APPLIED CAx

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Rapid technological innovation, growing cybersecurity threats and mounting economic challenges are squeezing industrial organizations from all sides.

Amid rising global tensions, aerospace and defense firms are under pressure to deliver resilient digital command systems and AI-powered autonomous platforms. Meanwhile, energy providers and utilities must contend with the shift to distributed resources and ongoing sustainability efforts, which require real-time data and reliable infrastructure. Workforce shortages and increasingly complex supply chains further compound these issues.

In this new reality, modernization is no longer optional.

But moving fast without compromising performance, safety or compliance is difficult—especially in industries defined by aging systems and strict regulations. Traditional application development approaches that rely on specialized resources and custom integrations struggle to keep up. And all new software must go through recertification or authorization cycles to verify compliance with security, operational and regulatory standards, which can delay deployment by months or even years.

Low-code, AI-assisted development offers a better path forward.

Built for speed and governed for scale, Mendix delivers a modern development platform that helps industrial teams build secure, reliable applications faster—without disrupting existing systems or workflows. With Applied CAx's deep expertise in engineering and enterprise integration, organizations can confidently deploy Mendix applications across high-stakes domains.

The role of low-code in modernization

Low-code uses visual interfaces, reusable components and baked-in integrations to simplify application development and shorten time to value. It lowers the barrier to entry for engineers, analysts and compliance leads who need tools tailored to their domain-specific workflows, but don't have the time or skills for traditional coding.

Mendix is designed specifically for enterprise-grade, industrial-scale use cases. Teams can create purpose-built applications that both meet current needs, such as optimizing manufacturing operations or digitizing engineering workflows, and scale over time. Prebuilt modules further reduce the time and effort required to create feature-rich applications. Mendix's modular, container-based runtime supports flexible deployment: on-premises, in the cloud, in hybrid environments and even in air-gapped networks—a vital capability for defense and critical infrastructure organizations, where any external network exposure is tightly controlled or outright prohibited. Plus, with built-in governance features such as version control, automated testing and granular access management, teams can innovate quickly while staying compliant with security and audit requirements.

For entities subject to federal oversight, Mendix also addresses the delays associated with obtaining an Authorization to Operate (ATO). This formal approval—a prerequisite for running software on a secure government network—typically takes several months to obtain, but the Private Mendix Platform (PMP) can reduce ATO cycles by as much as 80%.

PMP is a FedRAMP-aligned environment within Amazon Web Services (AWS) GovCloud that offers continuous compliance monitoring, a zero-trust security architecture and preapproved templates. It inherits FedRAMP High-level controls from AWS GovCloud, providing agencies with pre-validated infrastructure. This reduces the number of security assessments required for ATO approval. It also creates a controlled environment in which all data, workloads and personnel remain within U.S. boundaries, maintaining data sovereignty and compliance.

Integrating complex systems

One of the biggest barriers to modernization is fragmented operational data. Engineering, operations, supply chain and maintenance teams often work in their own digital silos, with limited visibility into other systems. Custom integrations can seem like acceptable workarounds, but they rarely scale—and often introduce new risks.

Instead of hardcoding every integration, organizations can use Mendix to standardize and automate data flows. There's no need to rip and replace, either, because Mendix integrates with critical systems such as product lifecycle management (PLM), enterprise resource planning (ERP), SCADA and GIS. With support for REST, SOAP, Kafka and OData protocols, plus a growing library of native connectors, the platform acts as a modernization layer that connects and orchestrates these disparate systems.

For example, a defense contractor using Siemens Teamcenter for PLM and SAP for ERP can use Mendix to automatically push approved product design changes into procurement, update production instructions and trigger downstream maintenance planning—all within a governed, traceable environment. This approach maintains data fidelity and process integrity while creating resilient, adaptable applications.

AI-driven development and operations

As competitive and regulatory pressures increase, industrial organizations must modernize faster and uncover new business opportunities. Mendix integrates artificial intelligence (AI) across the entire application lifecycle—from design to deployment to integration—to support these efforts.

