

Digital Thread: Are You Progressing?

CIMdata Commentary

Key takeaways:

- *The concept of a digital thread is becoming mainstream within manufacturing companies and is often part of a digital transformation program.*
- *Connecting silos throughout the lifecycle with a digital thread to improve data integrity, access, and business performance is a common goal of many digital transformation programs.*
- *CIMdata research shows companies continue to struggle to achieve success in their digital thread projects even as they adopt agile-based development methodologies.*
- *Successful digital transformations need to address people, process, and technology.*
- *The Aras PLM Platform's low-code approach and web services architecture enables agile development, easy silo connection, app development, and business process evolution, to properly support digital thread creation and maintenance.*

Introduction

Many companies have had digital transformation programs running for several years focused on creating a digital thread. CIMdata's annual *PLM Status and Trends survey*¹ shows the following:²

- PLM appears to have gained momentum in 2020 but management disconnect is believed to be widespread.
- Implementation scope continues to be focused on the traditional PDM aspects of PLM such as engineering release, change management, engineering data management (pre-release), configuration management, product engineering process management, and global engineering collaboration.
- Digital thread, digital twin, and digitalization are not growing in scope as fast as other advanced PLM topics such as additive manufacturing and artificial intelligence and machine learning.

For the traditional PDM-focused implementation scope items, 35% to 63% of the respondents indicated the areas listed about in the second bullet were in scope and the number of companies claiming this scope has grown over the last three years. According to the same survey, digital twin/digital thread and digitalization adoption were basically flat from 2019 to 2021. This point is interesting considering the buzz in the PLM industry over digital thread, digital twin, and digitalization. A possible explanation for the lack of growth is that these are hard to implement, and companies are not achieving their goals. We hope next year's survey will show more growth in PLM-related "digital areas."

Furthermore, CIMdata's extensive experience working with industrial companies and our resulting knowledgebase indicates that, while many companies have pieces of their digital

¹ <https://www.cimdata.com/en/education/educational-webinars/webinar-2021-plm-status-trends>

² Travel and/or other expenses related to this commentary were provided by Aras Corp

thread connected and in production, most of these pieces are within a few domains or departments and only a few cross those boundaries. CIMdata often sees PLM to ERP integrations, but few operate as a true digital thread, most just pass items and BOMs in one direction helping avoid rekeying data, but workflows, such as change processes, rarely cross boundaries automatically and require manual checking across multiple systems—a broken digital thread.

These facts beg the question, are companies having success with their digital transformation programs? What functions contribute information to your digital thread? Are elements connected and running in production? Are benefits of a digital thread being seen, or are such initiatives moving slowly, stuck, or even failed? Please answer the [short survey](#)³ so we can get more insight on this topic.

This lack of digitalization success is interesting and in CIMdata's experience at least one of the following three elements has failed: people, process, or technology. Often, legacy technology cannot be adapted to support people and process needs. In general, investigation to determine why the projects are not going as planned and to develop a comprehensive strategy to move forward are required. This will likely result in significant updates to a company's digital strategy, and in the worst case a restart may be needed.

Digital Transformation

Many of the benefits related to digital transformation are well understood. Digitalization of data, extracting it from documents into data elements makes it more useable, re-usable, and actionable. Elimination of application and data silos by consolidating systems and building integrations among data silos makes information flow faster and easier while providing better traceability. These changes lower cost, while improving quality and speed to market and enabling more resources to be focused on innovation.

Digital transformation is still a project with a large IT component that needs proper planning and management. While people, process, technology, and data all need to be addressed holistically many believe that the best practice is to lead with process design and follow with technology design. Unfortunately, this isn't true. In fact, there is a high likelihood that technology will influence process design. Business opportunities and processes can be significantly improved when they take advantage of technology capabilities and features. For example, a digital thread that uses IoT to connect digital twins to their physical instances can enable condition-based and predictive maintenance models that can improve field service revenue and even enable a new business model. As a result, the true best practice is to look to improve people, processes, and technologies in an iterative and continuous manner.

Unfortunately, most companies are still struggling with the IT project portion of digital transformation. This issue has been recurring since the inception of IT and most IT projects fail to meet expectations—digital transformation projects are not an exception. According to the Boston Computing Group, 70% of digital transformations fall short of their objectives, often with profound consequences and digital leaders achieve earnings growth that is 1.8 times higher than digital laggards.⁴

CIMdata often sees failures due to legacy technology and strategies. A key takeaway is to not get stuck in the sunk cost fallacy. Continuing to invest in a failed strategy is not a good business decision. Write the loss off and move forward with a more considered approach. For PLM, the

³ <https://www.eSurveysPro.com/Survey.aspx?id=04343dee-37d4-4a00-b4c3-b7efd3a1ce80>

⁴ <https://www.bcg.com/publications/2020/increasing-odds-of-success-in-digital-transformation>

product innovation platform is the best-in-class strategy.⁵ Business processes must be designed to meet the company vision and business objectives and those processes implemented with a product innovation platform that is configurable and sustainable.

