INNOVATION RESEARCH INTERCHANGE

Accelerating Value Creation

A division of the National Association of Manufacturers

Future R&D Capabilities

Phase I Study: Top Skills Needed for Successful R&D Teams

NATIONAL ASSOCIATION OF Manufacturers

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Executive Summary

Artificial intelligence is transforming research and development, creating opportunities for manufacturers to accelerate innovation at a scale and speed previously unimaginable. Yet as the focus moves past adoption and experimentation, leaders are confronting a more fundamental challenge: how to ensure AI delivers a competitive advantage.

In this new era of R&D, technology alone will not determine who leads. Competitive advantage will belong to the organizations that develop and cultivate the talent, technical skills, and strategic capabilities needed to effectively apply AI across the innovation lifecycle.

Scientists working alongside AI systems will spend less time processing information and more time asking questions, solving problems, and evaluating and applying AI-enabled insights. This evolution will require new levels of AI fluency, technical expertise, critical and systems thinking and business understanding.

The time is now for organizations to invest in new approaches for developing scientific talent, preserving institutional knowledge, strengthening collaborative processes, and preparing leaders to guide AI-enabled research teams. In the age of AI, the organizations best positioned to compete will be those that combine AI capabilities with the human expertise, ingenuity, creativity, and business acumen that drives innovation.

How to Use This Report

This report is a practical tool for thinking about how your R&D organization will need to evolve over the next five to seven years—and what it will take to get there. It aims to help leaders identify which capabilities to hire for, which to develop within existing teams and where current talent strategies may need to change.

This report offers sample teams and AI agent scenarios that provide a concrete vision for how human expertise and AI-enabled contributors may work together in future R&D environments, with AI agents supporting insight generation, knowledge reuse, decision support and discovery while people retain judgment, creativity and accountability.

It is designed to help organizations imagine where their R&D function may be heading, assess whether they are building the right mix of capabilities and begin shaping the teams, learning pathways, operating models and leadership practices needed to make that future successful.

Acknowledgements

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The IRI also extends special thanks to the working group members who helped shape the direction of this report, interpret emerging themes and refine the skills and capabilities identified in the research:

- TOPPAN Packaging Americas Chief Technology Officer Laura Buen Abad
- Former DuPont Chief Technology and Sustainability Officer Alexa Dembek
- The Lubrizol Corporation Senior Vice President and Chief Technology Officer Julie Edgar
- GE Aerospace Executive Quality Leader, GE Aviation Martha Gardner
- James Hardie Chief Technology Officer Joe Liu
- Arkema Vice President of R&D, North America Arthur Martin

Their guidance ensured that this report remained practical, forward-looking and grounded in the lived experience of R&D and innovation leaders.

About the Innovation Research Interchange

The Innovation Research Interchange—the innovation division of the National Association of Manufacturers—is a community of innovation and R&D leaders from manufacturers, federally funded laboratories and research-driven institutions. The IRI provides a neutral, noncompetitive forum where members exchange best and next practices, build organizational and team capabilities, and shape the future of how innovation gets done.

For more than 85 years, the IRI has been the place where the people who lead corporate innovation come to learn from one another. Through peer learning, collaborative research and shared problem-solving, members share what is working today, explore what is coming next and advance the practice of innovation management together.

Some of the field's most influential and widely adopted frameworks, including open innovation, the front end of innovation and stage-gate, emerged from the work and collaboration of IRI members. This tradition of practitioner-led insight remains at the heart of the IRI, enabling innovation leaders to solve shared challenges, develop more effective approaches to innovation and R&D, and strengthen the performance of their organizations.

Introduction

Manufacturing R&D has reached a critical inflection point. AI, geopolitical uncertainty, supply chain volatility, demographic shifts and an accelerating pace of change are fundamentally reshaping how innovation is done. The key challenge facing R&D leaders is building the talent, capabilities, knowledge systems, leadership practices and operating models required to innovate in an environment where expertise is evolving as quickly as the technologies themselves.

Innovation leaders are asking:

- What are the human capabilities and organizational models required to succeed in an uncertain, AI-enabled future?
- How can organizations develop those capabilities and design themselves for long-term success?

While AI remains one of the most prominent topics, the focus has expanded from technology adoption to broader questions around workforce readiness, scientific judgment, creativity, knowledge transfer, organizational learning and change fatigue. There is an increased recognition that these issues are interconnected. Questions about AI adoption quickly evolve into questions about workforce capability. Discussions about knowledge management become conversations about expertise development and organizational learning. Conversations about innovation strategy increasingly focus on leadership, collaboration and the conditions required to sustain scientific excellence.

