Emerging Tech: Tech Innovators for Intelligent Simulation — Technology and Platform Innovation

27 June 2025 - ID G00827557 - 20 min read

By: Stacey Yin, Walker Black, Evan Brown, Mark Wah, Alfonso Velosa, Ethan Cai

Initiatives:Emerging Technologies and Trends Impact on Products and Services; Increase Product Traction

> Product leaders must integrate AI assistants and natural language interfaces in simulation tools to provide an intuitive decision-making experience. Otherwise, they risk disengaging nonspecialist users, leading to subpar adoption of their solutions.

Overview

Key Findings

- High-tech C-level executives must deliver intuitive decision making experiences for the intelligence sim offering or fall short of capitalizing on the adoption potential.
- AI-native simulation platforms are transforming enterprise decision-making by embedding AI assistants, automation, and natural language interfaces. This evolution lowers the barrier for nonspecialists, accelerates time to insight, and expands simulation use across functions.
- Domain-specific simulation twins are becoming essential for predictive intelligence and life cycle optimization. By tailoring models to specific assets and systems, innovators are unlocking new levels of operational foresight and control.
- Composable architectures and low-code simulation environments are redefining simulation as a scalable enterprise capability. Innovators are enabling integration such as with ERP and product life cycle management) (PLM) systems, allowing cross-functional teams to orchestrate real-time scenarios and deploy simulations more rapidly across business units.

Recommendations

To remain competitive in the AI race, product leaders must:

- Embed AI assistants and natural language interfaces into simulation tools and prioritize investments in guided workflows, context-aware assistants, and UI/user experience (UX) patterns designed for nontechnical users to expand simulation access and accelerate decision-making.
- Develop and package simulation twins around domain-specific use cases by combining industry data models, asset-specific simulation logic, and prebuilt connectors to operational systems to unlock predictive value from simulation.
- Adopt composable and low-code simulation platforms by standardizing on modular frameworks, enabling API-based integration with business applications, and empowering teams to reuse and configure models without extensive coding to scale simulation capabilities across the enterprise.

Analysis

This document is part of Gartner's case-based research (CBR) for intelligent simulation, focusing on the application of this technology in emerging sectors, and their use cases. The Gartner CBR project involved a team of analysts conducting in-depth interviews and data collection from January to April 2025. This project included interviews with more than 20 intelligent simulation vendors globally and an analysis of more than 50 adopters of intelligent simulation (see Notes 1 and 2 section for further details).

Key objectives of the research included uncovering the frontier of innovation in intelligent simulation and identifying the most innovative vendors. The vendors in this document were selected to illustrate different types of innovation occurring in the intelligent simulation space and their impact on the technology market.

Overview of Intelligent Simulation Innovation

Intelligent simulation is evolving from a technical modeling capability into a strategic enterprise function that supports decision-making across asset-intensive industries, digital operations, and complex systems. Innovations from vendors such as TWAICE, Cosmo Tech, DataMesh, and Alembic reflect a shift toward AI-native design, real-time insights, and broader usability beyond traditional engineering teams.

Technology-Led Innovation

Innovators are embedding AI assistants, graph machine learning, and generative algorithms to automate scenario generation, reduce model setup complexity, and enable predictive forecasting. Technologies such as reinforcement learning, spiking neural networks, and data-driven digital twins are expanding the simulation landscape to include both physical processes and decision logic.

Platform-Centric Integration

Simulation is increasingly integrated into composable enterprise platforms that connect to digital twins, IoT telemetry, ERP systems, and cloud-based data layers. Vendors like Siemens and DataMesh are enabling seamless workflows through low-code environments and modular architectures, positioning simulation as a reusable capability across business units and use cases.

