

CIMdata®

Adapt and Extend PLM for Optimum Productivity

Mendix: Siemens low-code solution for tailoring product and production processes

Key Takeaways

Businesses today struggle to adapt technology solutions to create tailored, highly productive working and operational environments—due to increasing product, process, supply-chain, development, production, and service complexity.

Businesses need to easily be able to tailor their operational environments and reduce non-value-added activities while supporting diverse value chains by integrating data sources and supporting users with tailored, easy-to-use apps on their devices of choice.

Siemens is applying its Mendix low-code solution throughout their Siemens Xcelerator portfolio to enable businesses to more easily and rapidly create the value chains they need to establish and maintain their market competitiveness.

Mendix enables companies to improve their performance by simplifying employees' access to data, ensuring they can maximize the value they extract from that data, and extending that data to non-PLM users all via a low-code solution.

Introduction

Complexity in business is increasing across all areas, including multi-domain products, production, diverse supply chains, personalized sales, product as a service (PaaS), customer service, sustainability, and the circular economy. Manufacturers must manage these complexities while accurately handling their complete product definition and bills of materials (BOMs).¹

Users throughout an enterprise can be overwhelmed by using multiple solutions for product-related information, each with a different user experience. This inconsistency adds time and introduces errors in managing the various data sets within a product's lifecycle.

Locating and accessing needed product-related data can be difficult and time-consuming, as information is often spread across multiple, distributed data repositories managed by different applications and departments. Integrating these systems can be resource intensive.

Businesses and users want adaptable applications and systems and the ability to create working environments tailored to their needs. They seek tools that help them maximize the value of their IT

¹ Research for this paper was partially supported by Siemens.

investments, allowing for easy data access and use, regardless of device or location. Personalizing these solutions ensures each user has a fit-for-purpose experience for their role and responsibilities.

Mendix: Adapt and Extend PLM Across the Product Lifecycle

Mendix, a low-code application development platform, is a foundational part of Siemens Xcelerator portfolio. It enables professional programmers, citizen developers, subject matter experts, and business analysts to create or adapt and extend their business solutions and processes and create tailored user experiences with integrated workflows using a graphical drag and drop paradigm.

Mendix offers a versatile platform that empowers users to create intuitive user interfaces and tailored experiences. It seamlessly integrates both local and remotely managed information, allowing for a cohesive flow of data. Users can aggregate, display, report, and update data in ways that enhance productivity, whether for an individual or the entire enterprise. This capability extends the reach of both Product Lifecycle Management (PLM) and non-PLM managed data, making it accessible and useful to non-PLM users as well as PLM users. By leveraging Mendix, organizations can ensure that their data is not only more accessible but also more effectively utilized, fostering a more productive and efficient working environment.

Connecting Mendix

Connectors: Connectors are implemented as Mendix modules and used in app development to simplify connecting to existing third-party solutions or other Mendix applications, bringing low-code experience to map the data for use in applications.

Integration: Integration with other applications (other Mendix apps or applications built with different technology) can be done using REST, OData, GraphQL, SOAP/Web Services, or Business Events. Mendix can also import and export data using XML and JSON and supports integration with machine learning models.

REST Integration: In Mendix apps, the published REST services from 3rd-party solutions can be used. The REST Connector will abstract complexity, but users are expected to know how to use those APIs.

