



# UNLOCK THE FUTURE OF ENGINEERING: EMBRACE THE DIGITAL THREAD

A Guide to Removing Barriers, Enhancing Innovation, and Creating a Future-Proof Strategy

EBOOK

## 1 | Meeting the Demands of Modern Engineering

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As an engineering leader, you face relentless market demands, including tightening timelines, growing product complexity, and the need for seamless global collaboration. Your role extends beyond design to driving innovation, speed, and growth.

In this environment, challenges can feel overwhelming:

### **COMPLEXITY THAT WON'T SLOW DOWN:**

Products are intricate ecosystems of hardware, software, electronics, and advanced materials. Managing this complexity efficiently requires aligning every team member and system around shared goals.

### **DISCONNECTED DATA AND FRAGMENTED SYSTEMS:**

Information is often scattered across isolated systems, making access difficult and leading to delays and inefficiencies. Collaboration becomes challenging as teams rely on incomplete data, resulting in frustration and errors.

### **PRESSURE TO DELIVER FASTER:**

The drive for speed is unrelenting. Whether launching a new product or improving an existing one, traditional workflows often lack the agility to keep pace, risking quality and compliance.

### **HIGH STAKES FOR COMPLIANCE AND SUSTAINABILITY:**

Complying with regulatory requirements and sustainability goals is essential. Products must meet strict standards while contributing to environmental objectives. To stay proactive, teams need complete lifecycle visibility, which is challenging without integrated data.

To overcome these challenges, you need a new foundation—one that unifies product data, enhances collaboration, and equips teams with actionable insights to advance confidently through each stage. By addressing the barriers to innovation, efficiency, and growth, you can create a resilient framework that empowers your team to adapt and thrive in an ever-changing market, building an engineering foundation that delivers speed and control. It's time to redefine what's possible in engineering.

## 2 | The Digital Thread: Fueling Engineering Excellence

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In today's fast-paced market, connected information in context is key to engineering success. The digital thread acts as a data backbone, linking each phase of the product lifecycle—design, manufacturing, and service—into a single source of truth. This integration gives stakeholders accurate, real-time information, enabling faster, informed decisions.

More than a tool, the digital thread drives innovation and efficiency. It offers an uninterrupted flow of information from a product's conception to retirement, providing transparency and traceability. Teams can quickly adapt designs, optimize processes, and resolve challenges, with every change documented and accessible.

Core concepts:

<b>TRACEABILITY</b>	Captures every decision, change, and action, helping engineers track the product's evolution.
<b>AUTHORITATIVE SOURCE OF TRUTH (ASOT)</b>	Serves as a master reference, ensuring consistency across other systems and preventing conflicts caused by redundant or out-of-sync data, reducing errors.
<b>LIFECYCLE INTEGRATION</b>	This can span one or more phases of the product lifecycle, supporting quality, compliance, and seamless data handover.

The digital thread removes barriers and inefficiencies, transforming engineering workflows. Instead of searching for information across systems, engineers have instant access to accurate, real-time product data, allowing them to focus on problem-solving and innovation. Cross-functional collaboration improves as engineering, manufacturing, and service teams share visibility, identify issues early, and reduce rework.

## **Business impact**

The digital thread accelerates time-to-market, improves operational efficiency, and lowers costs. It supports concurrent engineering, allowing teams to work in parallel with the latest data. Additionally, full traceability aids compliance in regulated industries, reducing risks and ensuring high product standards, while historical data access enhances continuous innovation.

