

eBook:

A Blueprint for

# Digital Transformation:

Meeting the Challenge of Product  
Complexity for Global Manufacturers



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## Section 1: EXECUTIVE SUMMARY

Global manufacturers need to take immediate action to reduce their chances of being disrupted – either from existing competitors, or worse, caught unaware by new market entrants. Defending or advancing market share requires new business models that are supported by smart, connected products, and refined by continuous, closed-loop customer feedback to drive the perpetual motion required to stay ahead of the competition.

To set the foundation for growth in this era of smart connected products, manufacturers must rethink business processes and connect siloed systems. This requires a modern, platform-based approach that enables them to quickly change and evolve product processes as their business needs change. The result of connecting processes and systems is full product lifecycle traceability and creation of the Digital Thread.

In the first eBook, “How Most Companies are Getting it Wrong with Digital Transformation”, we provided a definition of the Digital Thread and its importance as part of an organization’s Digital Transformation. **In this eBook, we provide a blueprint to begin your move to the Digital Thread, in five concrete steps, with examples of companies who are actively pursuing it within their organizations.**

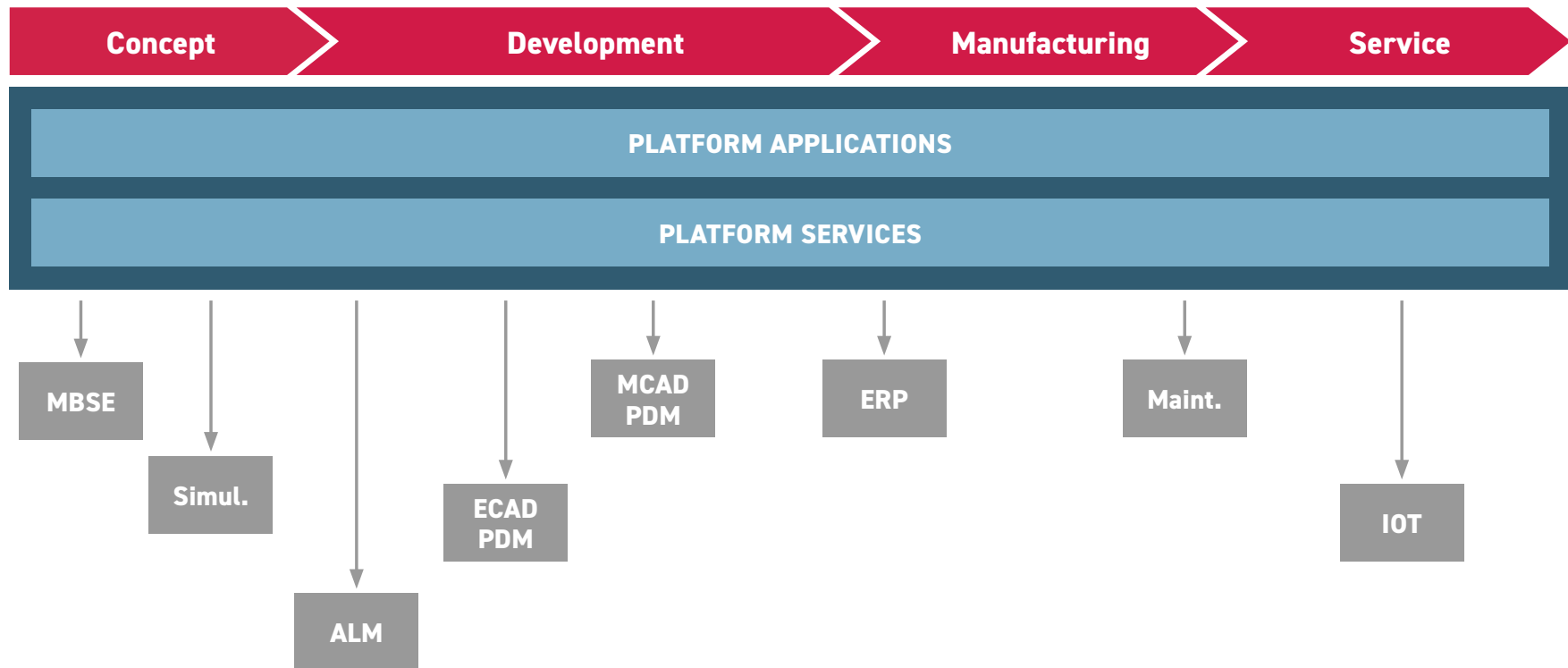


## What is the Digital Thread?

If you read the first eBook, you know that the Digital Thread allows anyone across the product lifecycle to trace the connections between a product and its digital assets, from initial capability planning and analysis, through design, manufacturing, testing, and on to final sustainment and disposal phases.