Aras Platform

CIMdata has [written extensively about Aras over the years](#),⁶ including that they have an architecture that provides excellent support for data and process management needed to manage product lifecycles. Additionally, it is adaptable to business and IT architecture changes (e.g., the most recent adaption is Aras' recent release of a SaaS option). Aras Innovator has been able to leverage cloud infrastructure from any cloud provider including Amazon AWS, Microsoft Azure, and Google Cloud, via virtual machines since its inception, but the new release transforms Aras Innovator into a containerized solution so it can leverage the cloud provider's infrastructure for scalability and management tools. The Aras SaaS solution is based on Microsoft's Azure platform. CIMdata believes that being Microsoft only will be fine, and if there is customer demand, we are confident that Aras will create a SaaS version for AWS and any other necessary platform.

Creating Digital Threads

Aras' customers have been creating digital threads from Aras' inception. The service-oriented architecture (SOA), federation, and low code approach have been available from Aras Innovator from the beginning. An early memorable customer was Xerox⁷ who presented at ACE 2010 and reviewed how they used Aras Innovator to encapsulate existing silos and connect them together for improved business performance, creating a digital thread long before the term was defined. The advantages listed in the presentation were:

- Not tied to a single vendor
- Data is not held hostage
- Agility to meet business needs
- Best of breed tools approach
- Make use of existing legacy information/tools
- Map business practices to business data
- Enable communication between disparate systems

Xerox used a handful of people to create a solution that linked data from many systems to create an item master that referenced data from many source tools and a complex change process that referenced information from many silos, logically breaking them down without the pain of really doing it. CIMdata found this solution impressive back in 2010, and believes all the concepts Xerox implemented in 2010 are still relevant.

Digital Thread Infrastructure

Aras' architecture is a modern rendition of what Xerox used to develop their advanced solution in 2010. New services and additional applications have been created to broaden and deepen Aras Innovator's lifecycle support including visualization, systems engineering, technical documentation, and MRO. The services and flexible data model enable creation of apps that connect data from anywhere in the lifecycle. For example, what if changes in requirements

⁵ <https://www.cimdata.com/en/resources/about-plm/a-cimdata-dossier-plm-platformization>

⁶ <https://www.cimdata.com/en/resources/solution-provider-profiles/plm-dossier-aras>

⁷ <https://www.aras.com/-/media/files/resources/whitepapers/aras-plm-model-based-soa-architecture-enterprise-application.ashx>

need to be connected to technical documents and spare parts lists? Within Aras Innovator all the information is accessible from the platform services making the app creation and data access use the same low code engine as any other part of Aras Innovator making it easy for developers and business analysts to not only extend digital threads easily but also quickly create new apps.

Aras's approach to enabling digital threads with the Scalable Agile Framework (SAFe) to improve Aras Innovator is having great success. Aras develops web services to address a problem space then builds apps that leverage those services to solve specific problems. This approach makes developing their product and testing it more complex, as is it difficult to predict how customers will configure the solution, but it ensures that customers who want Aras Innovator to connect silos can be easily supported as the web services are built to solve a more general problem rather than just link their own solutions. This also incentivizes Aras to ensure services perform well, and does not incentivize Aras to make 3rd-party or competitor solutions perform worse.

While Aras is known for the ability to create custom solutions via configuration, while at the same time guaranteeing that they are upgradeable, Aras also has a growing suite of Out of the Box (OOTB) solutions. Product Engineering is prebuilt to support CAD data and documents with a preconfigured CM2 change process and embedded viewer. Program management is a multi-user Microsoft Project-like application that connects to Product Engineer and supports deliverables management. Digital Twin Core enables the connection of physical assets to the digital model.

Conclusion

Creating the digital thread, connecting silos to integrate data and processes is a major element of most digital transformation initiatives. The benefits of digital threads are well understood, but so far companies have struggled to achieve the promise. Every implementation has its reasons for lack of progress, but they usually come down to people, process, technology, and data.

Platforms are the state-of-the-art for digital transformation technology and agile development is the state-of-the-art for solution development and deployment. Both are critical enablers of digital transformation. CIMdata believes these foundational elements combined with a well-defined vision and strategy will enable companies to meet their business vision and digital thread objectives.

The Aras platform is proven to deliver the technological capabilities required to create and manage digital threads. CIMdata has talked with many Aras customers that have created digital threads. They often comment on the ease of development the low-code platform enables and how they can embrace and extend legacy solutions and configure new solutions. Companies looking to create or extend digital threads need to develop a holistic plan that addresses all the dimensions of the issues, and should evaluate the Aras platform as a solution to enable their plan.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design, deliver, and support innovative products and services through the identification and implementation of appropriate digital initiatives. Since its founding nearly forty years ago, CIMdata has delivered world-class knowledge, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) solutions and the digital transformation they enable. CIMdata also offers research, subscription services,

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