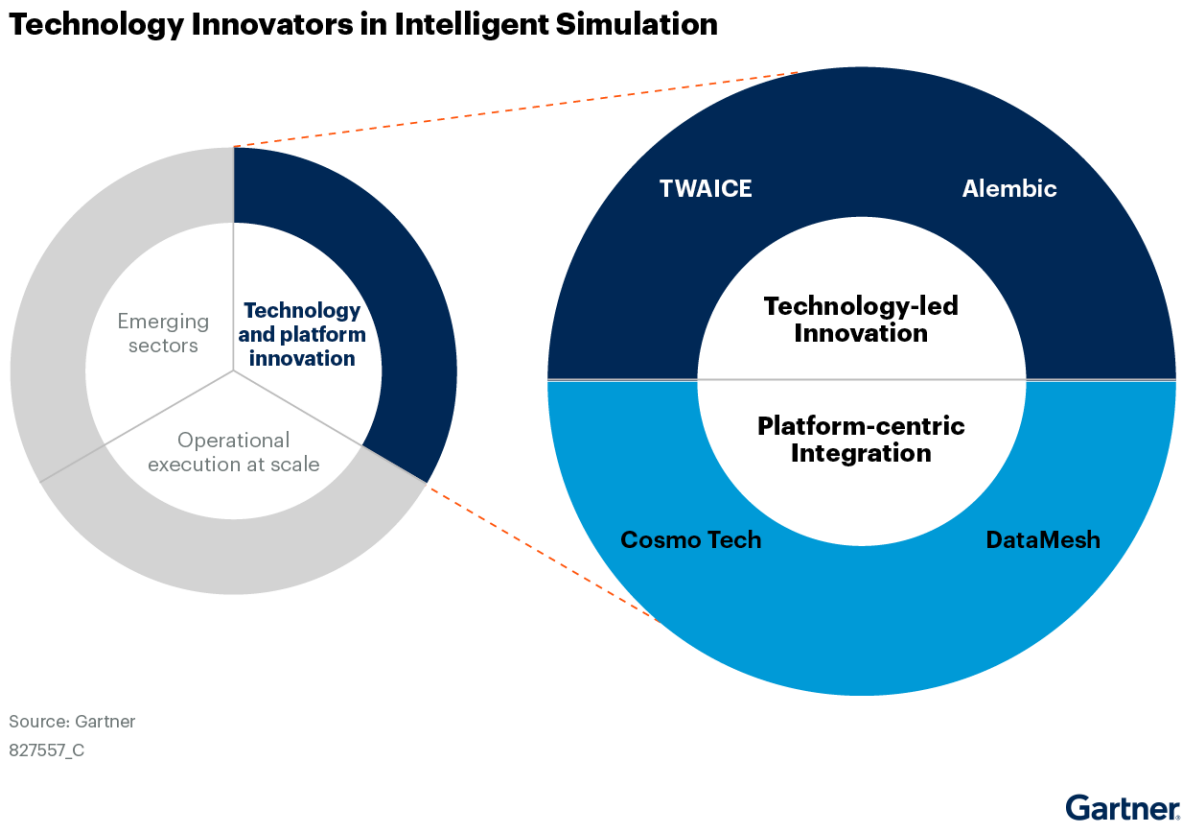
Technology Innovators

Intelligent simulation implementations require sector-specific knowledge and the ability to customize solutions to meet enterprises' specific business objectives and outcomes. Intelligent simulation can be adapted to the domain of interest, whether it is agriculture, finance, weather or molecular modeling. Therefore, the range of intelligent simulation innovation is high. For the purposes of this research we have grouped innovations into three groups based on the core innovation features and functions of each of the vendors. The focus of this research is vendors aligned with technology and platform innovation (Group 3) as illustrated below in Figure 1.

There are three groups:

- Group 1: Emerging Tech: Tech Innovators for Emerging Sectors in Intelligent Simulation
- Group 2: Emerging Tech: Tech Innovators in Intelligent Simulation — Operational Execution at Scale
- Group 3: Emerging Tech: Tech Innovators for Intelligent Simulation — Technology and Platform Innovation

Figure 1: Tech Innovators in Intelligent Simulation



This research report focuses on Group 3 tech innovators and highlights technology providers that advance and accelerate the use of intelligent simulation. These two types of categories — technology-led intonation and platform-centric integration — feed off one another and drive forward the opportunity space in the intelligent simulation market. See Table 1.