This shift points to a broader conclusion: the greatest challenge is not adopting AI—it is building organizations capable of thriving with it. AI will not replace scientists, but their roles will evolve fundamentally as they increasingly operate in hybrid human–AI environments. Future R&D professionals will need to combine deep scientific expertise with an evolving array of business and technical skills.

This report examines the forces reshaping R&D, explores how those forces are redefining the roles supporting innovation and identifies the organizational capabilities leaders will need to sustain innovation performance in an increasingly complex and AI-enabled world. It also provides plausible, yet provocative scenarios of what future R&D teams may look like. These scenarios are intended to spur discussion and bring the findings of this work to life.

Methodology

This report represents the first phase of the IRI's effort to help prepare manufacturing R&D teams for the challenges and opportunities of the future. This phase aims to define the capabilities R&D organizations will need over the next five to seven years. Developed through an industry-informed process, the analysis synthesizes recurring signals into a practical framework for understanding the future of R&D. The intended audience is senior R&D leadership within manufacturing organizations.

This report is based on multiple IRI sources:

- The Edge of What's Next, the IRI's quarterly trends analyzer, examines the strategic environment in which innovation and R&D take place. Each quarter, the IRI's Foresights Advisory Board evaluates key trends and assesses their potential impact on innovation. Data used in this report covers the period from January 2025 to July 2026.
- The Innovators Summit, the IRI's flagship three-day event, features facilitated discussions among R&D leaders and practitioners. Data used in this report covers coded themes and discussion frequencies from the 2025 and 2026 events, which engaged nearly 190 participants from 83 companies and 185 participants from 92 companies, respectively.
- The R&D Trends Forecast, the IRI's annual survey and report, has tracked R&D resourcing and priorities for more than 30 years. Data used in this report includes the survey findings and analysis from 2024 and 2025.

Together, these inputs provided both quantitative and qualitative evidence of how the priorities of manufacturing R&D are evolving. Quantitative data reflect how often relevant themes are mentioned and discussed, while qualitative insights helped interpret the concerns, opportunities and organizational implications behind those signals. By combining trend analysis with direct perspectives from innovation leaders, the report is rooted in the lived experience of R&D leaders while also reflecting broader patterns across the innovation community.

A working group of CTOs, senior R&D leaders and advisors from medium and large manufacturers guided the work through in-person and virtual meetings as well as written feedback.

Over the course of the project, the group helped shape the scope, define the attributes of a future-ready R&D organization and translate those attributes into the skills and capabilities R&D teams will need to succeed in the years ahead.

In developing the findings, the IRI considered the needs of a broad range of roles across the R&D and innovation enterprise, from senior R&D and product development leaders to managers, scientists, portfolio owners and strategic innovation leads. At the end of the report, AI-generated scenarios of future R&D teams are included. These illustrative future team models were reviewed and refined to ensure they reflected practical organizational realities, member experience and the different demands of incremental, adjacent and transformational innovation.

R&D's Capability Imperative

In 2025, R&D leaders were navigating an environment defined by disruption and uncertainty. Their concerns revolved around the accelerating adoption of AI, geopolitical instability, supply chain disruption, tariffs, sustainability pressures, workforce shortages, talent retention and the challenge of maintaining long-term innovation investments in a volatile environment. The primary concern centered on how R&D organizations could continue to deliver innovation while responding to rapidly changing external conditions.

By 2026, the conversation had expanded. While AI remained one of the most prominent themes, the focus shifted beyond technology adoption toward the organizational capabilities required to succeed alongside it. Leaders were focused increasingly on workforce readiness, the changing role of the scientist, human judgment and creativity, knowledge loss and expertise continuity, change fatigue, organizational barriers and the skills needed to operate effectively in hybrid human–AI environments. The question was no longer simply whether organizations could implement AI, but whether they had the talent, leadership, knowledge systems, and operating models needed to transform how R&D work gets done.

The focus shifted beyond technology adoption toward the organizational capabilities required to succeed alongside it.

The table below demonstrates how key areas of concern evolved from 2025 to 2026 at facilitated sessions at the IRI's Innovators Summit, highlighting a shift from managing external disruption toward building the internal capabilities required for future innovation. While AI remained a dominant topic across Innovators Summit discussions, the nature of the conversation changed significantly—from questions about adoption and productivity to questions about how AI will reshape scientific work and the capabilities required for future R&D organizations.

Table 1. R&D Focus Areas Are Shifting from External Disruption to Internal Capability Readiness

Focus Area	Percentage Change from 2025 to 2026
Human Role, Judgment & Creativity	+140%
Knowledge Loss & Expertise Continuity	+50%
Change Fatigue	+50%
AI, Gen AI & Digital Transformation	+35%
Workforce, Talent & Future Scientist Skills	+25%
Organizational Execution & Adoption Barriers	+17%

The evolution of AI-related concerns illustrates this broader shift. For example, the sharp increase in mentions of Human Role/Judgment/Creativity illustrates the increasing pressure R&D organizations are facing to integrate the capabilities of AI with the human expertise required to evaluate, contextualize and execute. The future value of the R&D practitioner will not come from performing tasks that AI can increasingly accelerate, but from applying scientific judgment, creativity, domain expertise and critical thinking to guide innovation decisions.