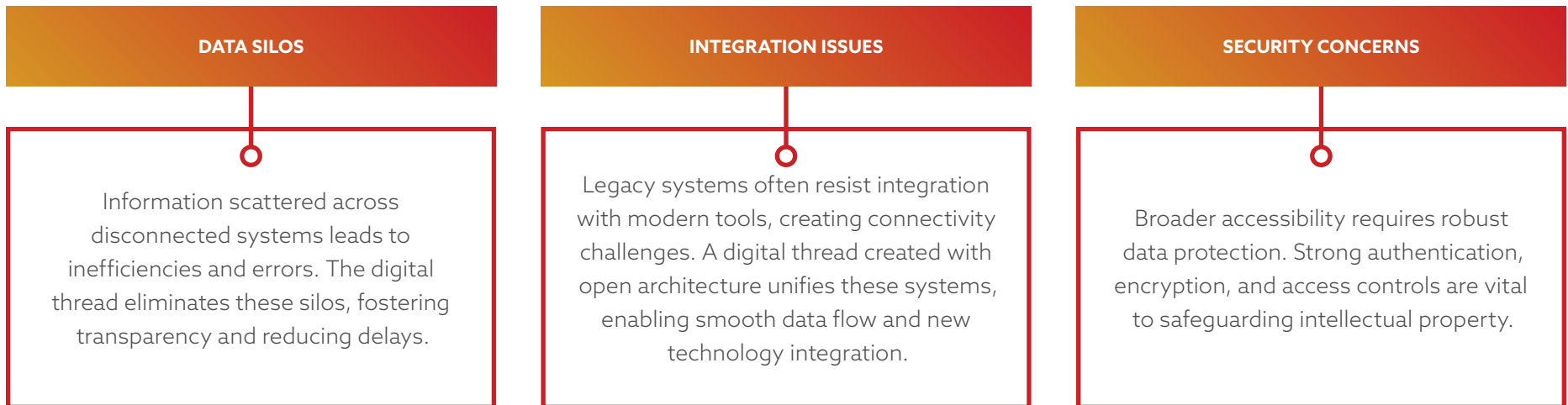
In short, the digital thread empowers teams to design, build, and maintain products with greater agility and effectiveness. Now is the time to embrace it, transform engineering, and secure a competitive edge in today's complex market.

### 3 | Own Your Digital Thread

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Owning the digital thread goes beyond technology – it transforms how your teams collaborate, innovate, and compete by creating a unified data backbone for every phase of the product journey.

Common challenges in digital thread management:



By addressing these challenges, companies build a collaborative, innovative environment where product lifecycle management has full visibility and control.

## What does it mean to own your digital thread?

Owning your digital thread means having accessibility, traceability, and integration of product data, processes, and decisions across the lifecycle. A digital thread connects information rather than navigating disconnected systems, offering traceability from concept to retirement. This unified view streamlines decision-making, reduces redundant tasks, and improves efficiency—empowering your organization to work smarter and deliver better products.

## Here's how it reshapes businesses:

Owning your digital thread offers a strategic edge in a landscape where speed, adaptability, and resilience are crucial. This unified data approach accelerates time-to-market, drives innovation, and enables agile responses to changing demands. By connecting data, organizations can lower costs, eliminate redundancy, and ensure quality and regulatory compliance. With a fully owned digital thread, companies are prepared to navigate both today's market and tomorrow's growth opportunities confidently.

### Systems thinking:

Treat the product lifecycle as an interconnected ecosystem instead of separate phases. This holistic approach enhances decision-making and overall efficiency.

### Streamlined collaboration:

Break down barriers between departments, suppliers, and partners. Integrated data enables real-time collaboration, reducing miscommunication and accelerating workflows.

### Integrated workflows:

Connect CAD models to ERP systems for a unified product development view. This integration improves efficiency and eliminates data handoffs.

### Proactive compliance:

Embed regulatory requirements into each lifecycle stage for full traceability, minimizing risks and reducing audit costs.

### Broader enterprise integration:

Extend the digital thread to CRM, supply chain, and service operations for smarter team decision-making.

### Analytics and AI platform:

Unified data allows AI tools to optimize processes, predict maintenance needs, and improve quality, giving a competitive edge.