Table 1: Tech Innovators for Intelligent Simulation

(Enlarged table in Appendix)

Vendor	Innovation	Market Impact
TWAICE	Predictive battery digital twins using machine learning and neural networks to model degradation patterns and simulate future performance scenarios across entire battery life cycle	Enables proactive battery asset management in energy storage and automotive sectors; helps OEMs extend battery lifespan, ensure safety compliance, and improve predictive maintenance strategies
DataMesh	AI-powered real-time operations simulation platform with drag-and-drop UI, combining simulation twins, spatial computing, and AI agents for manufacturing and facilities management	Demonstrated faster problem resolution in manufacturing; streamlines digital twin development and enables real-time monitoring, virtual planning, and automated decision-making
Cosmo Tech	AI simulation platform for supply chain and asset optimization, balancing contradictory constraints (revenue, cost, resilience, carbon footprint) with demand uncertainties using prescriptive algorithms	Decrease in operational conflicts and optimize capex strategies; enables long-term asset life cycle forecasting and scenario planning
Alembic	Spiking neural networks and causal algorithms for marketing attribution and prediction, incorporating timing information to identify relationships between marketing activities and outcomes	Transforms marketing ROI analysis by identifying precise actions within campaigns that drive growth; enables accurate prediction of future returns and revenue opportunities from marketing investments

Source: Gartner (June 2025)

TWAICE predictive battery digital twins enable proactive life cycle decisions in energy storage and mobility sectors.

Analysis by: Stacey Yin

Nature of the Innovation

TWAICE is innovative because it creates a domain-specific simulation twin that predicts battery behavior across the entire life cycle, transforming static monitoring into predictive intelligence and operational optimization. Its analytics platform integrates machine learning (ML) and neural networks to model degradation patterns, assess risk and simulate future performance scenarios, enabling users to make informed decisions before issues arise. This innovation stands out for its ability to generate operational and financial foresight from battery data, supporting predictive maintenance, warranty strategies and investment planning. By aligning simulation outputs with real-time fleet metrics, TWAICE delivers a digital representation of battery assets that evolves with usage, bridging the gap between engineering insight and business value in energy storage systems.

Adopter Case Story

TWAICE collaborates with battery asset owners and operators to address common challenges in battery energy storage system (BESS) management. The company's platform enables users to reduce operational risk and maximize asset value by providing real-time performance insights, predictive analytics and fleet-level visibility across their battery systems.

Operators can monitor multiple battery systems through an integrated dashboard that consolidates key metrics, such as geographic location, nominal power and degradation trends. This functionality supports proactive issue identification and operational planning across distributed deployments.

TWAICE's solutions are designed to address typical operational challenges — such as unplanned downtime, uneven battery aging and performance uncertainty — by delivering simulation-based insights tailored to real-world needs.

TWAICE's adoption in the automotive sector helps OEMs and Tier 1 suppliers extend battery lifespan, ensure safety compliance and improve life cycle transparency. Industrial and energy storage operators are also leveraging the platform to enhance predictive maintenance strategies and improve financial planning linked to battery asset performance.

TWAICE's simulation twin approach enables customers to transform battery data into actionable intelligence, reinforcing the platform's value in driving operational excellence and risk mitigation across sectors.

Market Adoption and Impact

Domain-specific simulation twins are gaining momentum as critical enablers for predictive intelligence and operational optimization across industries. Early adoption in sectors like automotive, energy storage and industrial operations demonstrates their potential to improve asset health management, reduce downtime and optimize life cycle performance. For example, battery digital twins have been shown to reduce unplanned downtime by up to 25% and extend asset lifespan by 15% to 20%, while supply chain simulation twins enable scenario planning that can cut lead times and inventory costs by up to 10%.

