

From AI Potential to Business Impact Across the Digital Thread

How manufacturing leaders unlock value from AI by aligning strategy, data, and organizational change

Takeaways

To scale, AI must be lifecycle-aware. Point solutions consistently fail when they lack context across requirements, engineering, manufacturing, service, and other lifecycle functions, limiting their ability to deliver sustained value beyond localized optimization.

AI delivers business value only when it can be trusted at scale. When AI outputs are grounded in authoritative, governed product data, organizations can make faster and more confident decisions while reducing risks to quality, compliance, and intellectual property.

PLM-centered data governance is foundational. Trusted product structures, configurations, and change histories are prerequisites for effective AI deployment and for achieving sustained adoption across engineering, manufacturing, and service organizations.

Explainability and traceability are mandatory in engineering contexts. AI output must be auditable, defensible, and clearly linked to lifecycle artifacts to meet engineering authority, regulatory, and safety requirements.

Closed-loop learning delivers the highest long-term value. Feedback from manufacturing, quality, and service must continuously inform upstream decisions to improve design quality, reduce rework, and strengthen lifecycle performance.

Protection of intellectual property and sensitive product data is a prerequisite for executive trust in AI-enabled digital thread solutions. Approaches that isolate customer data, enforce role-based access, and prevent cross-customer data reuse reduce risk and accelerate organizational adoption.

Introduction: Challenges Industry Faces

Manufacturers are operating in an environment defined by accelerating product complexity, expanding variant portfolios, and growing interdependencies across mechanical, electrical, software, and service domains.¹ At the same time, regulatory scrutiny continues to increase, while customers and markets demand faster innovation cycles and shorter time-to-market. These forces place significant strain on traditional product lifecycle processes that were not designed to support rapid, data-driven decision-making across the full digital thread.

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Artificial intelligence has emerged as a promising capability across engineering, manufacturing, and service organizations. Interest is high and experimentation is widespread. However, many AI initiatives remain disconnected from core lifecycle systems and governance structures. As a result, pilots often fail to scale or to demonstrate measurable, repeatable business impact. Without lifecycle context, AI insights tend to remain isolated within individual functions, limiting their relevance and trustworthiness.

Organizational silos further inhibit progress. Engineering, manufacturing, IT, and service organizations often operate with different priorities, data models, and accountability structures. These disconnects prevent AI-generated insights from flowing across the digital thread and being acted upon consistently. In many cases, AI initiatives struggle to align with established governance frameworks, particularly in industries where engineering authority, regulatory compliance, and safety considerations are paramount.

Cultural and organizational readiness also present significant challenges. Executives frequently underestimate the degree of change required to integrate AI into long-standing roles, responsibilities, and performance metrics. Fragmented data ownership, inconsistent lifecycle definitions, and limited governance discipline further constrain AI's ability to reason across configurations, effectivity, and change history.

Concerns about data leakage, loss of intellectual property control, and unintended reuse of proprietary information continue to slow or block executive approval of AI initiatives, especially in regulated and IP-intensive industries. As expectations mature, executives increasingly require AI investments to demonstrate clear business value through faster decision-making, improved quality, and reduced operational risk. As the market matures beyond peak expectations, organizations that invest in AI-ready digital thread foundations are better positioned to achieve sustained, scalable value.

Best Practices for Deploying AI Across the Enterprise

Successful AI deployment begins with aligning AI strategy to business outcomes. Organizations must define AI initiatives in terms of concrete objectives such as cycle-time reduction, quality improvement, cost avoidance, and compliance readiness. Framing AI as a value-generating capability rather than an experimental technology is essential for executive sponsorship and long-term investment. Prioritizing use cases that span multiple lifecycle stages reinforces the importance of end-to-end visibility and avoids isolated optimization.

Clear ownership of digital thread outcomes is equally critical. Executive sponsorship and cross-functional accountability must be explicitly established to support AI initiatives tied to lifecycle performance. Organizations should clarify responsibility for AI-driven recommendations, decisions, and exceptions. This is particularly important where automation intersects with human judgment. In this context, PLM plays a central role in governing product definition, change management, and traceability.

Investment in data and governance foundations is a prerequisite for scalable AI. Lifecycle data must be treated as a strategic asset with clear ownership, quality standards, and governance policies. Standardized identifiers, configurations, and effectivity models enable consistent AI reasoning and reduce ambiguity. AI amplifies existing data maturity rather than compensating for its absence, making governance discipline essential.

Embedding AI into decision-making processes drives adoption and impact. AI insights should be delivered directly within existing workflows where decisions are made, rather than through disconnected dashboards or tools. Human accountability for approvals and outcomes must be preserved to maintain trust and alignment with established governance structures.