As companies move beyond experimentation and begin integrating AI into R&D workflows, leaders are increasingly focused on how to preserve expertise, strengthen decision-making and enable effective human–AI collaboration. Table 2 illustrates this changing conversation.

"AI delivers its greatest value when paired with human expertise and judgment, turning insight into faster, smarter innovation."

— Joe Liu, Chief Technology Officer, James Hardie

Table 2. Sampling of Questions Posed by R&D Leaders at the Innovators Summit

AI Discussion Point	2025 Focus	2026 Focus
AI Adoption	How can we begin using AI in R&D?	How do we redesign R&D workflows around AI?
Productivity	How can AI improve efficiency?	How does AI change how scientific work gets done?
Workforce Impact	Will AI replace or reduce roles?	What skills will scientists need to succeed alongside AI?
Expertise and Knowledge	How can AI provide access to information?	How do we preserve judgment, context and institutional expertise?
Governance and Trust	What guardrails are needed?	How do we build responsible AI-enabled decision making?
Skills Development	How do we increase awareness of AI's capabilities and encourage experimentation?	How can we increase AI fluency alongside business acumen, communication, relationship-building and creativity?

Future R&D organizations will need to combine deep scientific expertise with AI fluency, business structures and the uniquely human capabilities that drive innovation. These changes create a new set of organizational challenges and risks, which raise important questions about talent development, knowledge continuity, operating models and leadership readiness.

The R&D Organization of the Future

To fully understand the scale of the capability challenge facing manufacturing R&D, the first step is to determine what the R&D organization will need to look like in this technologically enabled, globally interconnected, yet uncertain world.

In her work to ensure that TOPPAN Packaging Americas' R&D function is future-ready, Chief Technology Officer Laura Buen Abad identified the future R&D function of a global organization as AI enabled, globally distributed, platform driven and ecosystem integrated. The organization will operate as a dynamic network rather than fixed structure while combining internal expertise with external partnerships to accelerate learning and value creation. Speed, adaptability and the ability to orchestrate across boundaries will define competitive advantage. Table 3 breaks down the full list of attributes.

"The future R&D function of a global organization will be AI-enabled, globally distributed, platform driven, and ecosystem integrated."

— Laura Buen Abad, Chief Technology Officer, TOPPAN Packaging Americas

Table 3. Attributes of a Global Manufacturing R&D Organization (2031–2033)

Attribute	Description	
Globally Distributed R&D Structure	**Dynamic network:** R&D is carried out in a focused set of locations, chosen deliberately for their access to critical talent, specialized expertise and market insight.	**Centers of excellence and project-based teams:** Core teams build and maintain expertise, while project teams form as needed to tackle specific priorities.
Collaborative Culture and Cross-Functional Integration	**Cross-functionality:** As organizations adopt new tools and face emerging challenges, different functions will need to collaborate in novel ways—reducing silos and mapping resources strategically.	**Building trust, influence and a culture of openness:** Leaders are expected to create opportunities for connection to promote idea and knowledge sharing while also guiding multiyear thinking and long-term roadmapping.
Technology-Enabled R&D	**Ubiquitous technology:** Advanced tools, such as AI and quantum computing, are embedded across the R&D lifecycle, with AI and humans working as one team—accelerating complex problem-solving and integrating market and customer insights.	**Advanced discovery:** Advanced tools accelerate the discovery of new materials and other industry-specific breakthroughs, which are integrated quickly into roadmaps.
Ecosystem Partnerships and Open Innovation	**Aligning the partner network:** External versus internal innovation is balanced based on strategic goals, with emphasis on key customer and supplier partnerships that can be activated quickly to capture Voice of Customer, assess new opportunities and accelerate development.	**Managing IP, data and trust:** As collaboration increases, so does the need for clear approaches to intellectual property, data sharing and governance, ensuring that openness does not come at the expense of competitive advantage.
Agility, Speed and Impact	**Increased pace of innovation:** R&D organizations are expected to move faster, adapt continuously and respond to shifting priorities and external pressures.	**Dynamic resource allocation:** Investment and talent shift quickly toward the most promising opportunities, based on real-time decision-making with the ability to scale up or down as needed.
Integration of Business Strategy and Insights	**Clear link to business value:** R&D is aligned tightly with business strategy and guided by ongoing input from customers, markets and external trends. Investment decisions and performance metrics are coordinated across all three horizons to deliver the business strategy effectively.	**Strategy through insight:** R&D translates signals from technology, customers and markets into long-range insight that shapes enterprise direction and investment priorities.
Knowledge Integration and Continuous Learning	**Connected knowledge systems:** Knowledge is treated as a core asset that is captured and then integrated into workflows to accelerate innovation.	**Culture of learning and experimentation:** Teams are encouraged to test ideas, learn quickly and share results openly with a willingness to take informed risks while learning from failure.
Operating in a More Complex World	**Resilience and adaptability:** R&D organizations must navigate increasing external complexity, maintaining continuity and momentum in innovation and growth by rapidly adapting to disruptions.	**Sustainability and climate impact:** R&D plays a central role in addressing sustainability challenges, including the impacts of climate change and energy consumption, through new technologies, materials and processes.

