



Executive
Perspectives

AI-First Companies Win the Future

Aerospace and Defense

April 2026

Introduction

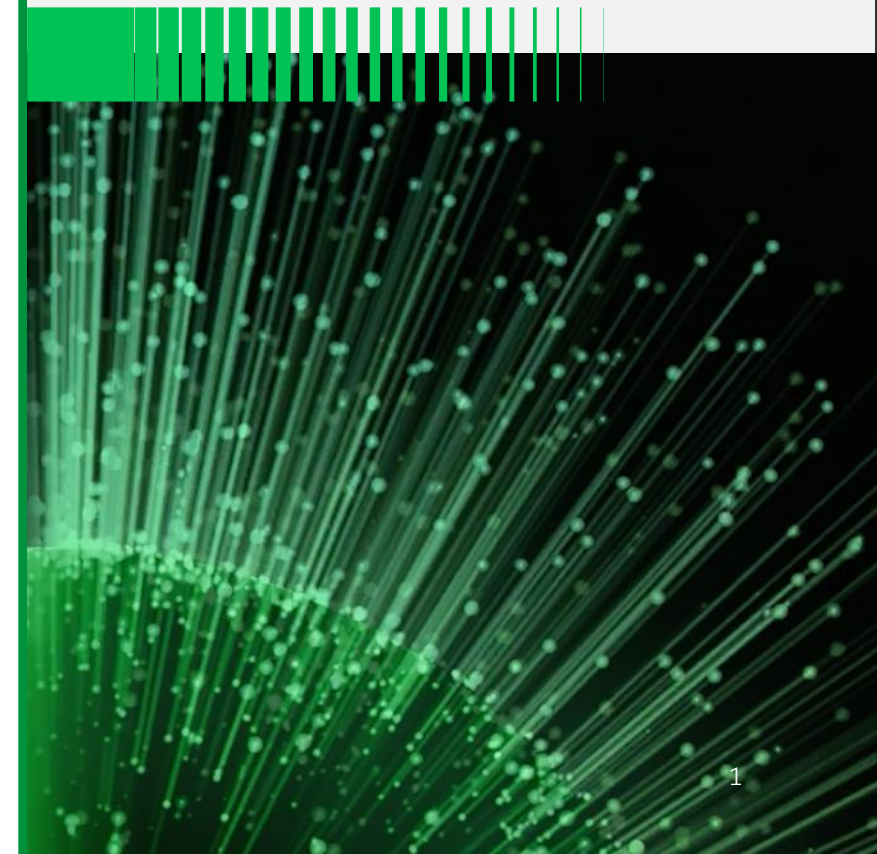
We meet often with CEOs to discuss AI—a topic that is both captivating and rapidly changing. After working with over 2,000 clients for more than two years, we are **sharing our most recent insights in a new series designed to help CEOs navigate AI**. With most sectors going through major shifts, the focus in 2026 is on how to leverage AI to **fully transform organizations** and create **new sources of competitive advantage**.

In this edition, we discuss the future of aerospace and defense (A&D) and how organizations must evolve to capitalize on current and future AI developments. We address key questions on the minds of A&D executives:

- Where should A&D leaders focus AI to relieve growing industry pressures?
- Why are some organizations seeing step-change gains while most struggle to scale beyond pilots?
- What can leaders do now and in the near term to scale impact without disrupting core operations?

This document is a guide for A&D executives to cut through the hype around AI and understand what creates value now and for the future.

In this BCG Executive Perspective, we discuss how aerospace and defense can capture the full value of integrated AI



Executive summary | Unlocking the value of AI in commercial A&D

WHY

now is the right time to act

A&D is at an inflection point - making AI investment imperative now:

- **A&D organizations face compounding structural pressures:** Rising demand, shrinking critical expertise, aging assets, and rapidly increasing technical and operational complexity across programs
- At the same time, **GenAI has developed into a transformative technology** with exponential growth and real impact across a variety of industries and applications
- **Capturing value from AI is uniquely hard in A&D;** regulatory constraints, fragmented data and tools, and unclear prioritization lead many organizations to misalign investment and struggle to move beyond pilots
- A small set of **AI leaders are achieving measurable gains by understanding where AI creates real operational value** and by mobilizing disciplined, business-led plans and talent to translate ambition into sustained returns