## 4 | Future Trends in Digital Engineering

The digital thread is a future-focused strategy that enables organizations to capitalize on emerging trends in digital engineering. By providing a unified foundation for data, the digital thread supports integrating advanced technologies, helping organizations adapt and innovate more effectively. Managing, connecting, and using product data becomes vital as technology evolves. The digital thread forms the core for integrating new technologies, adopting smarter systems, and maintaining a competitive edge in the industry.



**From Industry 4.0 to Industry 5.0:** The evolution from Industry 4.0 to Industry 5.0 represents a shift from purely data-driven, automated processes to a more human-centered, collaborative approach. Industry 4.0, powered by IoT, emphasizes real-time data, predictive insights, and optimization, allowing companies to reduce downtime and continuously improve. Moving into Industry 5.0, the focus shifts to enhancing human collaboration with technology—integrating tools like AR and virtual collaboration to enrich user experience. The digital thread supports this evolution by creating an environment where real-time insights, human creativity, and digital connectivity converge, fostering innovation and efficiency.



**Artificial intelligence and machine learning:** AI and machine learning are revolutionizing engineering with predictive maintenance, quality control, and product design applications. The digital thread provides the connected data AI needs for quick, data-driven decisions, enabling smarter, more efficient engineering practices.

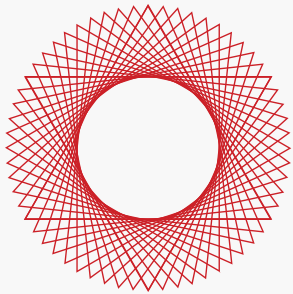


**Sustainable engineering practices:** Sustainability is now a strategic priority. The digital thread aids in embedding sustainability from the design stage, helping companies reduce waste, minimize energy usage, and meet demand for greener products, aligning with consumer and regulatory expectations.

## 5 | The Aras Effect – Transforming Engineering with a Connected Digital Thread

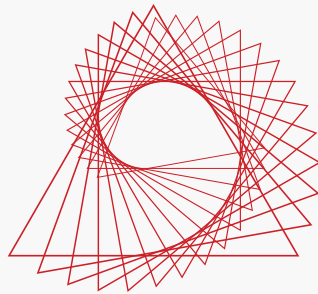
In a complex, fast-moving market, traditional PLM solutions often fall short. The Aras Effect represents a powerful, flexible approach to product lifecycle management that enables engineering organizations to fully own their digital thread, unifying data and processes across the product lifecycle.

The Aras Effect centers on five pillars – digital thread, adaptability, openness, scalability, and community – that empower engineering teams to stay agile, innovate faster, and overcome today’s biggest challenges.



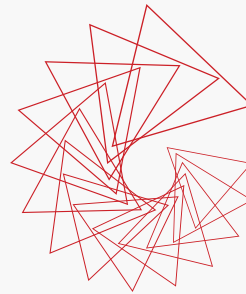
### CONNECTION

Build your PLM strategy on a digital thread that streamlines collaboration, decision making, and tracability



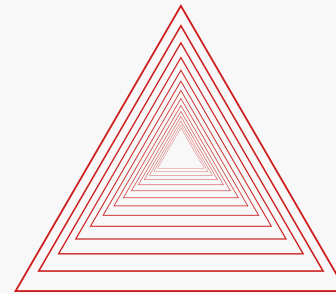
### ADAPTABILITY

Leverage adaptable PLM solutions that fit your unique needs and can evolve



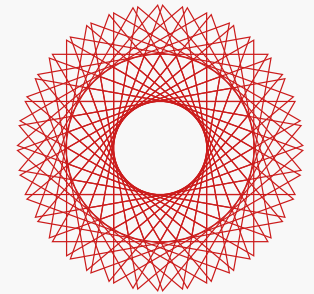
### OPENNESS

Gain the agility of an open digital engineering ecosystem



### SCALABILITY

Harden and future-proof your PLM infrastructure



### COMMUNITY

Join a community focused on collaborative innovation

The Aras Effect brings more than just technology – it provides a strategic advantage. By leveraging Aras Innovator, companies can confidently own their digital thread, enabling them to make faster decisions, ensure end-to-end compliance, and empower teams to innovate effectively. This connected, future-ready environment allows engineering leaders to meet today’s demands while seamlessly adapting to future challenges.