Organizational change management is also required. Teams must be prepared for new ways of working in which AI recommendations complement engineering judgment. Training, incentives, and performance metrics should reinforce adoption and responsible use. Scaling AI through measured execution allows organizations to pilot high-impact use cases, validate results, and expand incrementally while continuously assessing readiness and return on investment.

Addressing intellectual property protection and data security early is essential. Executives should evaluate AI solutions based on how customer data is stored, accessed, and isolated across tenants and roles. Approaches that keep proprietary product data within the customer environment, enforce role-based access controls, and prevent reuse of customer data beyond its intended purpose significantly reduce risk and accelerate adoption.

CONTACT Software Solution: Fourier AI

Embedded AI Architecture Within CONTACT Elements

CONTACT Software's Fourier AI is architected as an embedded intelligence layer within the CONTACT Elements platform rather than as an external or bolt-on capability. This enables engineers to interact with AI assistance in a manner comparable to consulting a senior colleague who has deep knowledge of product information, design history, and organizational context. Fourier AI augments human expertise by providing context-aware guidance while preserving engineering authority and accountability. Operating as a shared AI infrastructure across CONTACT Element's modules—including requirements engineering, change management, project management, manufacturing operations, test management, quality, and service—Fourier AI reduces the need for redundant AI implementations across functions. By residing inside the PLM environment, AI outputs inherit existing governance, access controls, and audit mechanisms, reinforcing trust and adoption.

Retrieval-Based, Context-Grounded Intelligence

Fourier AI emphasizes retrieval-based intelligence, grounding AI responses in customer-specific product data, relationships, and metadata. This approach significantly reduces reliance on purely generative outputs and mitigates hallucination risks that are unacceptable in engineering and compliance-sensitive environments. By maintaining awareness of product structures, variants, configurations, and lifecycle states, Fourier AI improves both the relevance and defensibility of AI-assisted insights. This grounding in authoritative lifecycle data is essential for executive confidence and for scaling AI beyond isolated experimentation.

Vectorization and Knowledge Representation

To support scalable reasoning across complex product portfolios, Fourier AI transforms product and lifecycle data into embeddings that enable semantic search, similarity detection, and contextual reasoning. This approach allows AI services to operate across heterogeneous data types, including documents, requirements, bills of material, and engineering artifacts, without duplicating or fragmenting source data. As a result, Fourier AI can deliver consistent intelligence across large datasets while preserving the integrity of authoritative product information.

AI Model Orchestration and Federation

Fourier AI includes centralized orchestration capabilities that dynamically route tasks between CONTACT's proprietary domain-specific AI models and best-of-breed commercial large language models. CONTACT develops proprietary models optimized for PLM-specific use cases, such as multi-modal 3D CAD similarity search, which are not adequately addressed by generic AI tools. At the same time, Fourier AI leverages

commercial models where appropriate to balance performance, cost, and response quality. This federated approach aligns with CIMdata guidance on composable digital thread architectures, enabling customers to benefit from both CONTACT’s domain expertise and ongoing advances in commercial AI technologies.

Workflow-Embedded AI Experience

AI interactions within Fourier AI are seamlessly integrated into user workflows, encompassing change management, requirements engineering, and project execution. Delivering AI insights at the point of decision minimizes context switching and increases the likelihood that recommendations are acted upon. Human review and approval remain integral to these workflows, reinforcing accountability and ensuring AI complements rather than replaces established engineering processes. This tight integration supports adoption while maintaining governance discipline.

Enabling Closed-Loop Lifecycle Learning

Sustained AI value depends on feedback flowing from downstream operations back to upstream decisions. Fourier AI supports closed-loop learning by connecting insights from manufacturing execution, quality events, and field service back to engineering and design functions. When a quality deviation or service issue is logged within CONTACT Elements, that information becomes available to AI-assisted analysis, enabling engineers to identify patterns, assess root causes, and refine future designs. This continuous feedback loop helps organizations move beyond reactive problem-solving toward proactive design improvement, reducing rework and strengthening lifecycle performance over time.

Scalability, Security, and Governance Considerations

Fourier AI is designed to scale incrementally as organizations introduce additional use cases and data sources. Data residency, access control, and security are maintained within the customer environment and governed by existing PLM policies. Customer data is isolated within individual environments, and access is controlled through defined roles, supporting intellectual property protection and data sovereignty requirements. AI outputs are traceable back to source data and lifecycle artifacts, enabling auditability and compliance with regulatory and internal governance expectations.

The following diagram (Figure 1) shows how Fourier AI can enhance a digital thread.