These capabilities are increasingly embedded into day-to-day decision-making processes, enabling operators to shift from reactive problem-solving to proactive life cycle planning. By aligning simulation insights with real-time data from distributed systems, domain-specific twins help asset owners forecast degradation, optimize maintenance schedules, and validate investment decisions with greater confidence.

This shift is driving adoption beyond early innovators, with simulation twins becoming a standard component of digital transformation programs in sectors where asset performance and risk management are vital. The market impact is amplified by the growing availability of composable, low-code platforms and AI-native capabilities that are lowering technical barriers and expanding access to simulation capabilities across business functions.

Implications for Product Leaders

- Product leaders should focus on building simulation solutions tailored to the specific dynamics and risks of particular assets or industries. Domain-specific twins deliver higher business value by providing actionable insights that translate directly into outcomes like cost reduction, risk mitigation, and performance optimization.
- Embedding AI into domain-specific simulation twins transforms static models into dynamic, predictive engines, enabling product leaders to forecast asset behavior, assess risks, and optimize decision-making across the life cycle.
- To drive adoption of domain-specific simulation twins, product leaders must ensure that complex predictive insights are delivered in accessible, intuitive formats that align with the operational priorities of nonexpert users.

Recommended Reading

- Emerging Tech: Techscape for Startups Powering Simulation Twins

DataMesh digital twin platform enables real-time operations simulation for manufacturing and facilities management

Analysis by: Ethan Cai

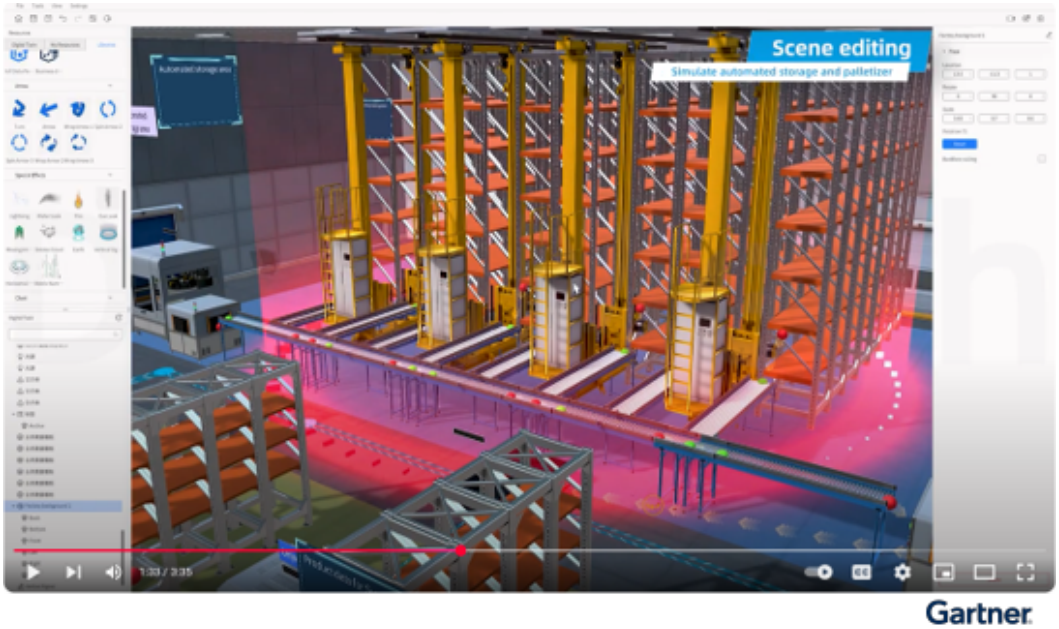
Nature of Innovation

DataMesh is innovative because it uses AI agents to deliver real-time analysis. The AI agents extend on their overall UX, which includes a drag-and-drop UI and data integration service. With its DataMesh FactVerse platform, DataMesh provides capabilities to build digital twins and run simulations for manufacturing and facilities management. The platform combines simulation twin, spatial computing, and AI technology to run real-time, business process and behavior simulations based on data collected from the existing environment. AI agents embedded in the digital twin also analyze live data streams and identify patterns and anomalies in the data. Using logic-based behavior trees, this triggers actions to optimize processes and predict failures, enabling automated decision-making.