The Skills and Capabilities Needed on the R&D Team of the Future

Having identified the organizational attributes required for future success, the next step is to examine the human capabilities needed to bring those attributes to life. Beyond deep scientific expertise, what skills and capabilities will R&D teams need to thrive? Future-ready R&D organizations will need to intentionally build teams whose combined strengths span technical expertise, human judgment, digital fluency, business understanding and collaborative execution.

In a working session at the 2026 Innovators Summit attended by over 40 R&D professionals from across industry, participants examined the list of attributes of the R&D organization of the future (Table 3) and determined the skills and capabilities most critical to enabling them. Their discussions produced a consolidated list of skills and capabilities, spanning all attributes and ranked by the number of times they were cited (Table 4).

Table 4. Top Skills and Capabilities Needed in Future R&D Organizations

Skills/Capabilities	Ranking
Communication and Relationship Building	1
Business Acumen and Strategic Insight	2
Systems Thinking and Integration	3
Cross-Functional Collaboration and Co-Creation	=4
AI and Digital Fluency	=4
Continuous Learning and Curiosity	=4
Resilience and Change Navigation	7
Adaptability and Agile Execution	=8
Influence Without Authority	=8
Knowledge Integration and Reuse	10

These skills illustrate that future R&D teams will need much more than technical depth alone. The most frequently cited capabilities—communication and relationship building; business acumen and strategic insight; systems thinking and integration; cross-functional collaboration and co-creation; AI and digital fluency; and continuous learning and curiosity—point to a broader shift in what it means to be effective in R&D. As innovation work becomes more networked, AI enabled and strategically integrated with the business, R&D professionals will increasingly need to connect across functions, translate technical possibilities into business value, work comfortably with emerging digital tools and continuously adapt as priorities and technologies evolve. The so-called "soft skills" of communication and collaboration come across loud and clear as essential differentiators of effective teams.

"Future R&D professionals will need to have both depth and breadth, but also fungibility—the ability to change and adapt to fast-changing circumstances."

— Arthur Martin, Vice President of R&D, North America, Arkema

Overall, the list reinforces a view often shared by Alexa Dembek, former chief technology and sustainability officer at DuPont: an R&D organization is like a quilt; no single piece is the same, and no one individual can have all the skills and capabilities a team or organization needs, but each contributes to the strength of the whole.

Key Gaps

Not all capabilities will need to evolve at the same pace. In certain areas, the gap is bigger between current organizational readiness and the level of capability future R&D teams will require. Five areas emerged as especially important:

- **Communication and relationship building:** Capability to work seamlessly across R&D, manufacturing, IT and other functions to solve complex, multidimensional problems.
- **Business acumen and strategic insight:** Ability to link R&D work directly to business outcomes—growth, margin, risk reduction or sustainability—across short-, mid- and long-term horizons.
- **Systems thinking and integration:** Comfort operating in a dynamic, networked organization—connecting expertise across geographies, functions and partners.
- **AI and digital fluency:** Ability to work effectively with AI tools across the R&D lifecycle—knowing when to trust, question and augment AI outputs rather than treating them as black boxes.
- **Influence without authority:** Ability to build trust, align stakeholders and move work forward across boundaries where formal reporting lines may not exist.

These gaps are not simply individual skill deficits; they reflect broader organizational challenges, including uncertainty about how AI will affect jobs, limited opportunities for junior technical talent to build business and communication skills, and a lack of structured development pathways for leading across boundaries without formal authority. Together, these gaps suggest that future readiness will depend not only on upskilling individuals, but also on creating the conditions, experiences and leadership practices that allow these capabilities to develop over time.