The Digital Thread allows companies to connect product information generated by a multitude of product functions including:

- Product Requirements
- Simulation Models
- Electronics and Embedded Software
- Manufacturing Process Plans
- Service Records
- Industrial Internet of Things



*Only a platform approach can sustain the Digital Thread*

## Get Ahead with Digital Thread

Following the blueprint to pursue the implementation of the Digital Thread allows organizations to link silos of information, add capabilities on top of legacy software investments, or replace them entirely. Those who follow this approach will be able to scale the development and manufacturing of next generation smart, connected products or processes.

Aras customers who are actively pursuing the Digital Thread are creating positive outcomes for their organizations. Linking information between disciplines and throughout the product lifecycle will result in:

- **Productivity gains**  
Delivering on-time product launches or process improvements to differentiate and compete in the digital era
- **The ability to rapidly respond to customers**  
Improving product quality and support to maintain long-term relationships
- **Market expansion**  
Supporting new markets, new service business models, and creating new or improved products, or product upgrades
- **Sustainable feedback loops**  
Linking operations and maintenance data back to engineering for innovation and growth



## Section 2:

# A BLUEPRINT FOR ACHIEVING DIGITAL TRANSFORMATION

## Five Steps to Getting Ahead

Even for abstract concepts such as Digital Transformation, the fundamentals of success remain the same – the interaction of people, process, and technology. These are either barriers or success factors for global manufacturers who seek to transform their systems and processes – and critical to projects focused on the Digital Thread. The following section details five actionable steps towards achieving Digital Thread. These can help to serve as a blueprint to accelerate your Digital Transformation initiatives.



## Step 1: Lead by Stepping Back, Looking Within

Over time, organizations inherit processes that can be completely removed from the product lifecycle equation. For example, one company examined their delayed delivery times and found their employees were walking 400 miles a year just to grab safety harnesses. More than likely, multiple processes are directly affecting efficiency and/or conflicting with corporate strategy. **The first step is to surface any and all of these situations for discussion and validation.**

Review and document all processes at a granular level. Get an in-depth understanding of how and why these processes are what they are and the objective they are trying to accomplish. Why do they exist? When this process is finished, is there a benefit?

When companies run into dead-end processes, they may end up with someone needing to manually update someone on another team. You may also find that a process ends, and then data needs to be manually entered into a different system – increasing labor requirements and, even worse, increasing the risk of error or data loss within the process.

**Documented process maps are the outcome of understanding existing legacy business processes.** These process maps will be used as the tool to evaluate proposed changes as the Digital Thread project takes shape. They are a necessary component to the next step – understanding data architecture.



## Step 2: Dive Into the Existing Data Architecture

Understanding data architecture involves a comprehensive analysis of the relationships among an organization's functions, available technologies, and data types. The major types and sources of data necessary to support the business should be identified. **The second step is to define all of the relevant data that exists, including how the business currently stores this data.**

When companies have data models that had been implemented in different ways, it makes it difficult to understand the control and flow of data within their systems. These disconnected data models can increase costs as individual users rely on old, manual processes to extract data and incorporate it into other tools like spreadsheets

and databases for analysis. The result is a process that is inefficient, error-prone, and even more disconnected than ever. According to Oliver Wyman's report, "Perspectives on Manufacturing Industries", 25-45% of all costs in engineered products add no value to the product or the customer.

Reviewing the data architecture forces organizations to document internal and external information flows **to identify information shortcomings, siloed departments and obsolete technology systems.**

Go to the next page to take on the data architecture challenge!



## Take the Spreadsheet & Access Database Challenge

Can you beat 250,000?