WHAT

A&D AI leaders do to conquer industry pressures and capture value

A&D leaders are scaling AI to navigate industry headwinds, offering clear lessons for organizations on their AI journey:

- **Apply AI across full workflows rather than to isolated use cases,** integrating data, decisions, and execution to improve E2E performance within a function
- **Focus AI on core value-creating operations,** rather than low-impact support functions
- **Embed AI into daily work to drive adoption** while codifying institutional knowledge and boosting workforce productivity
- **Reinvent workflows with AI** to respond to step changes in industry demands, deconstructing the end goals into sequenced, executable use cases that scale as maturity grows

HOW

to turn AI ambition into a scalable transformation

To turn their AI ambition into a scalable transformation, A&D leaders must take a deliberate, enterprise-led approach:

- **Adopt a balanced deploy-reshape-invent approach:** Apply AI by using a deliberate mix of proven tools, workflow transformation, and selective invention to compound value over time
- **Lead with a clear, phased roadmap:** Set a clear AI vision and deconstruct it into sequenced, achievable use cases
- **Focus on where AI creates advantage:** Target investment and efforts on high-value opportunities that are tied to competitive advantage and measurable business outcomes
- **Build the right delivery and talent models:** Develop mission-critical capabilities internally, leverage partners for speed and scale, and upskill teams with an A&D-tailored approach

A&D organizations face compounding structural pressures



Aviation fleets are about 15 years away from clearing the backlog ...

... hamstrung by **specialized supply chains, dwindling legacy-parts stockpiles,** and **quality issues in aging aircraft**



Shipyards are set to meet less than half of US demand ...

... as a result of **constant design churn, multiyear development cycles,** and **acute shortages in critical-path trades**



Aftermarket players face an escalating workload ...

... as post-Covid air travel outpaces capacity and a **shrinking technical workforce struggles to maintain aging fleets**



Companies struggle to meet high demand for low-cost affordable mass...

... **overloading legacy processes and production lines** built for bespoke output, not high volume



Manufacturers face issues with interoperable systems ...

... as **rising system complexity stalls production,** the result of certification, coordination, and configuration control requirements

At the same time, GenAI has developed into a transformative technology with real traction and exponential growth

AI has evolved into a technical revolution ...

AI

Computer science field that builds intelligent machines that can replicate, complement, or exceed human intelligence

Example: maintenance schedule optimization

1956

Machine learning

AI subset that enables machines to learn from existing data to analytically derive predictions or recommendations

Example: component failure analyses and predictions

1997

GenAI

Computed ability to create realistic written, visual, and auditory content given prompts or data

Examples: technical documentation updates

2021

Agentic AI

Autonomous agents that work across processes and systems with minimal human input

Example: E2E onboarding management

2023

... with tremendous potential for impact

- **GenAI matures at unprecedented speeds**, with use cases, model applications, and abilities skyrocketing
- **GenAI adoption has grown exponentially faster** than has any other modern at-scale enterprise technology
- **Agentic AI is the next step change**, reshaping platform design, compute orchestration, and how work is executed across tools and teams

What this could look like in the near future

Agents orchestrate maintenance planning, compliance, supply, and labor, continuously optimizing for cost, uptime, and safety

Humans set strategy, establish constraints, and perform physical work, while agents transform the E2E workflows from reactive to predictive

Despite the incredible potential of GenAI in A&D, many organizations struggle to capture value from AI investments

Reality check

Capturing value from AI is uniquely hard in A&D

- ! The breadth of AI use cases and inherent risk aversion makes it **difficult to know where to begin and how to prioritize**
- ! **Data privacy and decision sovereignty** are among the top CEO concerns, slowing enterprise-wide scale and adoption
- ! **Fragmented data, tools, platforms, and digital talent** inhibit AI efficacy
- ! **Cost-plus incentives and capex-heavy programs are misaligned** with AI's ongoing, usage-driven cost structure

As a result, A&D players tend to misallocate capital and efforts

- **Low-value work:** Up to 40% of AI investment targets support functions (e.g., HR and digital marketing) versus key areas (e.g., engineering or manufacturing)
- **Foundational infrastructure: About 50% of AI investment targets nondifferentiating data layers** and excessive spending on locked-in, vendor-provided AI platforms
- **An all-in-house posture:** A&D AI teams are **three times the size** of those in comparable industries and **cost over \$300 million, yet more than 40% are still not digitally literate** after upskilling

...and see limited returns for their efforts

66%

A&D AI initiatives that remain **stuck as proofs of concept**

67%

A&D firms that report **difficulty aligning AI efforts with the firm-wide strategy**

<10%

CEOs who feel very confident that **their AI strategy will net clear ROI**

A&D organizations that have extracted value from AI understand that successful efforts are driven by discipline, along with ambition



Digitally mature A&D firms know that AI is not a universal solution

Note: pp = percentage point.
Source: BCG analysis.