Plausible, Yet Provocative Scenarios for R&D Teams of the Future

To illustrate how the capabilities in this report can come together in practice, we created examples of R&D teams that embody the skills and capabilities identified. The sample teams laid out in Appendix 1 show how a future-ready R&D organization might staff Horizon 1 incremental innovation, Horizon 2 adjacency innovation and Horizon 3 transformational innovation. The examples are intentionally illustrative rather than prescriptive. They reflect the idea that teams will blend deep technical expertise, strong business connection, cross-functional collaboration and AI-enabled ways of working. Each team includes an AI agent as an active contributor to analysis, knowledge integration and decision support.

The purpose of the sample teams is to make the capability framework more concrete by showing how different skills, experiences and development pathways may come together in future R&D teams. Across the Horizon 1, Horizon 2 and Horizon 3 examples, the roles demonstrate that future capability building will likely draw on a mix of traditional education, professional certificates, nontraditional career paths, rotational experiences and on-the-job learning.

Examples from the sample teams include:

- Dr. Maya Chen's path combines formal scientific training with rotational exposure to plants, labs and quality systems.
- Priya Nandakumar and Elena Rossi illustrate how targeted certifications can build specialized operating and strategic capabilities without requiring a traditional graduate degree.
- Noah Stein shows how nontraditional backgrounds in foresight, economics and environmental policy can expand the aperture of transformational R&D.

The scenarios also show that future teams will be rounded out by AI agents that operate as active contributors rather than passive tools:

- CORE-OPS AI helps the Horizon 1 team continuously surface operational improvement opportunities.
- EDGE-SCOUT AI expands the Horizon 2 team's view of adjacent markets and partner ecosystems.
- NOVA-MIND AI serves as a provocative discovery engine for Horizon 3 exploration.

In each case, human team members retain judgment and decision-making authority, while AI agents accelerate learning, broaden perspective, strengthen knowledge reuse and help teams operate at the speed and complexity future R&D will require.

Conclusions and Next Steps

This report finds that the future of R&D will be shaped not by technology adoption alone, but by the ability of organizations to build the capabilities needed to work effectively in an AI-enabled, globally connected and increasingly complex innovation environment. Manufacturing R&D leaders emphasize stronger communication and relationship building, deeper business acumen, systems thinking, cross-functional collaboration, AI and digital fluency, continuous learning and the ability to influence across organizational boundaries as the capabilities most needed across incremental, adjacent and transformational innovation teams. These capabilities must be developed intentionally across roles, career stages and learning pathways.

Future-ready R&D organizations will likely combine deep scientific expertise with broader business, digital, collaborative and adaptive capabilities, while also integrating AI agents as active contributors to knowledge reuse, insight generation, decision support and discovery.

This first phase is intended to diagnose the challenge: What are the skills and organizational capabilities that future R&D teams must develop to be effective? The next phase must ask: What do we do about it?
Addressing this looming capability gap will require the full R&D ecosystem to work together:

- Industry will need to create the experiences, rotations, team structures and leadership practices that allow these capabilities to develop in context.
- Higher education will need to consider how technical preparation can be complemented by AI fluency, systems thinking, business understanding and collaboration skills.
- Professional development organizations can help fill near-term gaps through targeted certificates, applied learning and reskilling pathways.
- The IRI can play a convening role by bringing these groups together, testing ideas with members, surfacing emerging practices and translating this diagnosis into practical recommendations for building the future R&D workforce and organization.

The opportunity ahead is to move from shared recognition of the challenge to coordinated action that prepares R&D organizations, teams and talent for the future of innovation.

Appendix 1: Sample Future R&D Teams

The teams laid out below represent examples of what future R&D practitioners and teams may look like in the future. They are illustrative in nature only and are not representative of any particular individual or organization.

Team 1: Incremental Innovation Team (Horizon 1)

This team focuses on improving existing products, processes and platforms for current customers and markets. Its priorities are speed, reliability, customer responsiveness and steady business value creation. The team blends technical depth, manufacturing awareness, customer insight and AI-enabled learning to deliver a consistent stream of enhancements that strengthen the core business.

Dr. Maya Chen—Senior Product Development Scientist

Top three responsibilities: Translate customer and plant feedback into practical product improvements; lead formulation and performance testing for line extensions and quality enhancements; and work with manufacturing and quality teams to reduce variability and improve scalability.

Top three skills: Technical depth in core domain; human-centered customer insight; and adaptability and agile execution.

Background: Dr. Chen earned a bachelor's degree in chemical engineering and later completed a Ph.D. in materials science focused on applied product performance in industrial environments. She began her career in a rotational development program at a global manufacturer, where she gained experience in pilot plants, analytical labs and quality systems. Early in her career, she became known for connecting laboratory findings to real operational issues, particularly when products performed differently at scale than they had in controlled testing. She later moved into a product development role where she led reformulation work, cost-down projects and targeted product upgrades for existing customers. Over time, she developed a strong reputation for listening closely to customer complaints and field observations, then turning those insights into disciplined experiments and actionable product changes.