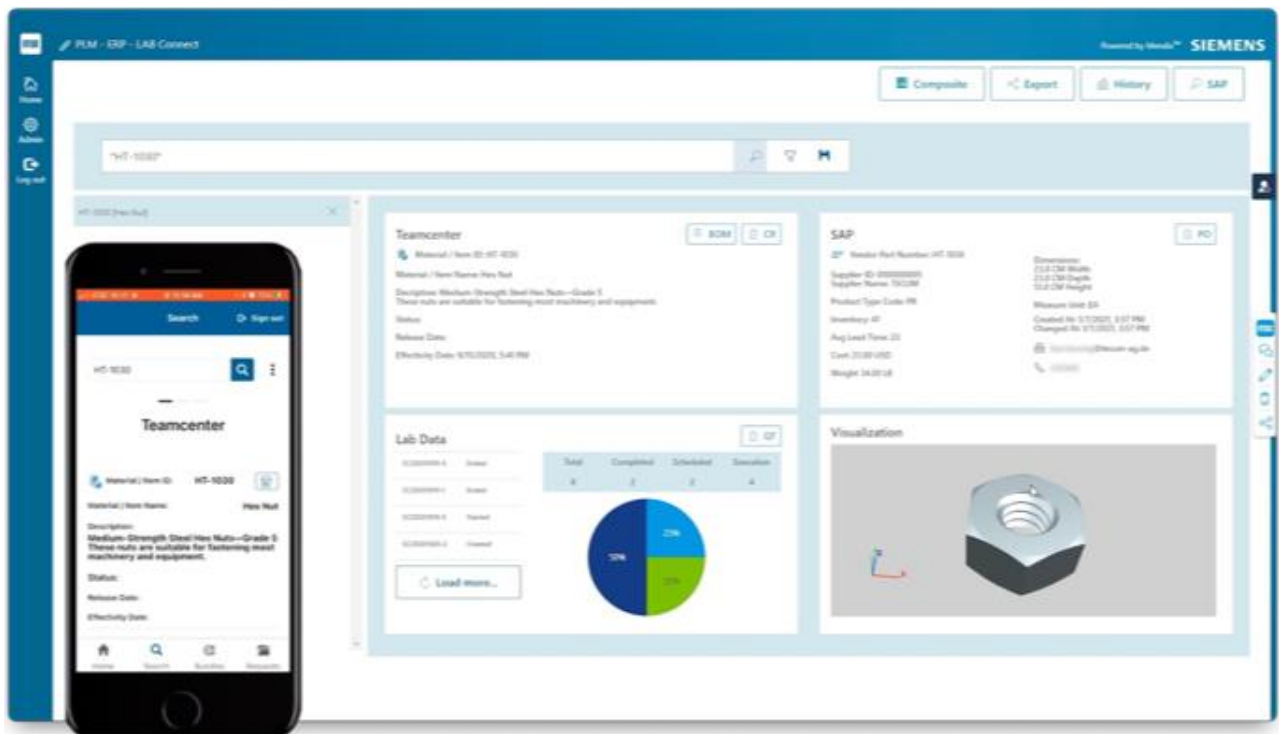


Figure 1—Mendix Application Combining Data from Teamcenter and SAP Illustrates Multi-Experience Capabilities (Courtesy of Siemens)

Mendix provides pre-defined connectors and integrations to both Siemens delivered and a wide range of third-party applications and solutions. Each of these solution approaches enables developers and individual users to adapt and extend a core application or solution to best meet users' and organizations' business functional requirements.

Within the context of Mendix, "adapting" means modifying the manner in which an application or system functions and/or delivers information to end users (or other systems). "Extending" allows an application to automatically or manually search for, access, and combine data from various systems within an extended enterprise or value chain. Integration of data provides users with a comprehensive understanding of a product's definition or status, enabling them to make quicker, more informed decisions relevant to their roles and tasks.

Additionally, Mendix can be used to create UIs and user experiences tailored to roles and tasks. While Mendix is a Siemens product, it can be used by a company as a standalone low-code platform to adapt, extend, and tailor both in-house and third-party solutions.

Mendix in Siemens Xcelerator

Mendix technology is being used to expand integrations between Siemens solutions and many third-party solutions. This expansive use enables both Siemens and its customers to more easily adapt and extend their current technological environments to achieve maximum effectiveness and return on their investments in their extended enterprise development, production, and service environments.

Mendix is the tool used to adapt and/or extend the Siemens Xcelerator functionality and capabilities to businesses' unique requirements. It enables customers to create functionality to solve issues that may not be supported by a commercial or OOTB solution. Additionally, the Mendix marketplace is a portal that provides easy access to reusable components and complete solutions for app developers to use.

Siemens uses both connectors and integrations between Mendix and technology solutions to deliver the desired functionality. Connectors support the drag and drop or no code paradigm and integrations leverage a more traditional process. Both enable Siemens and their customers to adapt or extend solutions within the Siemens Xcelerator portfolio to enable needed flexibility.

As an example, the Teamcenter Extension sits inside Mendix and contains user interface elements, has access to the Teamcenter data model, and is used to generate low-code building blocks. It also generates the necessary logic and artifacts to build apps on mobile platforms. The Siemens Xcelerator portfolio uses integrations, connectors, and extensions to connect to the Mendix platform. CIMdata expects these capabilities to evolve over time and more and more of the portfolio will be exposed via extensions.

Mendix and Opcenter: An Example

Opcenter is the Siemens Xcelerator solution designed to support manufacturing operations management (MOM). Capabilities include planning and scheduling, quality, execution, reporting, and laboratory information management (LIMS). The Opcenter development team deeply integrated Mendix into the core solution. It exposes the diverse data model and provides UI and process management capabilities. It is a native method to add capabilities to Opcenter and enables customization and integration by customers.

Opcenter also comes with tailorable, adaptable low-code templates for persona-based, industry-specific, and process-centric solution creation. Some examples of industry or process or persona tailored Opcenter templates built with Mendix include:

- Operator Terminal for automotive
- Work Order Screen for complex and A&D manufacturing
- Production Operator Terminals for Process/CPG and Semiconductor manufacturing
- KPI view and Downtime Management

DAB Pumps, a long-term Siemens customer needed to replace the obsolete UI of their Opcenter-based production line MES solution. The requirements included maintaining the look and feel and functionality to minimize re-training and change management while minimizing development time and ensuring easy upgrades. Since the latest Opcenter release included Mendix embedded within its core, they chose to adopt it. According to Siemens, DAB Pumps was able to adapt the Opcenter templates to fit their corporate guidelines and reduced development effort by 30%. The new user experience resulted in improved user engagement and improved user satisfaction.

In a demonstration example Siemens showed a Mendix app that linked Teamcenter, SAP, and Opcenter for production of a dune buggy automotive product. The app extracted data from NX, Teamcenter, SAP, and Opcenter and combined and displayed it (including a 3D view) to support the manufacturing change process. Trying to create this specialized app using typical application development tools would be very difficult and time-consuming.

Conclusion

Manufacturers face increasing complexities in product, production, supply chain, and service areas. These challenges include diverse information repositories, multiple user experiences, and the need for integration across various domains like mechanical, electrical, and software. Companies require easy-to-use tools to adapt and expand their product development, production, and service solutions, providing comprehensive, user-tailored information.

Siemens addresses these issues by incorporating Mendix into the Siemens Xcelerator portfolio. This enables companies to adapt, extend, and tailor their business processes using low-code technology and pre-defined application connectors, creating a more productive environment. Mendix is widely used to extend and tailor Teamcenter and Opcenter, often with SAP, optimizing information flow between critical solutions. Low-code solutions speed development and enable non-developers to create solutions that improve business performance.

CIMdata recommends that manufacturers consider Mendix for acquiring, adapting, extending, and personalizing their product lifecycle applications and systems.

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.