Maia, Mendix's built-in AI copilot, accelerates application delivery without sacrificing structure or maintainability. It helps generate data models, build logic flows and design interfaces based on plain language inputs. For example, a user can describe what they want an app to do, and Maia will generate a functional prototype, complete with test data and workflows. In addition, Maia supports the Model Context Protocol (MCP), which makes it easier to integrate AI agents with external platforms and orchestrate advanced workflows.

AI opens the door to a wide range of operational use cases in production. Predictive maintenance models detect anomalies and flag potential equipment failures to protect against downtime and outages. Automation orchestrates multi-step processes, such as analyzing sensor data, generating work orders and routing them to maintenance, repair and operations systems.

Mendix also supports AI in sensitive environments, allowing organizations to run generative and predictive models within IL4–IL6 classified environments. This happens through PMP's integration with AWS Bedrock, which provides access to foundational AI models as a managed service—meaning there's no underlying infrastructure to manage. For defense, energy and other critical sectors, this makes it possible to apply AI without exposing sensitive data or introducing compliance concerns.

Real-world applications

Across industries, organizations are solving complex, high-value problems with Mendix's AI-assisted, low-code development:

- **Aerospace and defense manufacturers** use Mendix to connect PLM and ERP systems, replacing email-based approvals with automated workflows and dashboards. These integrations speed up engineering change reviews, reduce rework and provide greater visibility into production readiness.
- **Utilities** merge OMS, GIS and SCADA data into a single workspace for greater reliability. Dispatchers gain a real-time view of field conditions so they can quickly understand electrical grid status, identify faults, and prioritize restoration activities.
- **Energy companies** can build chatbots that use MCP to triage questions about equipment performance and route tasks accordingly. If a query determines that equipment needs scheduled maintenance, for example, the chatbot can hand off the task to a system that handles work orders.
- **Government research facilities** build cleared portals to securely aggregate performance and operational data from multiple classified networks. These portals allow management to track key performance indicators and make informed decisions without exposing underlying classified or sensitive data layers.

Business and technical benefits

Mendix helps industrial organizations modernize with less risk and more control. Key benefits include:

- **Reliability:** Built on a cloud native, containerized architecture, Mendix supports high-availability deployments with blue-green releases, auto-scaling and continuous monitoring. Predictive analytics and AI-assisted workflows reduce unplanned downtime.
- **Speed:** Visual modeling, AI-assisted logic and reusable components cut development cycles from months to weeks. Integrated continuous improvement/continuous deployment pipelines support secure, testable iterations that remain compliant throughout the application lifecycle.
- **Security and compliance:** Role-based access controls, encryption and audit trails support standards including SOC 2, GDPR, HIPAA, and ITAR. PMP extends these capabilities up to IL6 environments, enabling secure innovation in classified settings.
- **Efficiency:** Automated data flows between systems eliminate manual reconciliation and redundant entries. AI recommends process improvements and flags issues early, helping teams move faster and with greater precision.
- **Collaboration:** Mendix fosters cross-functional development, allowing engineers, developers and analysts to build and iterate together. Applied CAx supports this model with industry-specific frameworks and templates that align with engineering best practices.

Modernize with confidence

Digital transformation is happening quickly across the aerospace, defense, energy and utilities sectors. But speed alone isn't enough. Modernization efforts must provide measurable business value while also preserving trust and control.

That's why global leaders across these and other highly regulated industries rely on Mendix. As part of Siemens Digital Industries, Mendix harnesses deep vertical expertise to help organizations bring innovative products to market with more connected, intelligent operations. And as a proud partner of Siemens, Applied CAx complements these capabilities with a wealth of experience in PLM, simulation and enterprise platform integration. By grounding strategies in the realities of complex industry workflows and safeguarding data integrity, Applied CAx helps organizations maximize the return on their digital investments and drive long-term transformation.

Together, Mendix and Applied CAx empower industrial teams to modernize with confidence and to build adaptive, resilient systems that position their organizations for sustained success.