COMMENTARY

CIMdata®

The Digital Product Highway

Enabling digital threads across the product lifecycle

Key Takeaways

CONTACT Elements' open web architecture, with a configurable data model, enables composable, reusable components to build applications and interfaces which provide the foundation for a digital thread.

CONTACT enables a closed-loop digital thread from requirements and project planning through product engineering, manufacturing, operations, maintenance, and through end of life as well as a web of digital threads and vertical integrations within each of these lifecycle stages.

CONTACT enabled Marel to create a "Digital Product Highway" for more efficient management of product data and collaboration across the enterprise.

CONTACT's digital thread capability enables companies to realize benefits to their top- and bottom-line and increase their resiliency.

Introduction

Many companies suffer from siloed data that is isolated and used within a given functional area but is disconnected and inaccessible to the wider enterprise. This siloed data results in time wasted searching for and often not finding information users need to do their jobs. An organization's processes should flow end-to-end across the product lifecycle, however often they are disconnected by these silos causing manual intervention, resulting in many inefficiencies. These pockets of siloed data constrained the organization's ability to collaborate and share insightful information across the extended enterprise. Without real-time visibility to product data, organizations struggle to make informed decisions and react with the speed and efficiency required in today's competitive marketplace.[1]

Companies with disconnected processes have huge challenges managing revisions and versions across information silos within the enterprise and across the extended value chain. A company's supply chain is critical to their success. Supply chains are complex, global, and multi-tiered, so it is essential that they are well connected with stakeholders throughout the enterprise. These disconnects impact quality, which is

[1] Research for this paper was partially supported by CONTACT Software.

everyone's job. Siloed information inhibits the ability to enable proactive quality control. This results in more defects and increases the cost of quality.

Data that is not connected results in many inefficiencies including schedule delays, cost overruns, and dissatisfied customers, all of which impact bottom-line profits, top-line revenues, the resiliency to adapt to market disruptions and respond to new business opportunities.

Without connecting data and processes across the enterprise, companies lack visibility and traceability, which prevents optimization and increases both risks and costs. As products become more complex, smarter, and more connected with increased digitalization, and as business models shift toward product as-a-service, companies are looking to take advantage of digital threads.

What is a Digital Thread?

A digital thread is a framework that connects data and processes across an extended enterprise. It is often thought of as a linear thread because the product is managed across its product lifecycle from concept through life. However, a digital thread consists of a web of items or nodes that connect the data and decisions that are made in many complex directions that support the product.

The digital thread is traceable, bi-directionally across the web of items from many contributing departments, domains, and suppliers containing information that can impact how well others can perform their tasks. This traceability enables users to "look back" to prior decisions or views of data they wouldn't normally have. It provides information that people can use to understand "how" and "why" decisions were made. In doing so, this helps them to collectively collaborate more efficiently, resolving issues faster, performing analysis and tasks with the correct data to make more informed decisions.

One common application of a digital thread is enablement of the connection between a physical asset and its digital twin—a virtual representation (i.e., digital surrogate) of a physical asset. The digital threads enable the company to take advantage of the dataflows to and from the physical assets. This improves operations by generating valuable insights, resulting in more efficient processes, and monitoring and optimizing the physical asset. The digital threads are the pathways that connect hundreds of information nodes that enable the enterprise to keep a digital twin up to date with visibility and access to everything related to the asset in manufacturing or in operation and service. Connecting the physical asset to a digital twin or series of digital twins across a closed loop digital thread enables the enterprise to continuously develop and improve existing assets as well as improve the development of newer generations of the product.

Key attributes of a digital thread are:

- Openness, that enables integration to other applications besides those the solution vendor offers.
- Connectivity and interoperability, which allows seamless collaboration.
- Composable, providing the ability to readily expand the scope of architecture and applications across the enterprise.

The Benefits of a Digital Thread

Companies that have digital threads are more collaborative and productive. They accelerate their time to value, reduce their cost of quality, and are more resilient with increased ability to address challenges and opportunities with speed and agility.

The most obvious benefit to the end user is their ability to find data quickly. Using a digital thread, stakeholders can navigate and access the most relevant product data, enabling them to use this information to collaborate with others across projects, domains, departments, and throughout the supply chain.

The increased connectivity and visibility when using a digital thread across departments, enterprise systems (i.e., ERP, MES), and the supply chain accelerates the enterprise's ability to access the right data faster, enabling analysis and other tasks to be performed more efficiently. This increases a company's operational productivity and accelerates their time-to-value.

When everyone can access the same data, and trace back to when decisions were made, it reduces defects caused by incorrect data. This enables quality to become everyone's concern without extra effort.

CIMdata's view is that a company that has visibility across its end-to-end processes is more resilient because it is connecting the many different specialized areas that impact each other. This enables the collective organization to be more informed and have greater and quicker insights into how to address potential disruptions or take advantage of market opportunities faster and collaboratively. CIMdata believes this ultimately has a positive impact on their top- and bottom-lines.

Technology and Approach

CONTACT Software offers a set of five products in one platform: PLM, IoT, Project Management, Collaboration, and Integration. CONTACT Elements is the underlying open architecture and configurable data model which enables composable reusable component applications and interfaces. It provides the foundation to allow for an end-to-end digital thread across the digital enterprise. This modular approach enables applications to be composed and updated faster than more monolithic approaches.

CIM Database PLM is an open, scalable PLM software that enables collaboration and flexible processes within projects, across disciplines and systems, and across the extended enterprise. It consists of PLM modules based on the open, modular low-code Elements platform.

CONTACT Catalyst Web Services are the building blocks based on standardized technologies that enable the development of enterprise applications. CONTACT Catalyst integrates the PLM platform and CIM Database with other large enterprise applications such as ERP, which enables the digital thread capability.

CONTACT Elements creates both horizontal and vertical connectivity. While it can connect horizontally across the product lifecycle, it also enables vertical integration from any lifecycle stage. Marel, a full-line supplier of innovative food processing solutions, were able to use CONTACT to enable a "Digital Product Highway" ensuring that everyone is looking at the correct information, in easy-to-understand formats with data consistency in a cohesive integrated approach from concept through end-of-life. There are several benefits to this approach, such as process harmonization, which can be observed in Marel's Digital Highway approach. Also, from an automation perspective (i.e., data integration, data distribution), CONTACT provides considerable benefit to support mass data processing and consolidation. From a corporate strategic perspective, having the flexibility to deal with post-merger/acquisitions where processes need to be harmonized is another key benefit.

Conclusion

CIMdata believes that to maintain market competitiveness, companies must digitally connect their end-to-end processes and adopt the use of digital threads across their extended enterprise. CIMdata is impressed with CONTACT Elements open web architecture. The configurable data model enables

composable, reusable components on which organizations can build applications and interfaces, which provide a foundation for a digital thread. CONTACT enables a closed-loop digital thread from concept through life as well as a web of digital threads and vertical integrations. This promotes improved efficiency, quality, time-to-market, visibility, collaboration, more informed decision making, and ultimately impacts the top-line and bottom-line. CIMdata recommends any company looking to enable end-to-end connectivity with both horizontal and vertical integration consider CONTACT Software.

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.