She has worked extensively with manufacturing, procurement and quality colleagues, which made her especially effective in moving ideas quickly from concept to implementation. Her career path reflects the blend of technical rigor, practical problem-solving and business responsiveness that is critical for Horizon 1 innovation.

Jordan Alvarez—R&D Program Manager

Top three responsibilities: Prioritize the incremental innovation portfolio based on customer value, feasibility and timing; coordinate cross-functional execution across R&D, operations, supply chain and commercial teams; and monitor project progress, tradeoffs and post-launch results to ensure impact.
Top three skills: Business acumen and strategic insight; communication and relationship building; and influence without authority.
Background: Alvarez studied industrial engineering as an undergraduate and later earned an MBA with a concentration in operations and strategy. He started his career in manufacturing excellence, where he learned how process discipline, throughput and cost structure shape product decisions. After several years in operations, he moved into a project management role supporting new product introductions and lifecycle improvements. That transition gave him experience bridging technical teams and business stakeholders, especially when timelines, margin goals and plant realities were in tension. Over time, he became the person leaders relied on to bring order to complex project portfolios. He developed strong skills in stage-gate governance, resource planning and portfolio tradeoff decisions, but his greatest strength has been translating across functions. He understands enough of the science to ask the right questions and enough of the business to keep projects tied to commercial priorities. His career path makes him well suited for Horizon 1 work, where success often depends less on breakthrough discovery and more on disciplined coordination, speed and continuous alignment around customer and business value.

Priya Nandakumar—Manufacturing Integration Lead

Top three responsibilities: Ensure product and process changes can be implemented reliably at scale; identify manufacturing constraints and opportunities early in development; and connect plant learning back into the R&D workflow to improve speed and reuse knowledge.

Top three skills: Systems thinking and integration; cross-functional collaboration and co-creation; and knowledge integration and reuse.

Background: Nandakumar earned a bachelor's degree in mechanical engineering and then built her expertise through a series of professional certifications in lean manufacturing, Six Sigma, supply chain operations and advanced manufacturing systems. She began her career as a process engineer in a high-volume production environment, where she worked on line optimization, equipment qualification and root-cause problem solving. That early foundation gave her deep appreciation for the reality that even strong technical ideas fail if they cannot be produced consistently, economically and safely. As her responsibilities grew, she continued to deepen her capabilities through targeted credentialing rather than pursuing a traditional graduate degree, using each certification to strengthen a different part of her operating toolkit. She later joined a central engineering team that partnered closely with R&D on product transfers, scale-up and process changes across multiple facilities. In that role, she became highly skilled at spotting downstream risks early and helping teams design with implementation in mind. She has led numerous cross-functional efforts involving operations, quality, regulatory and sourcing teams, and she is known for translating operational detail into useful design guidance without slowing innovation down. Her educational path and career trajectory have made her a key bridge between lab and plant.

CORE-OPS AI—Incremental Optimization Agent

Top three responsibilities: Analyze customer complaints, quality data and production trends to identify improvement opportunities; recommend likely formulation, design or process adjustments based on prior projects and current constraints; and capture and surface reusable knowledge from past experiments, launches and plant learnings.

Top three skills: AI and digital fluency; knowledge integration and reuse; and adaptability and agile execution.

How this agent works with the rest of the team: By 2032, CORE-OPS AI is not just reviewing data after the fact; it is functioning as the team's always-on optimization layer. It continuously monitors live streams of product performance, plant variability, customer feedback, supplier inputs and prior experiment data, then flags emerging issues and improvement opportunities before they become visible through traditional review cycles. Dr. Chen uses it to generate next-best experiment pathways in real time, Alvarez uses it to dynamically re-rank priorities as conditions change, and Nandakumar uses it to test implementation scenarios before a change ever hits the line. Rather than waiting for humans to ask the right question, the agent actively surfaces anomalies, predicts likely downstream effects and proposes actions with evidence attached. The team does not hand over decision rights, but it does rely on the agent as a proactive operating partner that compresses learning cycles, reduces rework and keeps incremental innovation moving at a pace that manual coordination alone could no longer sustain in 2032.

Team 2: Adjacency Innovation Team (Horizon 2)

This team focuses on moving beyond the core into related markets, technologies, channels or business models. Its work requires a balance of discipline and exploration: enough structure to scale promising ideas, but enough flexibility to test new assumptions. The team blends market insight, partnership building, platform thinking and digital experimentation to help the company grow into spaces that are new to the organization but adjacent to existing strengths.

Elena Rossi—Strategic Innovation Lead

Top three responsibilities: Identify and shape adjacency opportunities that leverage existing technical and commercial strengths; define learning agendas, business cases and decision points for pilots in adjacent spaces; and align R&D efforts with strategic growth priorities and portfolio choices.