## 6 | Customer Examples: Digital Thread in Action



### **NuScale: Revolutionizing Nuclear Power with Digital Twin Technology**

NuScale's innovative approach to nuclear power centers on small modular reactors (SMRs) built in a factory and transported to sites. By implementing Aras, NuScale created a digital thread across the product lifecycle, ultimately achieving a digital twin that links product data to support customer needs and regulatory compliance.



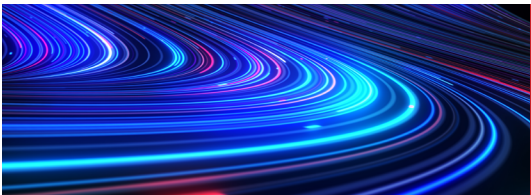
### **Kendrion: Simplifying Systems for Enhanced Traceability**

Kendrion, managing multiple systems across divisions, sought a unified PLM environment to establish a digital thread across product development. With Aras, they integrated legacy tools and enhanced traceability, allowing the mapping of requirements to engineering. This approach minimizes manual processes, improves information reuse, and provides greater visibility into product data.



### **Technip Energies: Accelerating the Energy Transition**

Technip Energies chose Aras to drive its digital-by-design approach, creating a digital thread for full lifecycle traceability and optimization. Standardizing data flows across projects improves cross-disciplinary collaboration and unlocks new opportunities in the energy industry. The platform offers streamlined engineering reuse, reduced cycle time, and actionable reporting through integrated data.



### **Nissan: Supporting Electrification Goals with Aras Innovator**

To enhance competitiveness in an electric-driven market, Nissan adopted Aras Innovator to streamline the development of electronic control systems under its "NISSAN NEXT" transformation plan. Aras supports Nissan's configuration management, allowing the company to efficiently handle complex software variants and integrate seamlessly with alliance partners.



### **Tamturbo: Ensuring Data Visibility and Trust**

As Tamturbo expanded, their data structures became complex and challenging to manage. With Aras, Tamturbo centralized product data, creating transparency and reducing data loss. Now, employees have easy access to accurate, current information, leading to significant time and cost savings.

*"With Aras, we expect to realize the benefits of the digital thread sooner, at a lower cost, and with flexibility that grows with NuScale."*

## 7 | Summary and Future Action

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The digital thread is not just a tool—it's a mindset shift that will shape the future of engineering. Owning digital thread empowers teams to drive innovation, quality, and speed. Now is the time to act and transform these insights into tangible actions.

To get started, follow these key initial steps:

### **1. Define the scope and purpose**

Clearly outline the digital thread's goals, scope, and stakeholders to ensure alignment with business objectives and measurable outcomes.

### **2. Establish the infrastructure**

Build a scalable, integrated framework using platforms like PLM systems, open standards, and federated data models to connect disparate systems seamlessly.

### **3. Implement governance and collaboration**

Ensure data integrity, security, and accessibility while fostering collaboration across teams with user-friendly tools and defined permissions.

Take these proactive steps today to embrace the digital thread, initiate transformative changes, and position your team for long-term success!



#### About Aras

Aras is a leading provider of product lifecycle management solutions. Its technology enables the rapid delivery of flexible solutions built on a powerful digital thread backbone and a low-code development platform. Aras' platform and product lifecycle management applications connect users in all disciplines and functions to critical product data and processes across the lifecycle and throughout the extended supply chain. Visit [www.aras.com](http://www.aras.com) to learn more and follow us on [YouTube](#), [X](#), [Facebook](#), and [LinkedIn](#).

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