The platform also includes the DataMesh Data Fusion Service to help consolidate data and integrate into existing systems, as well as DataMesh FactVerse Designer, which streamlines digital twin development with its drag-and-drop features and library of existing digital assets. Using the platform, adopters in the manufacturing and facilities management space can enable enhanced training and guidance for frontline workers, virtual planning and design, real-time monitoring and operations, and smart maintenance and support.

Figure 2 is an example simulation twin created using the DataMesh FactVerse platform.

Figure 2: Representative DataMesh Simulation Twin



Source: DataMesh

Adopter Case Story

NIO, an electric vehicle manufacturer, uses DataMesh simulations to improve operations by conducting layout planning and real-time production simulations that reflect reality. NIO used the DataMesh FactVerse platform to build a visual twin of the plant. Using the platform, NIO integrated into multiple data systems using the DataMesh Data Fusion Service. With the DataMesh FactVerse Designer tool, the company was able to drag and drop to create digital twins of different aspects of the plant. These digital twins were connected to the factory and automated guided vehicle (AGV) systems, allowing the company to gain data visibility and run simulations of processes. The process of building the views of the plant was streamlined by modifying existing DataMesh digital assets to reflect NIO production line, cars, infrastructure and processes.

With DataMesh's simulation solution, NIO was able to build dynamic views of operations across stakeholders. The solution reduced production lead time and enabled teams to identify and resolve problems in real time 10% faster than before. In addition, the solution contributed to NIO's strategic vision of process improvement culture and long-term sustainability strategy for creating a product of the future.

Market Adoption and Impact

Simulation solutions like DataMesh's solution that enable real-time operations simulation and automation are gaining significant traction in manufacturing and facilities management. While intelligent simulation will be relevant across all enterprises, manufacturing and industrial verticals will lead adoption. This is because process and operations simulations are delivering significant value and enabling automation in industrial environments by optimizing facility performance and productivity through the simulation of key operations like equipment status and logistics. These simulations help reduce downtime, optimize workflows and drive process improvements and predictive maintenance in manufacturing environments, extending to the monitoring of entire manufacturing processes and organizations. In addition, they will greatly assist the ability to scale operations, such as building a new facility from scratch.

Intelligent simulation will enable unprecedented business benefits in terms of resource savings, increased efficiency, and enhanced manufacturing quality. Currently, autonomous capabilities are limited, with agentic solutions — AI systems that take autonomous actions — restricted to predicting next best actions. As AI decision-making capabilities and trust in AI technology improve, the automation of operations will advance, moving toward fully autonomous facilities with minimal human oversight. Intelligent simulations will adapt to their environments, enabling preemptive execution of tasks and autonomous decision-making, thus enhancing operational efficiency and scale.

Implications for Product Leaders

- Consolidating intelligent simulation offerings into a single platform will become the new standard, as virtually every adopter voices implementation challenges for intelligent simulation. This includes data consolidation and management services to accelerate integration.
- Industrial process and operations management will become more autonomous and require less human oversight. Intelligent simulation capabilities will progress as simulations begin to learn and adapt from environments for autonomous decision-making, executing tasks based on predicted next best actions. Product leaders should prepare for this innovation by incorporating simulation solutions into their portfolio while forming the necessary change management strategies to reduce adopter friction.
- Agentic AI is key to unlocking fully autonomous intelligent simulation solutions. Leading providers will include advanced AI and analytics capabilities, digital twins, data fabric, spatial computing, physical AI and other simulation-enabling technologies in their roadmaps to plan for new simulation innovations.