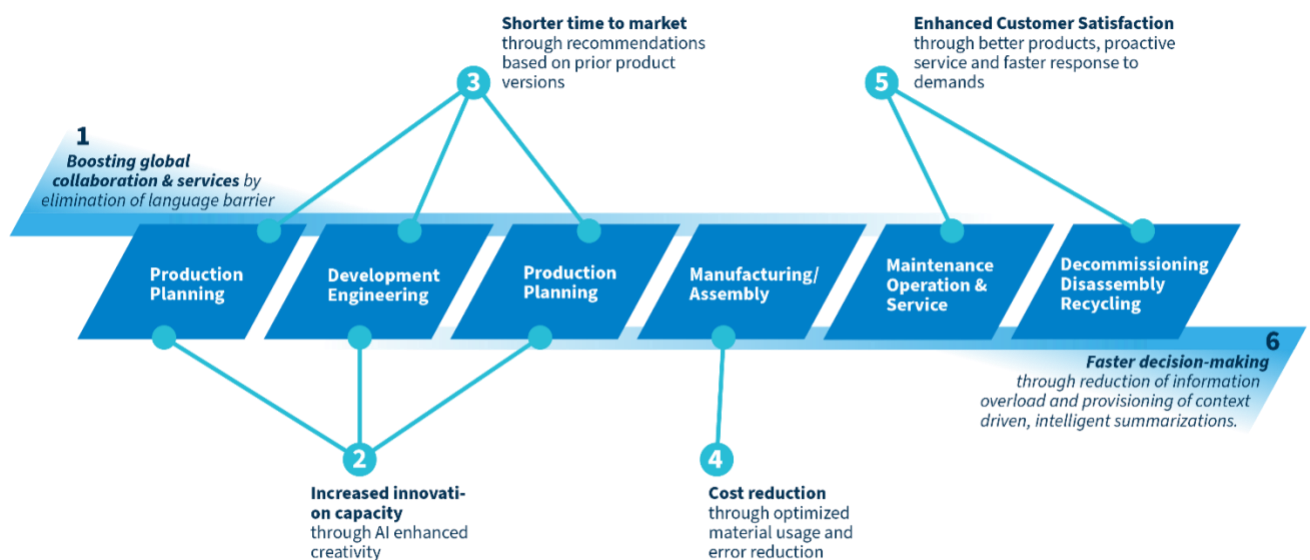


Figure 1—Enhancements of Fourier AI Across the Digital Thread
(Courtesy of CONTACT Software)

Find more information on: [CONTACT’s Fourier AI webpage](#)

Demonstrated Business Impact

These architectural principles translate into measurable business results. CONTACT Software has demonstrated measurable business impact through customer deployments of Fourier AI. A major automotive supplier implemented Fourier AI to support test case generation, addressing a process that previously required manual creation of approximately 5,000 test cases per year. Each test case required significant expert effort, with quality of results dependent on individual experience.

Fourier AI analyzes PDF-based requirements and generates test cases with acceptance criteria, which engineers then review and approve. This approach reduced test case creation time by approximately 12 minutes per case, resulting in high five-figure annual savings while improving consistency and quality. The example illustrates how AI embedded within lifecycle workflows can deliver tangible productivity gains without compromising governance or engineering accountability.

Removing Adoption Barriers

CONTACT Software removes common barriers to AI adoption by eliminating the need for customers to hire AI specialists, select models, or manage infrastructure. Customer data remains within customer instances, while the central Fourier Cloud operates in a GDPR-compliant environment and receives only prompts and responses.

Information processed by AI models is not stored, reused for training, or shared across tenants. Fourier AI complies with the EU AI Act and is classified as a limited-risk system, meeting transparency obligations while enabling customers to assess risk based on their specific use contexts. This approach reduces AI adoption from a multi-year infrastructure initiative to a subscription-based capability that can be activated and scaled incrementally.

Conclusion

When AI is implemented as a trusted extension of the digital thread, organizations can accelerate decisions while reducing exposure to quality, compliance, and intellectual property risks. Executives should view AI as a strategic digital thread capability rather than a standalone technology investment. Successful deployment requires alignment across strategy, PLM-centered data governance, organizational change, and disciplined execution.

To scale and provide sustained value, AI must operate with full lifecycle context, drawing on authoritative product structures, configurations, and change histories while producing outputs that are explainable, traceable, and defensible in engineering and regulatory environments. The greatest long-term value emerges when AI-enabled insights are reinforced through closed-loop feedback from manufacturing, quality, and service, continuously informing upstream decisions. Based on its ability to embed AI into governed lifecycle workflows, support federated architectures, and protect sensitive product data, CIMdata recommends that manufacturers focused on enhancing their digital thread capability evaluate CONTACT Software's Fourier AI as part of their digital thread solution assessment.

Broad availability is planned for early 2026 to enable manufacturers to begin evaluation and trial deployments.

About CIMdata

CIMdata, a global strategic management consulting firm, provides services designed to maximize an enterprise's ability to design, deliver, and support innovative products and services. For more than forty years, CIMdata has provided industrial organizations, providers of digital technologies and services, and investment firms with world-class insight, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) topics and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more, visit www.CIMdata.com or email info@CIMdata.com.