Count the number of spreadsheets and databases used in your organization to manage information. One manufacturer did just that and came with 250,000 different spreadsheets—31 terabytes of data that was not being managed or controlled in a formal way. Just think of the efficiencies to be gained by connecting disparate data and processes with the Digital Thread!

## Step 3: Align Business and IT on Digital Thread Goals

**The third step is gaining organization alignment—business goals and objectives need to align with the process of execution.** For this to work, management has to be ready to change and adapt as the vision for the organization evolves. Mapping the processes to the product lifecycle is no small task. There are many disciplines within many different departments and cultures will vary.

To keep up with fast changing business requirements, organizations need an Agile approach to application development. To be successful, create teams that bring together the right people from the Business and IT. To do this, organizations must define the competences of the team to evaluate people, processes, and technology.

Once the team is established, you now have to focus them on the sea of issues you're dealing with and boil them down to manageable, critical items. **We recommend that organizations create a list of the “top 10 goals and business priorities” to accomplish with the Digital Thread.** It is important to align these with the business goals, strategies, and objectives – where they want to go now and in the future – and incorporate this information into the plan.

The next page depicts common challenges and best practices to ensure alignment as you start to execute.



To keep up with fast changing business requirements, organizations need an Agile approach to application development.

# The Never-ending Application Development Cycle

## Do You Face This?

### CURRENT REALITY

**IT:** What do you need? What are your requirements?

**BUSINESS:** My requirement is X, Y, Z, so give me exactly this...

**IT:** OK, I will develop exactly this capability. What do you think, Business?

**BUSINESS:** This isn't what I asked for, this isn't the capability I need, I really need this and this...

**IT:** OK, let me take these new requirements back and develop a new capability. What do you think of this?

**BUSINESS:** You're getting closer, but still not right, try again....*(and so on and so forth)*

### BEST PRACTICE

**FEASIBILITY:** Determine if solution ideas create business value, company value, and determine risk.

**PLANNING:** Build the project team and identify features, estimate scope, create plan.

**ITERATE:** Create sprints to convert iterations into code, test and demonstrate to stakeholders.

**ADAPT:** Use feedback from sprint, update plan, evaluate speed and adjust capacity as required.

**DEPLOY:** When iterations are complete, update production environment with new solution.

## Step 4: Implementing Better Processes Through Updated Technology Tools

Now that your priorities are in place, it's time to improve upon existing processes and implement them. You will then need to find the right tool to connect your processes.

**The fourth step starts with designing new or updated processes based on the “Top 10 goals and business priorities” from the previous step.** Be sure to include implementation and adoption steps up front in your project plan.

Be aware, even new processes can fail. They need to be fully tested and measured with proper training put in place. Also, communicate to the workforce ahead of time so they are ready for the change.

Once the desired process changes have been identified, it is time to align them to technology tools that will enable the processes to work. Select a partner or vendor to work with on a Proof of Concept (POC). For those not familiar, a POC is a demonstration of a certain process or idea in order to test its feasibility. This study will help you prove to the team that the software can solve specific requirements, validate key differentiators of a product, and minimize your risk.

Approaches to POCs can consist of: 1) targeting high risk areas such as an integration to a specific application; 2) prove an overall strategy such as a process that goes across several functional areas; 3) do a deep dive into a specific area like Project Management, or 4) can be used to test new ideas.

A key to success with POCs is making sure the partner or vendor has assigned a key stakeholder that becomes part of your Business and IT teams. **The fourth steps ends with building better processes through the use of better technology.**

With the vastly changing technology landscape, implementation will lead to some failures—there is no quick solution. The following page provides helpful guideposts to keep in mind as you lead your organization towards Digital Transformation.



## Success and Failure are Intertwined in Digital Transformation Projects

The best organizations know how to embrace the unknown, learn, and adapt quickly from missteps. As famed Novelist Samuel Beckett said “Try Again, Fail Again, Fail Better”.