Top three skills: Business acumen and strategic insight; systems thinking and integration; and responsible risk-taking.

Background: Rossi earned her undergraduate degree in biochemistry and then built her strategic range through a series of professional certifications in technology management, innovation strategy, market analysis and portfolio planning. She began her career as a bench scientist but quickly developed an interest in why some technically strong ideas received investment while others stalled. That curiosity led her into a strategy-facing role within R&D, where she supported portfolio reviews, growth opportunity assessments and long-range planning. Over the next several years, she worked at the intersection of science, market analysis and business development, helping teams evaluate whether emerging opportunities fit the company's capabilities and strategic direction. As her role expanded, she continued to deepen her expertise through targeted credentialing rather than pursuing a traditional graduate degree, using each certification to strengthen a different part of her strategy and innovation toolkit. She became especially effective in mid-horizon work: opportunities that were not pure core extensions, but also not fully disruptive bets. She has led cross-functional teams exploring adjacent customer segments, technology applications and service-based offerings linked to existing products. She is known for bringing rigor to uncertain opportunities by clarifying assumptions, sequencing experiments and connecting technical possibilities to strategic choices.

Samir Patel—Ecosystem Partnership Manager

Top three responsibilities: Build and manage relationships with universities, startups, suppliers and external technology partners; design collaboration models that accelerate learning while protecting strategic interests; and bring external capabilities into pilots and scale-up efforts for adjacent opportunities.
Top three skills: Ecosystem and partnership management and development; communication and relationship building; and IP stewardship.
Background: Patel studied electrical engineering and later completed a graduate certificate in innovation and entrepreneurship. He began his career in a technical sales engineering role, which exposed him to a broad set of customers, suppliers and emerging technology providers. That external-facing experience gave him a strong instinct for where capabilities existed outside the company and how partnerships could accelerate internal progress. He later moved into corporate technology scouting and then into open innovation, where he helped connect business units with research institutions, startup partners and strategic suppliers.

Over time, he built a reputation for making partnerships productive rather than symbolic. He understands how to define collaboration scopes, governance expectations and value-sharing arrangements so that teams can move quickly without creating confusion over ownership or data use. He has supported adjacent innovation efforts ranging from new sensing technologies to digitally enabled service models, often serving as the translator between internal technical teams and external collaborators. His path combines technical credibility with boundary-spanning relationship skills, making him particularly effective on Horizon 2 teams where growth often comes from recombining internal strengths with capabilities sourced from the broader ecosystem.

Lena Brooks—Digital Experimentation Manager

Top three responsibilities: Design rapid pilots and simulation-based experiments to test adjacent product, service or platform concepts; integrate customer, technical and operational data into learning cycles; and help teams decide when to scale, pivot or stop adjacency initiatives.

Top three skills: Advanced discovery and digital experimentation; AI and digital fluency; and continuous learning and curiosity.

Background: Brooks holds a bachelor's degree in computer science and a master's degree in data analytics with a focus on applied experimentation. She started her career in a digital product team, where she worked on analytics dashboards, A/B testing and user behavior analysis. Although her initial work was outside traditional laboratory R&D, she developed strong capabilities in structured experimentation, data interpretation and rapid iteration. She later joined an innovation group in an industrial company to help modernize how development teams ran pilots and gathered evidence. In that role, she built digital tools and workflows that allowed technical teams to simulate options, monitor pilot performance and compare scenarios more quickly than through conventional processes alone. Over time, she became a key contributor to adjacency efforts where the company was testing new offerings that combined physical products with digital features, services or new routes to market. Her background helps teams navigate uncertainty and learn faster by designing experiments that are disciplined but not slow. She brings a technology-enabled mindset that is increasingly important as Horizon 2 innovation relies more heavily on data, simulations and iterative validation before committing larger-scale resources.

EDGE-SCOUT AI—Adjacency Opportunity Agent

Top three responsibilities: Scan technical, market, customer and partnership signals to surface promising adjacency spaces; compare internal capabilities with external opportunities and identify likely gaps or partner needs; and synthesize pilot data and external intelligence into recommendations for scaling, pivoting or deprioritizing initiatives.

Top three skills: Strategic insight translation; AI and digital fluency; and ecosystem and partnership management and development.