AI-enabled firms in A&D know where to deploy AI to get real value ...

- Not as a broad cure-all but deliberately, **as a tool tightly aligned to real operational drivers**
- Not in isolated quick-win use cases but **integrated across full workflows**

... and what it takes to realize returns

- **A bias for action**, grounded in a **business-led plan that advances in deliberate stages**, not a one-time overhaul
- **Strategic build-vs-buy decisions**, tactically using partners and deployable tech while fostering internal skills in areas where AI delivers competitive advantage

These players see measurable returns from AI efforts

Examples

+20pp

Bump in demand forecast accuracy

10x

Faster turnaround time for engineering design changes

30%

Reduction in unplanned asset downtime

A&D leaders are scaling AI to target specific industry headwinds, offering lessons for organizations that are beginning to leverage AI



Deploy AI across the workflow, not in isolated use cases

Secure E2E supply chain visibility with AI and build targeted interventions

Offset declining fleet reliability by addressing legacy-part scarcity



Target operational drivers to gain clear value from AI

Focus AI efforts on core value-creating operations (e.g., R&D versus HR)

Enable the accelerated design cycles needed to meet contractual timelines



Equip teams to adopt and excel with AI advances

Deploy AI tools to boost productivity and **offset the attrition of critical talent**

Incorporate AI in daily workflows work to **bolster AI adoption and fluency**



Fully reimagine workflows with AI to realize a step change in progress and development

Use AI to **reinvent cross-functional workflows, enabling on-time production** as rising technical complexity overwhelms current operating models

Overhaul the workflow in deliberate phases, adding use cases as enterprise maturity grows



Challenges surface within distinct players, but solutions apply across organizations

Integrate AI across the workflow | A naval equipment manufacturer secured delivery reliability using AI-driven monitoring and intervention support

Value opportunity

Nearly 50% of the materials arrived late, as buyers did not have E2E visibility across sourcing decisions and delivery signals, significantly delaying production timelines

Action and application of AI

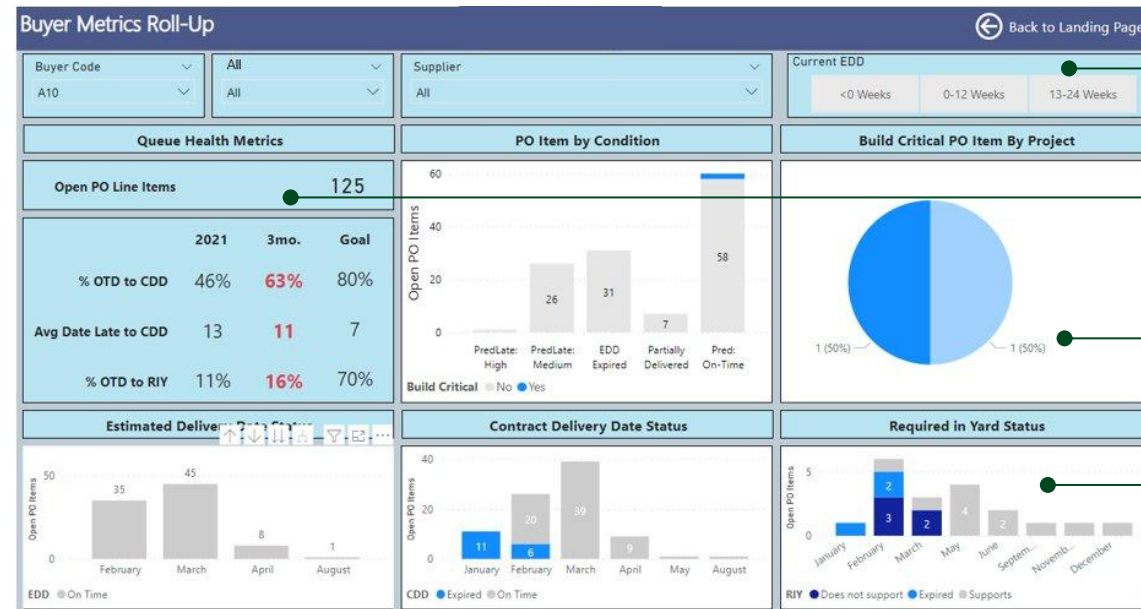
Developed an AI-enabled supplier risk management toolkit that integrated data across the procurement workflow (e.g., historical supplier performance, purchase order status signals, and schedule dependencies) to forecast delivery risk and prioritize and inform mitigations