Recommended Reading

- Emerging Tech: Overcoming the Main Obstacles to Simulation Twin Growth
- Emerging Tech: Techscape for Startups Powering Simulation Twins

Cosmo Tech's simulation platform transforms asset and supply chain strategies with scenario planning and predictive KPI analysis amid demand uncertainty

Analysis by: Walker Black

Nature of the Innovation

Cosmo Tech offers a simulation platform that focuses on supply chain and asset management use cases, where the platform can factor in moving variables and uncertainties to optimize complex processes for an enterprise. The platform innovates via unique AI capabilities which allow for predicting the evolution of a system over time, enabling a simulation twin, AI-simulation and optimization, and enterprisewide AI-simulation orchestration. The solution differentiates by balancing contradictory constraints, including revenue, cost, resilience, and carbon footprint, with uncertainties and real-world variables that may impact demand.

Cosmo Tech achieves these outcomes by leveraging AI through various forms. Based on a core IP of a modeling software development kit and open source models, Cosmo Tech embeds prescriptive algorithms in their platform that predict demand and uncertainty impact on KPIs, and arbitrate for different scenarios. Their solution uses AI-simulation assistants built on large language models (LLMs), small language models (SLMs), and retrieval augmented generation (RAG). This set of AI technologies enables a holistic simulation twin that predicts and orchestrates for scenario planning in supply chain and asset management.

Adopter Case Story

RTE is the French electricity transmission system operator and was Cosmo Tech's original customer. Cosmo Tech provided its asset management solution to RTE with the goal of enhancing their operational and financial performance, specifically to find the optimal maintenance strategy and the optimal capital expenditure (capex) and operating expenditure (opex) strategies. Considering an aging electrical grid and infrastructure, coupled with resource constraints, RTE sought to upgrade the grid with a long-term solution that aligned to company strategy.

Cosmo Tech's simulation solution generated a holistic simulator to help manage electricity network assets, integrating components and constraints to simulate investment strategies and forecast the resulting industrial and financial performance. RTE was able to see how each possible variation in asset maintenance and renewal decisions would impact KPIs and run what-if scenarios on different resource allocations and trade-offs. These capabilities gave RTE heightened visibility into operational and financial forecasts, allowing them to project the lifecycles of assets, based on survival laws and parameters implemented by RTE, with forecasts extending over 30 years. This led RTE to demonstrate that a short-term increase in the maintenance budget would generate medium-term savings — avoiding hundreds of millions in additional costs for certain assets. RTE obtained the confidence of the regulator with regard to the increase of its budget, and as a result RTE is committed to expanding the use of this simulator and its developments, in order to optimise asset management trajectories.

Market Adoption and Impact

Cosmo Tech's platform offers customers the ability to plan for various scenarios, and make accurate predictions of asset lifecycles and efficiencies. The simulation platform innovates in how it accounts for uncertainty and can generate trends on aging assets. The market will move toward vendors that can replicate this capability so that strategies and models can be optimized given multiple variables and goals, and fluctuating levels of uncertainty in demand.

These outcomes have specifically demonstrated the applicability of advanced simulations in supply chain and manufacturing use cases. Companies in advanced manufacturing and energy industries will change how they approach their supply chain such that customer demand is met, inventory and replenishment strategies optimized, and service levels are enhanced. However, the capabilities that allow for the supply chain and asset management simulations are not limited to those industries. With many industries looking to enhance their long-term forecasting of assets, advanced simulation providers have the opportunity to move into more business units and industry use cases. Logistics and network design show clear applicability, and there is also demand for simulation techniques and scenario planning like Cosmo Tech's in finance, particularly for portfolio optimization. The impact of advanced asset management simulation solutions will be very high and cause all organizations to adapt for better forecasting and planning.