How this agent works with the rest of the team: In 2032, EDGE-SCOUT AI operates like a live strategic radar system embedded in the team's daily work. It is constantly sensing shifts in adjacent markets, startup activity, customer behaviors, policy signals, technology breakthroughs and partner moves, then recombining those signals into opportunity pathways the team may not have considered on its own. Rossi uses it to simulate adjacency plays and stress-test their strategic logic at speed. Patel uses it to identify nonobvious partner combinations, anticipate collaboration friction points and shape stronger ecosystem plays before competitors see the opening. Brooks uses it to connect pilot data with external momentum in real time, allowing the team to redesign experiments on the fly rather than waiting for formal reviews. The agent acts less like a research assistant and more like a continuously learning market shaper—surfacing options, exposing blind spots and challenging stale assumptions. Human team members still choose where to place bets, but the AI dramatically expands their peripheral vision and enables a faster, more opportunistic approach to adjacency growth than most organizations could manage alone.

Team 3: Transformational Innovation Team (Horizon 3)

This team focuses on longer-term breakthrough opportunities that could create new platforms, new business models or entirely new sources of value. Its work is exploratory, uncertain and high risk, but also essential for long-term renewal. The team combines scientific imagination, systems thinking, external sensing and bold experimentation, using AI as a thought partner and force multiplier to accelerate discovery and option creation.

Dr. Amina Okafor—Breakthrough Research Director

Top three responsibilities: Define and lead long-range research agendas aimed at future platforms and disruptive capabilities; guide exploratory programs through ambiguity while maintaining scientific rigor and strategic relevance; and connect emerging science to long-term enterprise options and potential new businesses.
Top three skills: Creativity; systems thinking and integration; and resilience and change navigation.
Background: Dr. Okafor earned a bachelor's degree in physics, followed by a doctorate in advanced materials and nanoscale systems. She began her career in academic research, where she worked on early-stage science that had uncertain commercial applications but significant long-term potential. After several years in academia, she moved into an industrial research lab because she wanted to see how frontier science could shape real products and markets over time. In industry, she initially led exploratory programs in new materials platforms and quickly became known for her ability to connect deep technical research with broader strategic questions about where the company could play in the future. Over time, she took on leadership roles in advanced research, managing portfolios that spanned low-maturity technologies, university collaborations and internal venture concepts. Her experience has taught her how to create structure for highly uncertain work without crushing creativity, and how to defend long-term bets in environments that often favor near-term results. Her path reflects the mindset needed for Horizon 3 innovation: scientific depth, patience with ambiguity and the ability to translate emerging possibilities into future strategic options.

Noah Stein—Future Markets and Foresight Lead

Top three responsibilities: Identify weak signals, emerging technologies and future customer or societal shifts that could reshape the business; build future scenarios and opportunity spaces that inform transformational R&D priorities; and help translate external uncertainty into strategic choices about where to explore and why.
Top three skills: Business acumen and strategic insight; systems thinking and integration; and sustainability literacy.

Background: Stein studied economics and environmental policy as an undergraduate and later completed a master's degree in strategic foresight. He began his career in market intelligence, where he analyzed competitor moves, regulatory shifts and demand trends for a large industrial company. While that work was focused initially on near-term strategy, he became increasingly interested in longer-term discontinuities, such as climate pressure, technology convergence, geopolitical shifts and new customer expectations. He moved into a foresight and future strategy role, where he built scenarios, facilitated strategic workshops and helped executives think beyond the current planning cycle. Over the years, he has worked closely with technology leaders, corporate strategists and external experts to frame questions about what kinds of capabilities the company might need in five to 10 years. He is especially strong at turning broad, ambiguous external change into usable implications for R&D portfolios. His career path is less traditional than that of a scientist, but that is precisely what makes him valuable on a transformational team. He expands the aperture of innovation work, helping technical colleagues anchor breakthrough exploration in plausible future needs, risks and opportunities.

NOVA-MIND AI—Transformational Discovery Agent

Top three responsibilities: Generate and test novel hypothesis combinations across scientific, technical, market and ecosystem domains; model future scenarios and identify potential breakthrough opportunity spaces or second-order risks; and accelerate concept exploration by synthesizing literature, patents, internal knowledge and experimental results into actionable options.

Top three skills: Advanced discovery and digital experimentation; systems thinking and integration; and continuous learning and curiosity.

How this agent works with the rest of the team: NOVA-MIND AI operates as a true discovery engine inside the team, not simply a tool for summarization or search. It continuously generates novel hypothesis combinations across science, technology, market and societal domains, runs synthetic thought experiments against future scenarios and identifies unconventional platform opportunities that would be easy for human experts to miss because they sit between disciplines. Dr. Okafor uses it to push beyond established research pathways and surface unexplored scientific directions with strategic relevance.

Stein uses it to connect weak signals into credible future worlds and expose second- and third-order implications that shape where the team should explore next. The team treats the agent less like support and more like a provocative intellectual force—one that expands the frontier of what can be imagined, modeled and debated in a single working session. Human judgment remains decisive, but the scale, speed and originality of exploration are fundamentally different because the AI is actively co-creating the future with them.