Impact

AI identified high-risk suppliers and materials, giving the visibility needed to act **early and prevent disruptions**

Drove rapid improvement in on-time deliveries across materials

45% Improvement in on-time deliveries



Consolidates buyer workload and risk

Identifies at-risk purchase orders

Prioritizes critical materials

Monitors delivery trends over time

Key takeaway

Firms beginning their AI journey focus on isolated use cases; AI leaders work to apply AI across the full function

Find value in operational drivers | A leader in shipbuilding revolutionized engineering design to shorten delivery time

Value opportunity

A global ship manufacturer faced increasing technical complexity and design changes, creating pressure to accelerate engineering cycles without sacrificing quality or rework risk

Action and application of AI

An autonomous agent provided comprehensive support for engineering in reasoning, planning, and executing design tasks across a full engineering tool suite

Function



Task planning

Description

Defined steps to action, based on company policies and user input



CAD interaction and manipulation

Converted CAD files into a manageable database format, enabling data extraction and modifications that directly translate to drawings



Design task execution

Executed a variety of design tasks with precision, ensuring compliance with project requirements



Simulation-based optimization

Integrated complex models and tools to find the best possible solution by **simulating various scenarios and analyzing outcomes**

Impact

Determined the optimal specifications, number, and coordination of scuppers, **eliminating functional design errors**

Results were directly recorded into CAD drawings for **future reference and knowledge sharing**

40%

Savings of engineering resources

75%

Reduced lead time

Key takeaway

AI creates the most value when it is deliberately focused on the highest-impact operational drivers

Equip teams to adopt and excel | A global airframe MRO used AI and GenAI to improve wrench time, codify knowledge, and drive consistency

Value opportunity

An airframe MRO's heavy reliance on tribal knowledge, combined with extensive manual documentation, drove workload delays, inconsistent defect recognition and repair, and a growing dependence on specialized expertise that was steadily exiting the workforce

Action and application of AI

MRO deployed AI tools across maintenance execution and training, using **immersive simulations and real-world procedures** to build lasting competency faster

XR- and AR-enabled assistants provide hands-free control and intelligence assistance:

- **Live video and contextual 3D overlays** with annotated, unit-specific information
- **Automated fault detection and diagnosis**
- **AI-enabled semantic search** of manuals and **real-time remote expert support**
- **Automated workflow management** and supporting task guides

Maintenance copilot delivers GenAI-powered support from issue diagnosis through repair:

- **Incident investigation:** Retrieve manuals, historical data, and other insights with conversational interface
- **Failure diagnoses:** Use augmented reality to detect asset state and diagnose issue
- **Restoration support:** Conduct repair with real-time GenAI technical guide

Impact

Established **quick and consistent defect identification** across expertise levels

Accelerated task execution for routine and nonroutine maintenance

- ~**20%** Gains in inspection efficiency with XR applications
- ~**40%** Reduction in technician time spent on search and administrative tasks
- 5–10%** Projected increase in operational aircraft with copilot

Key takeaway

Integrate AI into daily workflows to jump-start effectiveness and drive sustained adoption of AI

Reinvent the process with AI | A commercial shipbuilder reimaged its E2E operating model to manage rising complexity and delivery pressure

Value opportunity

A global shipbuilder faced progressive delays—**80% of vessels were behind plan—due to legacy processes and a fragmented operating model that could not deliver** on the increasing demand for highly integrated systems

Action and application of AI

Designed distinct functional agents (“control towers”) and a digital backbone to integrate work and requirements across functions



Design

AI reconciles requirements and drawings to flag conflicts, predict rework risk, and prioritize fixes



Supply chain

Using supplier and lead-time data, **AI forecasts availability and supply risks** to guide sourcing and expediting decisions



