The Value of an Integrated ET-IT-OT Approach

Driving Holistic and Optimized Business Outcomes Across Processes, Systems, and Organizations

Takeaways

Hitachi Digital Services (HDS) is a global player capable of fully integrating Engineering Technology (ET), Information Technology (IT), and Operational Technology (OT) to deliver end-to-end digital transformations that span the complete product and operations lifecycle.

An integrated ET-IT-OT approach breaks down silos, aligns digital workflows, and enables real-time insights, which can be used to drive efficiency, agility, and smarter operations across products, factories, and assets.

HDS AI/GenAI-powered Digital Threads and Digital Twins anchor their ability to provide real-time synchronization and alignment across design, manufacturing, and service.

HDS brings proven frameworks, implementation accelerators, simulation models, and more than 10,000 person-years of domain expertise.

Through AI, robotics simulation, immersive factory visualization, and industrial metaverse tools, HDS equips companies with advanced technologies to build resilient, intelligent, and adaptable operations.

The Challenge of Connecting the Enterprise

Today's manufacturers face increasing complexity that drives them to align their engineering, information, and operational strategies along with associated supporting technologies. Fragmented data across siloed systems and teams makes it difficult to synchronize decisions across design, manufacturing, maintenance, and service functions. As a result, critical insights that could improve efficiency, quality, and responsiveness often remain confined to individual departments, limiting an organization's ability to act holistically and proactively.[1]

Despite significant investments in digital pilots many companies struggle to scale their digital initiatives throughout their enterprise. A key barrier is the lack of integration between three data management core domains: Engineering Technology (ET), which encompasses design and product development and other product lifecycle management (PLM) areas; Information Technology (IT), which manages enterprise data, business systems and analytics; and Operational Technology (OT), which covers the technologies that run

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day-to-day operations—including manufacturing platforms, logistics, factory systems, and maintenance and service environments.

By converging ET, IT, and OT, companies can more easily ensure that their design choices, business strategies, and operational realities are aligned and streamlined. Too often, fragmented architecture, legacy infrastructure, and weak data interoperability between ET, IT, and OT platforms prevent organizations from extending digital solutions beyond isolated teams and/or facilities. This results in disconnected processes, incomplete data visibility, broken digital threads, and fragmented decision-making. Consequently, initiatives that promise accelerated time-to-market, improved quality, and enhanced operational insights often yield modest gains because they are not deployed at enterprise scale quickly enough. This slows the return on investment (ROI) and contributes to digital transformation fatigue as companies see delayed value despite continued spending. Without a coherent, enterprise-wide strategy, integrating ET, IT, and OT data and digital efforts remains siloed and vulnerable to failure.

The pressure to achieve operational efficiency, meet sustainability targets, and respond to customer expectations will only continue to intensify. Global competition, regulatory compliance, and cost constraints mandate that organizations improve their current operations while anticipating future market demands. Many companies struggle to balance these priorities while integrating emerging technologies into existing processes, creating a gap between innovation potential and tangible business results.

Workforce shortages in engineering, operations, and IT resources further compound these challenges. Companies often lack the skills necessary to implement and maintain advanced digital tools, analyze large volumes of data, and generate actionable insights from their systems landscape. Without strong transformation partners and organizational change management, organizations struggle to adopt and sustain new technologies, delaying enterprise-wide digital adoption.

Many businesses also lack effective real-time visibility into their products, assets, and operations. Without integrated access to asset performance data, predictive maintenance insights, and operational analytics, organizations operate reactively—responding to problems after they occur rather than preventing them. This absence of actionable intelligence reduces agility, increases downtime, and limits the ability to optimize resources across the enterprise.

While ET, IT, and OT strategies are widely recognized as essential, most companies struggle to integrate them effectively. Fragmented architecture, legacy systems, limited workforce capabilities, and poor data interoperability hinder scalable implementations and slow digital transformation. CIMdata believes that addressing these challenges, as HDS is attempting to do, requires a holistic, enterprise-wide approach that aligns people, processes, and technologies.

Best Practices for ET-IT-OT Solutions

Industry leaders initiate transformation by adopting a digital thread and digital twin strategy, establishing a continuous feedback loop that connects product design, production, and field operations. This integrated approach improves traceability, strengthens regulatory compliance, and drives ongoing improvement throughout the entire product lifecycle.

Model-based engineering and manufacturing approaches, extended to sales and service operations, enable companies to simulate products, processes, plant layouts, and service operations virtually before implementation. This capability helps identify design and alleviate flaws early, reducing the need for costly redesigns, minimizing commissioning delays, and improving overall product quality and serviceability.

Full ET-IT-OT convergence is best achieved through the adoption of open standards and reference architectures, such as ISA-95. The ISA-95 architecture was developed by the International Society of

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Automation (ISA). It is a framework for integrating enterprise IT systems, such as ERP, with manufacturing, as well as OT systems like MES, SCADA, or shop floor automations. Open standards improve the interoperability between systems, align workflows across different platforms, and enable end-to-end data visibility from the shop floor to the boardroom.

It is important to note that Artificial Intelligence (AI) delivers its greatest impact when it draws on data that flows seamlessly across ET, IT, and OT—linking design insights (ET), enterprise business data (IT), and real-time operational performance (OT) into a unified intelligence layer. AI plays a pivotal role in transforming manufacturing and service operations by uncovering inefficiencies that may go unnoticed through traditional analysis. AI can be used to dynamically optimize production schedules, reduce downtime, allocate resources more effectively, and respond to shifting market demands in real-time. AI-driven predictive maintenance helps anticipate equipment failures before they occur, minimizing costly unplanned outages and extending asset life. Additionally, AI can analyze vast datasets from production lines to improve yield and product quality, detecting subtle patterns that human inspection are likely to miss. In an era marked by volatile supply chains, fluctuating demand, and heightened customer expectations for speed, customization, and reliability, these AI-enabled insights are no longer optional—they are essential for maintaining a competitive edge.