### GUIDE POSTS TO FOLLOW:

1. Determine measures of success: establish this upfront to put everyone on the same page.
2. Codify your assumptions, test, record, and explore solutions; revisit and reassess as new information becomes available.
3. Focus on quick wins and fast fails: use agile development to build, test and iterate.
4. Manage uncertainty by minimizing deviation from established activities: do not pursue strategy unrelated to your business.
5. Build a culture that celebrates success and acknowledges failure as part of the process: enable people to try and fail constructively to create incentive to try and try again.
6. Socialize what you learn: have review meetings, and frequent checkpoints in a collaborative environment to build momentum.

## Step 5: Connect Your Product Lifecycle Processes Using a Proven, Platform Approach

According to respected industry analysts, using a modern, innovative platform is the most effective way to achieve true product lifecycle traceability. This type of connected platform is called a “Product Innovation Platform,” and should be the backbone for creating your Digital Thread. It is essential for those looking to design, deliver, and maintain smart, connected, and innovative complex products.

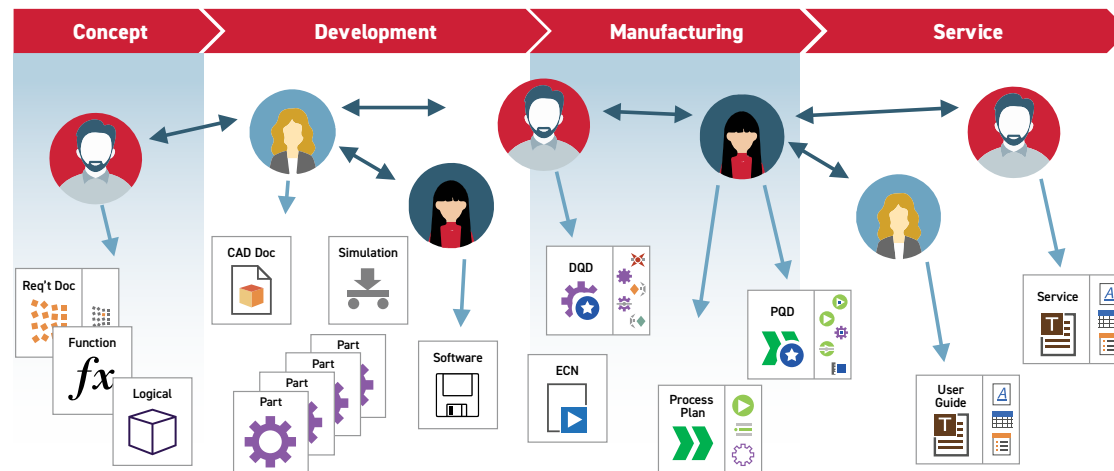
A platform approach allows you to connect all users and critical information to cultivate continuous creativity and collaboration in a single environment. Organizations can expect process improvements as well as the ability to develop innovative next-generation products at a higher quality.

Use the platform to connect the enterprise by integrating to critical applications, enhancing business processes by adding new capabilities, and replacing legacy IT. This includes users across all functions and

disciplines who operate within the product lifecycle. Be sure to budget for the opportunity and make sure there is room to iterate on the solution several times before releasing the common tool set.

Add capabilities over time, using an Agile approach, while continuing to knock off the “Top 10 goals and business priorities.” Aras customers report that continued successful delivery creates buy-in from other parts of the organization, which leads to new opportunities to solve complex problems.

Using a platform approach leads to the most exciting part, the creation of a Digital Twin—a digital replica of each unique configuration of product you produce. This digital product twin will have the ability to understand, react and update a configuration as changes occur throughout its operational lifecycle.



## Consider the Aras Product Innovation Platform Approach

“The Aras Platform is a proven Product Innovation Platform that is used across multiple industries and validated by independent analysts”

- CIMdata and Forrester Research

At its core, the Aras PLM Platform is an innovative model-based technology and a modern, service-oriented architecture (SOA) that allows companies to develop and modify applications, processes, and workflows far more easily than traditional product lifecycle management (PLM) systems that take a hard-coded approach and struggle to adapt.

Applications are built and modified using a visual approach via the Aras Modeling Engine and Models “subscribe” to the services they need, which ensures easier upgrades and the preservation of customizations. In fact, subscribers have their upgrades completed for them by Aras in a matter of weeks.