Implications for Product Leaders

- Simulation solutions that reveal inefficiencies and better predict for varying levels of demand in a given market will revamp traditional asset management and supply chain strategies.
- Simulation providers must be able to clearly demonstrate ROI and verify the results of simulations to prove to buyers and investors the value added by simulation techniques, as buyers can be reluctant to trust a system that replaces humans' action and decision making.
- Revenue growth will require product leaders to improve model accuracy while driving time and cost savings. This can be achieved via models that run scenarios under differing scenarios that can arbitrate for KPIs.

Recommended Reading

- Emerging Tech Impact Radar: Intelligent Simulation
- Innovation Insight: AI Simulation

Alembic simulates and predicts marketing outcomes using spiking neural networks and causal algorithms

Analysis by: Evan Brown

Nature of the Innovation

Alembic is innovative in that it applies causal inference techniques originally developed for fields like neuroscience and drug discovery to complex, multi-channel marketing. Unlike traditional attribution methods, Alembic's platform uses spatiotemporal dynamic graphs and non-parametric causal modeling to map how specific marketing actions drive outcomes over time. This allows organizations to better understand which actions caused incremental revenue, even in noisy, overlapping campaigns across TV, podcasts, social, search, and in-store channels.

What makes Alembic's platform especially innovative is its ability to detect directional information flow across touch points. This means capturing not just what happened, but what activity led to what action, and when. The system operates at massive scale, ingesting over 100 billion rows of data annually and using enterprise-grade infrastructure to model nonlinear relationships and evolving consumer behavior. This allows organizations to not only identify the exact components of a marketing campaign that contributed most to performance, but also simulate outcomes, forecast future returns, and allocate spend more precisely.

Alembic's platform is also capable of providing forward-looking predictions by combining historical causal structures with AI-driven modeling. These forecasts allow teams to estimate revenue from future campaigns and leads based on what's worked in the past.

Adopter Case Story

A Fortune 100 global airline partnered with Alembic to solve their long-standing challenge of connecting brand marketing efforts to revenue impact. Like many enterprises, the airline struggled with fragmented data and limited visibility into how above-the-line campaigns like sponsorships and broadcast media contributed to sales outcomes. During a major international sports event, the airline deployed Alembic's platform to evaluate the performance of its global sponsorship campaign in real time.

Alembic's causal inference technology revealed not only which campaign elements were most effective but also uncovered unexpected drivers of performance. This included external, non-marketing events that correlated with spikes in ticket sales. One ongoing partnership, previously considered low priority, was identified as a top revenue contributor.

With these insights, the airline restructured its earned media strategy, expanded high-impact partnerships, and even adjusted internal workflows to operationalize Alembic's intelligence across departments.

Market Adoption and Impact

Alembic is one of the first companies to utilize AI developed for scientific research to optimize marketing, but it will not be the last. As simulation technologies continue to mature, the improvements to efficiency, cost savings, and strategic decision making provided by decision intelligence solutions will drive increased interest from both providers and adopters. The former is looking to expand their simulation capabilities to other markets, and the latter is looking to maximize the outcomes of their budget.

However, the adoption of such platforms will not solely be for justifying marketing spend. The insights provided by this technology will go on to shape decisions surrounding content production, partnership strategies and business expansion. With the potential to greatly optimize spend via in-depth analytics on existing and potential future outcomes, organizations will have the quantitative information they need to justify and optimize their decisions for more strategic pursuits.

Implications for Product Leaders

- Spiking neural networks showcase increased capabilities over other AI solutions when it comes to marketing insights due to their ability to incorporate time-bound information, and the use of such technologies will be essential for providers to compete in this space.
- Though billed as a marketing insights product, the information provided by these types of solutions demonstrates potential to improve strategic decision making in other areas — such as partnerships, and content planning — showcasing opportunities for product leaders hoping to compete with similar, more purpose-built solutions.