Accomplishing this transformation requires implementing a governance framework that aligns engineering, manufacturing, supply chain, IT, and service functions under a shared set of goals and performance metrics. A unified digital operating model ensures that transformation efforts remain aligned with business objectives and that progress is sustained over the long term.

Finally, leading manufacturers build resilient organizations by converging ET, IT, and OT into a unified, enterprise-wide digital strategy. Instead of confining digital enablement to isolated areas of the enterprise, they establish a digital thread that connects designs, business systems, and operational platforms, creating end-to-end process and data visibility, as well as closed-loop feedback. These integrations enable scalable deployments, faster ROI, and consistent decision-making across the lifecycle. By adopting flexible architectures, training cross-functional teams, strengthening supply chain links, and embedding sustainability into day-to-day processes, organizations enhance their ability to adapt, recover, and thrive—delivering long-term, resilient performance in the face of potential daily disruption.

Hitachi Digital Services' Solutions

HDS delivers fully integrated ET-IT-OT solutions that connect assets, processes, and enterprise platforms across the entire manufacturing and operational landscape. This comprehensive architecture spans edge devices and controllers through PLM, MES, and ERP systems. It includes cloud-based analytics, enabling organizations to achieve real-time monitoring, secure interoperability, and streamlined workflows. By integrating ET, IT, and OT, HDS enables companies to break down traditional silos, ensuring that data flows seamlessly from the shop floor to executive management and back, supporting informed, timely, and insightful decision-making.

At the core of HDS' offering, the Digital PLM and Digital Thread practice provides AI-powered tools, value-focused playbooks, and structured transformation roadmaps that accelerate product development while ensuring quality and compliance throughout the product lifecycle. By linking design, manufacturing, and field performance data, HDS enables companies to create a closed-loop environment where feedback from operations informs design improvements—reducing errors, minimizing rework, and shortening time-to-market.

HDS also delivers smart factory enablement through platforms such as Lumada and HMAX and partner solutions across MOM/MES, SCADA, APM, and IIoT. These technologies provide dynamic planning

capabilities, real-time anomaly detection, closed-loop process control, and automated workflow execution. The result is measurable improvement in Overall Equipment Effectiveness (OEE), faster cycle times, optimized production throughput, and enhanced workforce productivity. By combining operational visibility with actionable insights, their solutions help companies respond proactively to disruptions, optimize resource allocation, and maintain consistent product quality.

HDS also delivers immersive simulation and industrial metaverse platforms, allowing clients to design, simulate, and optimize entire factory operations virtually. This includes capabilities such as robotic cell simulation, virtual commissioning, ergonomic analysis, and facility layout optimization. These tools reduce deployment risks, accelerate commissioning timelines, and ensure that operational performance is optimized before physical implementation, enabling safer, more efficient, and more cost-effective production environments. While much AI and robotic technology is still in the early stages, CIMdata is impressed with HDS' efforts in this area.

HDS' ET-IT-OT-focused solutions are purpose-built for a variety of industry verticals, including automotive, aerospace, energy, semiconductors, industrial manufacturing, and life sciences. With a global footprint and decades of industry-specific expertise, HDS ensures that every engagement delivers not only technology alignment but also measurable business outcomes that are relevant to the client's sector. By combining deep domain knowledge with advanced digital capabilities, HDS enables organizations to move beyond pilot projects to a fully scaled, enterprise-wide transformation that drives innovation, efficiency, and resilience.

Conclusion

HDS delivers an integrated ET-IT-OT transformation framework that unites engineering, information, and operational functions into a single, business-aligned environment. In CIMdata's experience, this drives innovation, efficiency, and resilience across the entire value chain, enabling organizations to achieve operational excellence, faster time-to-market, improved ROI, and sustainable business outcomes.

Companies that adopt HDS' AI-powered digital threads and digital twins gain real-time synchronization across design, manufacturing, and service. These digital threads capture and synchronize information from design into manufacturing, and from production into service and back into engineering. Each loop improves visibility, traceability, and continuous feedback, thereby ensuring that insights gained at one stage of the product lifecycle drive improvements in all successive stages. With AI enabling real-time analysis supporting these loops, organizations can optimize product quality, asset performance, and operational efficiency—leading to proactive decision-making, faster innovation cycles, and accelerated business value. By utilizing advanced technologies such as robotics simulation, immersive factory visualization, and industrial metaverse platforms, HDS empowers organizations to design, simulate, optimize, and validate operations virtually before implementation. These tools reduce deployment risk, improve operational efficiency, and enable companies to build resilient, intelligent, and adaptable systems.

By leveraging HDS' proven frameworks, implementation accelerators, simulation models, and deep domain expertise, organizations can reduce transformation risk, shorten implementation cycles, and achieve measurable outcomes more quickly. HDS' smart factory solutions, AI analytics, and industrial metaverse platforms advance a company's ability to move beyond isolated pilots to scalable, enterprise-wide transformation.

CIMdata recommends that companies seeking to enhance performance across the entire product lifecycle and associated digital thread evaluate HDS' integrated ET-IT-OT approach. This end-to-end methodology

not only unlocks innovation and efficiency but also provides a sustainable competitive advantage in an increasingly complex industrial landscape.

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.