Production

AI dynamically sequences work on the basis of material availability, design readiness, and labor constraints to maximize throughput



Finance

By linking actuals and forecasts, **AI surfaces cost and schedule risks early** to inform tradeoff decisions



External collaboration

Through **AI-enabled portals, the requirements are packaged** for suppliers and contractors and the responses and **potential execution risks are flagged**

AI capabilities were introduced in stages, evolving from workflow-specific automation to full-scale agentic coordination across the enterprise

Projected impact

“Digital thread” to **automate manual work** with high accuracy and proactive risk-flagging

E2E integration across the production ecosystem to **drive compounding performance gains**

~2x velocity Across engineering, supply, and production

Key takeaway

For step changes in demands, reinvent cross-domain work with AI and sequence use cases to support growing maturity

A&D leaders turn AI ambitions into tangible value by taking a deliberate, enterprise-led approach

Understanding where there is value with AI...



Targeting AI toward the enterprise's key operational or financial drivers



Integrating AI across three strategic plays: deploy, reshape, and invent



Investing in differentiating, operational tech, rather than just foundational layers

...and what it takes to realize it



A clear AI vision, deconstructed into sequenced use cases



Finding partners for scale, speed, and support functions

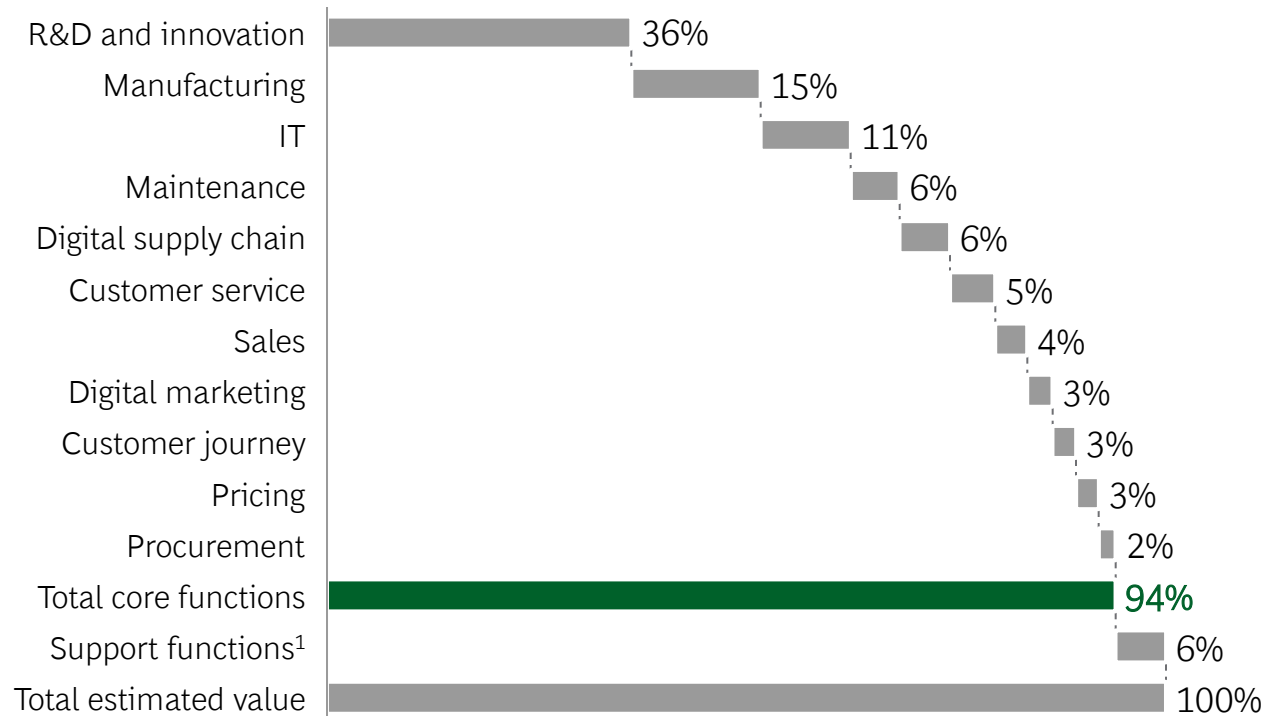


Upskilling teams with purpose-built programs for mission-critical work

Where value lives | Focus AI efforts on areas that measurably improve core operations or mission outcomes

AI leaders understand the value at play ...