In addition, the Aras PLM Platform supports an open architecture, including open standards, APIs, and connectors, ensuring the platform easily integrates with other enterprise applications and legacy PDM/PLM systems. This open architecture does not compromise your security in any way—our platform was developed with network and data security as a top priority.

Finally, Aras’ open community approach means companies can participate in collaborative, open-source development and innovation, casting a wider net for capabilities that will accelerate and increase the value of their implementations.

**ADAPTIVE CLIENT**

**MODELING ENGINE**

Flexible data and process model

**SERVICES LAYER**

Standard PLM services

**REPOSITORY**

Model and data

*The Aras PLM Platform is based on a modern, service-oriented architecture (SOA) which makes application modeling quick and easy*



## Section 3:

# CUSTOMERS STEPPING UP TO THE CHALLENGE

## **Kawasaki**

Kawasaki Heavy Industries (KHI)

Streamlining product development and optimizing costs with a platform approach

Before the Digital Thread, each group within KHI developed their own systems and processes, resulting in many systems for the same processes. Another challenge was the lack of real-time communication and collaboration between departments. It was very time consuming to share product information across disciplines.

Using the Aras Platform approach, they linked critical information in CAD, document management, design data management, and related processes using the Digital Thread to help teams from Engineering, Quality, and Supply Chain collaborate, streamlining product development.



“The possibilities for streamlining both technical and business processes are almost endless with Aras, and the fact that the upgrades are included in the Aras subscription and performed by Aras is a significant benefit to us into the future”

Yutaro Mishima  
Information Planning Department,  
KHI



*KHI Product Picture:  
Develop the mid fuselage*



## GE Aviation Increasing inter-departmental collaboration through synchronizing systems

Relying on manual processes to translate engineering change to manufacturing change, GE Aviation lacked a robust business system to cascade engineering change orders into manufacturing change orders. This was resulting in failures in downstream quality testing.

Using the Aras PLM Platform, GE Aviation built a Digital Thread to synchronize the translation of Engineering Bill of Materials to Manufacturing Bill of Materials across multiple legacy manufacturing systems and locations. This resulted in increased inter-departmental collaboration and full visibility of change.





## Carlisle Brake & Friction (CBF) Handling increased product complexity with a standardized platform

As Carlisle Brake & Friction (CBF) moved into international markets to serve OEMs, they quickly found that the product development processes and products grew in complexity. Existing systems, including product data management, product management, workflow, test information and processes were managed in standalone and homegrown systems.

Using a standardized, single platform, they built a Digital Thread to establish a single source of truth for product data and processes supporting ITAR compliance, engineering processes, parts management, BOM management, change management and auditing for 11 manufacturing and purchasing facilities worldwide.



“The most significant driver for a new PLM approach was to unify data once stored and managed in multiple systems stored across the organization.”

Isaiah Kincaid  
Electrical and Computer Engineer,  
Carlisle Brake & Friction



## Section 4:

# CONCLUSIONS: FUTURE PROOF YOUR BUSINESS, BUILD YOUR DIGITAL THREAD

Using this five step blueprint to create your Digital Thread will help you manage the design, manufacture and sustainment of complex products. It will eliminate many issues that legacy systems have failed to rectify. This approach helps to future proof your business as its needs and processes change while enabling you to build additional capabilities.

As Aras' customer experiences show, organizations who link critical information created during all phases of a product's development, manufacture and service, and can drill down to understand changes made as a product moves throughout the product lifecycle, receive a wide array of benefits.

**To ensure your business can adapt quickly as the market environment changes, act quickly. The time is now!**



Aras provides a resilient platform for digital industrial applications. Only Aras offers open, low-code technology that enables the rapid delivery of flexible, upgradeable solutions for the engineering, manufacturing, and maintenance of complex products. Aras' platform and product lifecycle management applications connect users in all disciplines and functions to critical product data and processes across the lifecycle and throughout the extended supply chain. Headquartered in Andover, MA with major offices throughout the world, Aras supports more than 350 global multinational customers and over 250,000 users. The Aras Innovator platform is freely [downloadable](#). All applications are available at a single subscription rate, which includes all upgrades performed by Aras. Aras customers include Airbus, Audi, GE, GM, Honda, Kawasaki, and Microsoft.

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