Recommended Reading

- Emerging Tech Impact Radar: Artificial Intelligence in Retail
- Emerging Tech: Top Emerging Use Cases in Generative AI

Note 1: Gartner Case-Based Research Methodology

This document presents results and insights from a Gartner case-based research (CBR) project (from January through April 2025) that explored more than 50 use cases and examined the offerings of more than 20 technology providers. Gartner conducted this research to advise product leaders on advancing capabilities for intelligent simulation, identifying the most prominent, business-valuable and emerging use cases, and to support strategy and product roadmap evolution.

To develop profiles of a representative list of impactful vendors, Gartner analysts engaged vendors in multiple discussions:

- A vendor briefing to understand product capabilities, features and related go-to-market strategies
- A vendor interview reviewing verifiable real-world use cases demonstrating adoption of the vendor's innovation where the customer achieved desired outcome

Each innovation profiled in this research study was evaluated against the below set of Gartner criteria:

- Demonstrates uniqueness of technologies and solutions
- Holds potential for significant market impact
- Has feasibility for implementation at scale
- Solves significant, well-known technology or business problems
- Has catalyst potential to stimulate additional innovation

The vendors selected were included based on Gartner's opinion of the nature of their innovation against these qualities. Gartner analysts applied a five-level Likert scale to assess each tech innovation candidate. This analysis is specific to the innovation presented. It is not an endorsement of the company or an assessment of the company's viability as a business, a vendor or a potential partner. Although Gartner is highlighting the innovations of this set of technology providers, we recognize that there are other innovative companies out there and that this is not an exhaustive list.

Note 2: Vendor Participation

We believe the trends identified in this research are representative of the categories covered in this field study because of the good participation rate in each category. However, a number of high-profile providers did not participate, either declining or not responding to our outreach.

Recommended by the Authors

Some documents may not be available as part of your current Gartner subscription.

Critical Insights: Impact of U.S. Federal Policy Changes on Supply Chain Tariffs Creates Opportunity for Simulation Twin and Synthetic Data Providers

Emerging Tech: Top Emerging Use Cases in Generative AI

Emerging Tech: Techscape for Startups in Synthetic Data

Webinar: Use Simulation Twins to Drive Revenue Scale and Stickiness

Emerging Tech: Adoption Trends in Simulation Twins Show New Long-Term Revenue Opportunities

Emerging Tech: Overcoming the Main Obstacles to Simulation Twin Growth

Emerging Tech: Revenue Opportunity Projection of Simulation Digital Twins

Emerging Tech: Techscape for Startups Powering Simulation Twins

Emerging Tech Impact Radar: Intelligent Simulation

Table 1: Tech Innovators for Intelligent Simulation

Vendor	Innovation	Market Impact
TWAICE	Predictive battery digital twins using machine learning and neural networks to model degradation patterns and simulate future performance scenarios across entire battery life cycle	Enables proactive battery asset management in energy storage and automotive sectors; helps OEMs extend battery lifespan, ensure safety compliance, and improve predictive maintenance strategies
DataMesh	AI-powered real-time operations simulation platform with drag-and-drop UI, combining simulation twins, spatial computing, and AI agents for manufacturing and facilities management	Demonstrated faster problem resolution in manufacturing; streamlines digital twin development and enables real-time monitoring, virtual planning, and automated decision-making
Cosmo Tech	AI simulation platform for supply chain and asset optimization, balancing contradictory constraints (revenue, cost, resilience, carbon footprint) with demand uncertainties using prescriptive algorithms	Decrease in operational conflicts and optimize capex strategies; enables long-term asset life cycle forecasting and scenario planning
Alembic	Spiking neural networks and causal algorithms for marketing attribution and prediction, incorporating timing information to identify relationships between marketing activities and outcomes	Transforms marketing ROI analysis by identifying precise actions within campaigns that drive growth; enables accurate prediction of future returns and revenue opportunities from marketing investments

Source: Gartner (June 2025)