Estimated distribution of value potential from AI across functions within A&D



... and focus intensely on those key domains

Leaders do less and reap more

AI leaders focus on only critical opportunities, exploring about 40% fewer initiatives per function but garnering roughly two times greater adoption and ROI

Leaders explore both cost and revenue opportunities

Leading A&D firms use AI and GenAI to both decrease cost bases (e.g., maintenance costs) and unlock incremental revenue through new business models

Leaders build enterprise-wide value via staged AI efforts

Leaders anchor to broader enterprise objectives while sequencing AI efforts; each effort builds capabilities and buy-in, creating momentum toward cross-domain impact

When specific domains are prioritized, leverage test-learn-scale approach to use cases to sequence and drive long-term value

1. Support functions include HR, legal, and finance functions.
Source: BCG Build for the Future 2025 Global Study (n = 1,250, n = 30 for A&D).

Where value lives | Leaders integrate AI across three strategic plays to capture the most value



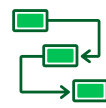
DEPLOY

Already becoming pervasive in commercial A&D

Embed ready AI tools into existing processes, delivering productivity and reliability gains without certification or system modifications

Already operational:

- GenAI-enabled intelligent search across technical manuals and drawings
- AI contract and compliance reviews
- Predictive load factor models in RM
- AI-driven multi-echelon inventory optimization



RESHAPE

Beginning to be developed by commercial A&D

Change existing processes within domains with integrated new use cases for gains in speed, quality, and cost

Areas starting to reshape:

- Generative design for part manufacturing
- Non-quality eradication in industrial operations
- Agentic MRO workflow automation
- Real-time data for dynamic routing
- E2E digital twins spanning engineering, operations, and the supply chain

Less mature companies focus mainly on **deploying** solutions, while more mature companies emphasize **reshaping and inventing**



INVENT

Untapped and not yet proven in commercial A&D

Create new multidomain use cases and operating models by integrating cross-functional data and decisions to unlock new value

Net-new developments being invented:

- Enterprise-wide planning engines balancing cost, schedule, risk, and availability across programs
- Integrated digital ecosystems spanning key stakeholders for improved collaboration and data sharing

E2E transformation across all three plays



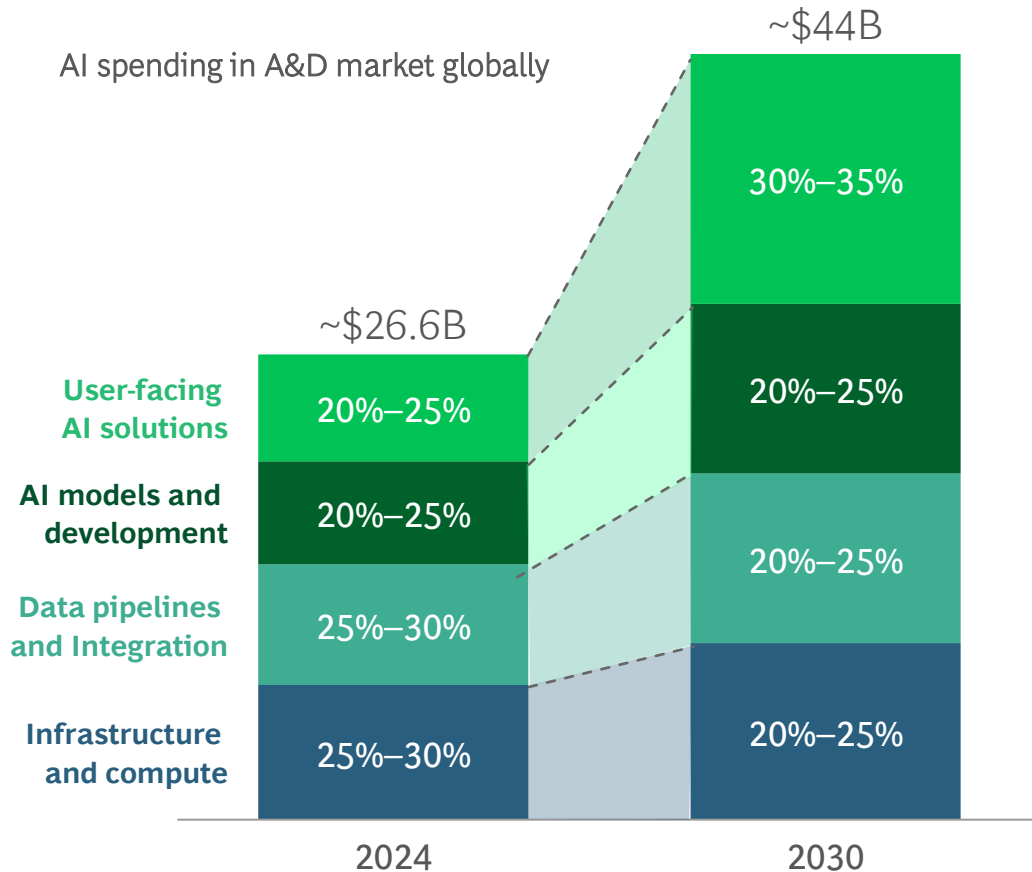
Combine multiple AI initiatives for an E2E functional transformation



