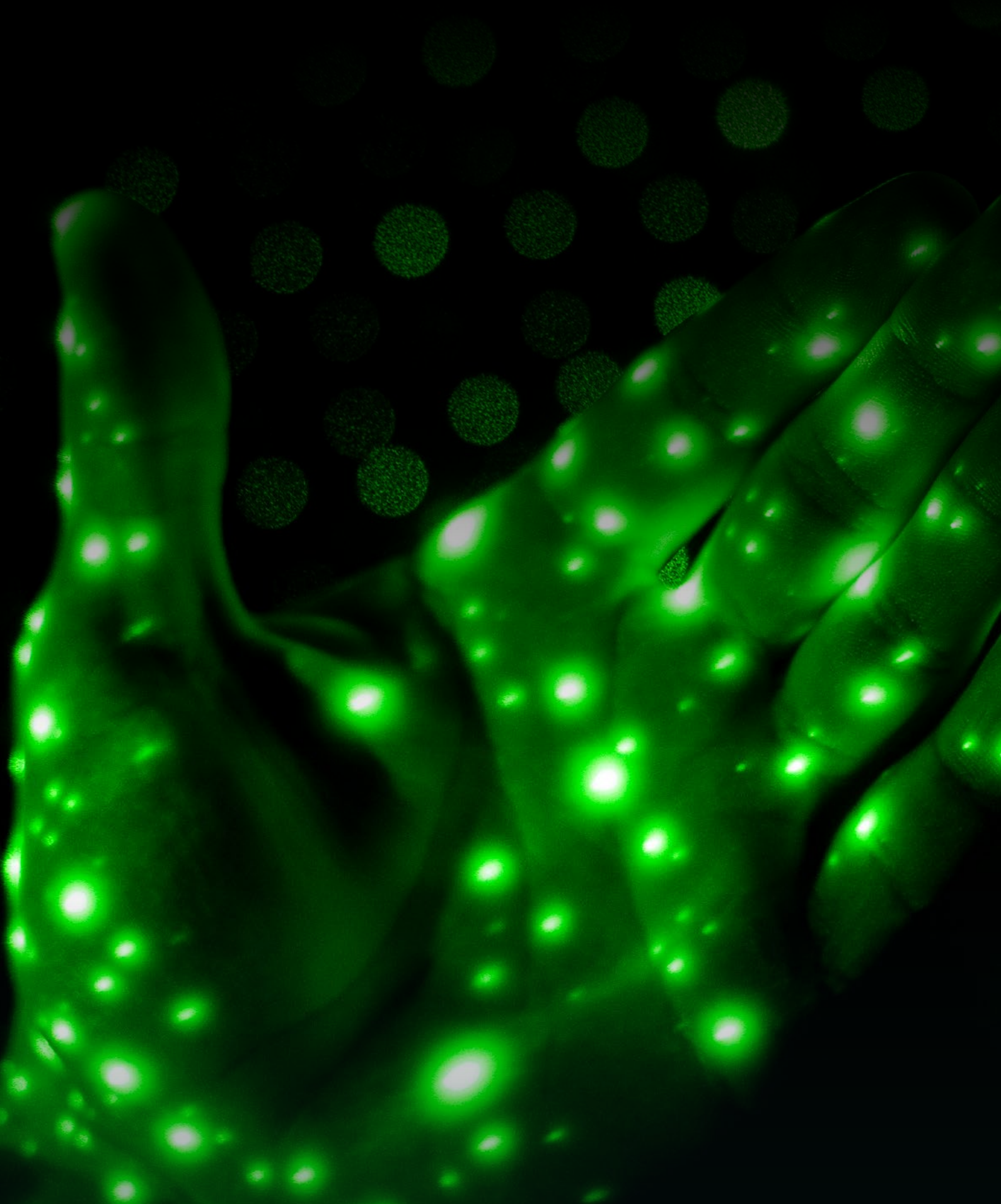
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Acknowledgments

The authors also wish to acknowledge the following individuals for their valuable support: Matt Aaronson, Jad Bitar, Geneviève Bonin, Ethan Boswell, Jon Campos, Hannah Coatsolonia, Fabio Dal Pan, Faisal Faraz, Giulio Galvan, Jeff Garigliano, Marc van Grondelle, Benjamin Grosch, Bailey Hand, Kathy Hauptman, Kjetil Holgeid, Bill Lescher, Lars Littig, Ton Van Loon, Joe Martin, Dan Morris, Bill Noderer, Cameron Scott, Daisuke Sohta, Troy Thomas, Louis Watt, Mark Watters, and Stephen Wilson.

Finally, the authors thank the public- and private-sector leaders who participated in confidential interviews, and everyone who responded to the survey.



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