Scale lessons from functional transformation to enterprise-wide value and evolution

Where value lives | A&D leaders invest in user-facing AI solutions and domain-tuned models, where differentiation lives

A&D AI spending has historically targeted data and infrastructure layers...



Note: AI Infrastructure may not capture all shared infrastructure costs (e.g., electricity and bundled costs with non-AI IT).
Source: Global Industry Analysts, 2025; industry expert interviews and survey; BCG analysis.

...but leaders know to invest where AI delivers the greatest competitive advantage

| | CAGR | Competitive advantage potential | |
|---------------------------------------|------|---------------------------------|---|
| User-facing AI solutions | +15% | ✓ High | AI is embedded in core business and end-customer products for measurable impact |
| AI models and development | +9% | ✓ Medium to high | Domain-tuned models drive advantage <i>if</i> they are built on proprietary or operational data |
| Data pipelines and integration | +6% | — Low | Critical enabler, but not a source of competitive differentiation |
| Infrastructure and compute | +5% | ✗ Low to none | Rarely differentiates; focuses on performance via a secure cloud |

What it takes | Build internally for mission-critical functions, and buy or partner where speed and scale are primary needs

In A&D, COTS solutions are suitable for support functions, but custom solutions deliver two times the value for core business areas



Tightly integrating with existing systems accelerates deployment

Custom solutions integrate directly with core systems (e.g., PLM, MES, ERP, and MRO), avoiding delays in certified environments



Designing for secure environments shortens the time to value

Building with A&D security requirements (e.g., US ITAR or EAR, US DoW IL5 and 6, and ATOs) from day one reduces rework and accelerates approval



Focusing on mission outcomes increases ROI

Custom solutions aligned to availability, reliability, and execution predictability deliver measurable gains in core A&D programs

Build-buy-partner decisions, therefore, vary based on context

Build when

- The need is mission-critical
- It creates competitive advantage
- Sensitive IP, export control, or certification constraints apply

Buy when

- Supporting enabling functions
- The solution delivers value without modifying certified processes
- Limited integration is required with the existing tech stack

Partner when

- Speed or scale are required but not proprietary ownership
- Specialized expertise or hard-to-access talent is needed

What it takes | Upskilling teams is a strategic imperative and must be executed with a mission-embedded approach built for A&D realities

Engrained dynamics pose a unique challenge for digital upskilling in A&D...

Budget constraints and a focus on the short term

- Investments in capital projects are prioritized over investments in people
- Upskilling ROI is long term, so it is underprioritized

Cultural resistance

- Risk-averse industries often undervalue innovation
- Digital skills are seen as disconnected from operations

Unclear ownership and workforce strategy

- Lack of clarity on necessary skill sets for the future
- Training responsibility is spread across enterprise silos

Outdated training infrastructure

- Attachment to legacy systems and rigid curricula
- Unable to build flexible, tech-enabled training at scale

...demanding workforce development tactics that are not like those in other industries

Shift from scaling head count to developing the right roles

- Define capability needs by role, not function
- Note where AI will influence decisions but skills still lag

Define which roles require AI expertise versus literacy

- Concentrate deep AI expertise in central model, data, and governance roles, while equipping the broader workforce with AI decision literacy

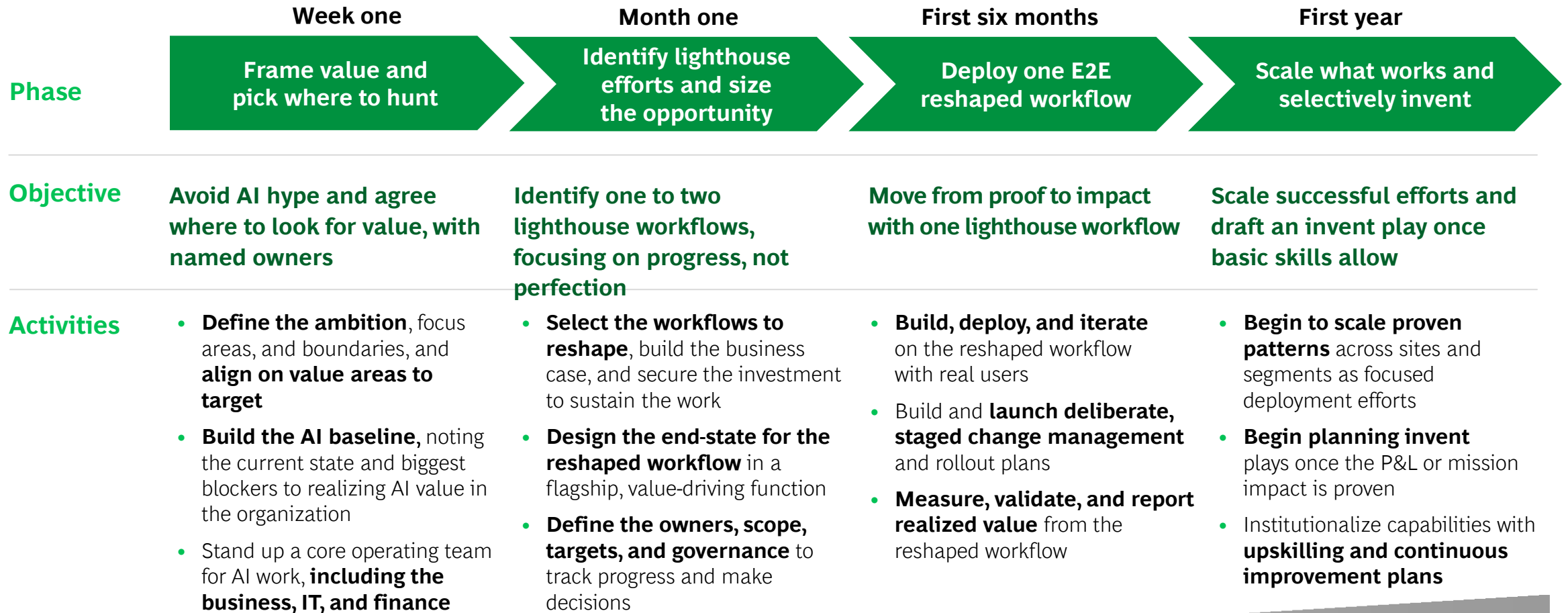
Upskill through mission workflows instead of classrooms

- Train teams inside real workflows using drawings, quality events, supplier data, and maintenance cases to rewire people's everyday actions to include AI tools

Link skills to measurable outcomes and accountability

- Measure upskilling success by essential outcomes (e.g., cycle time reduction and availability improvements), not the number of certifications completed

Getting started | Becoming an AI-first A&D organization can start today, scaling in depth as the enterprise matures



Underpin the journey with increasing investments in enterprise foundations across people, tech, and data

Self-check | Starting the AI journey with fundamental questions



WHERE does AI sit on your strategic agenda right now?



WHERE do you see the most potential for AI to make a difference in your business?



HOW do you define the value from AI for your organization?



WHEN it comes to AI, where do you think the organization is doing well and where is there room to grow?



WHAT are the non-negotiables as you think about AI and integrating it into your organization's work?



WHEN you decide something is strategic, what determines whether it scales effectively?

More information | Read more about BCG's insights in A&D



Article

[Three Truths About AI in Aerospace and Defense](#)



Article

[How Defense Organizations Can Build Digital and AI Skills at Scale](#)



Podcast

[Joint BCG and MIT Sloan Management Review interviews with AI winners across industries](#)



Article

[Six Strategies to Improve Airline Maintenance](#)



Article

[Ramping Up Aerospace and Defense Programs for Success](#)



Tool Suite

[Field Service AI by BCG X](#)

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