

eBook

THE ENGINEER'S GUIDE TO THE RESILIENT PLATFORM



The CIMdata 2019 Market Analysis Report (June 2019) states that digitalization and complexity are driving several major trends in the product engineering discipline, including: product innovation platforms, modeling and simulation platforms, model-based systems engineering, digital thread and digital twin, and democratization of modeling and simulation.

EXECUTIVE SUMMARY

Engineers are facing ever-increasing pressure from business executives to incorporate innovative technologies into their products. The realities of creating new and unexplored concepts, while accounting for more and more smart connected products, and continually adapting to changing market uncertainties, is making it challenging for companies to compete effectively.

In pursuit of innovative solutions, engineers are looking for new trends and disruptive technologies that promise to increase competitiveness, gain market share, and allow for moves into adjacent markets. However, this requires a platform to define and develop these complex solutions. Creating a platform that delivers and adapts contemporary solutions into the organization's existing technical landscape and business processes quickly, and with minimal disruption, will be a differentiator between fully realizing the benefits of these initiatives versus a generation of investments unable to meet their potential.

These critical product development strategies, alongside others in development, will drive rapid and significant changes over the next generation of product lifecycle management (PLM). Specifically, the success of any product development software will not only be based on the quality of the business applications, but also on the end-to-end platform's ability to adapt to changing business processes and evolve with technical trends.

Some design considerations for the next generation of product development:

- **Process adaptability**
Reducing cycle time for product development process changes without disrupting business operations or strategic initiatives
- **System customizations**
Customizations without impacting future upgrades or creating crippling technical debt
- **Technical evolution**
Adapting new and improved technology to legacy systems without extensive redesign efforts
- **Data transparency**
Accessing and integrating to the data model without dependencies to the native software

“While the PLM market is growing, there are some changes underway that are transforming the market. Over the last several years, CIMdata has noted the move toward platforms to support enterprise strategies and solutions. The new business platform paradigm is one in which solutions from multiple providers can be seamlessly deployed using a service oriented architecture (SOA) that is resilient and can withstand rapid changes in individual business functions or delivery modalities. This is possible to do today and some, in fact, are already being delivered.”

- CIMdata 2019 Market Analysis Report
(June 2019)

DATA TRANSPARENCY

An open platform allows organizations to own their data instead of leaving it captive to an aging technology or a software vendor.

TECHNOLOGICAL EVOLVABILITY

A platform should never be locked into a technology. For a platform to be continually relevant over time, there must be flexibility in the design by keeping to open standards.

BUSINESS PROCESS ADAPTABILITY

Business processes will not only change but will do so often, quickly, and without concern for the ability of the systems to change with them. A resilient platform needs to be so adaptable that it not only supports change, but also encourages it.

SYSTEM CUSTOMIZATIONS

Since every company is unique and every business process evolves, a platform must be able to implement customizations without impacting future upgrades or creating crippling technical debt.

THE RESILIENT PLATFORM SOLUTION

The first step in developing a system platform capable of addressing a new generation of business challenges is to adopt a set of basic design principles to guide the platform development. These fundamental building blocks represent the collective vision between designers and business leaders to ensure the platform meets its full resilient potential.

As product development processes incorporate a growing number of disciplines to support the end-to-end process, the need to build these applications on a single unified platform becomes more essential. While it is unlikely there will ever be a single application managing all the diverse sets of processes, it is reasonable to envision a powerful platform, supporting many product development applications, while utilizing a single data model to guarantee consistent and high-quality data. This platform is supplemented by the employment of advanced capabilities connecting information with outside applications to create a seamless digital thread. The design provides system owners many options to build out their system landscape while delivering a powerful platform as the end-to-end foundation. By using the design principles above, this resilient platform meets the demands of new product requirements and provides timely adaptation to new technology without disrupting daily operations.

THE ARAS SOLUTION

The Aras platform is built to model engineering processes, rules, and data in a low-code environment, limiting the amount of effort necessary to enact change. The platform also encourages a company's specific requirements by offering a strategic approach to customizations without negatively affecting the platform's ability to upgrade in the future and without adding technical debt required by "workarounds." Using Aras Innovator, a single unified data model is created, providing consistent and high-quality data across applications that is easily accessible and will never be tied to a specific technology in order to gain access. This critical information becomes easily portable and ready to move forward with any technology at any time.

The combination of Aras' unique model-based approach and service-oriented architecture (SOA) in the platform, ensures the flexibility of the platform to adapt to new processes or technology trends. The openness of the environment supports data sharing across systems, providing critical capabilities necessary for digital transformation efforts. Incremental deployment functions support agile methodologies and the ability to execute on a fast-paced schedule. Aras also guarantees and performs platform upgrades as part of the subscription, so customers never fall behind technologically. Without the ability to continually upgrade the platform, the environment would struggle to support technological advances, inevitably degrading the effectiveness of applications built on top of the platform.

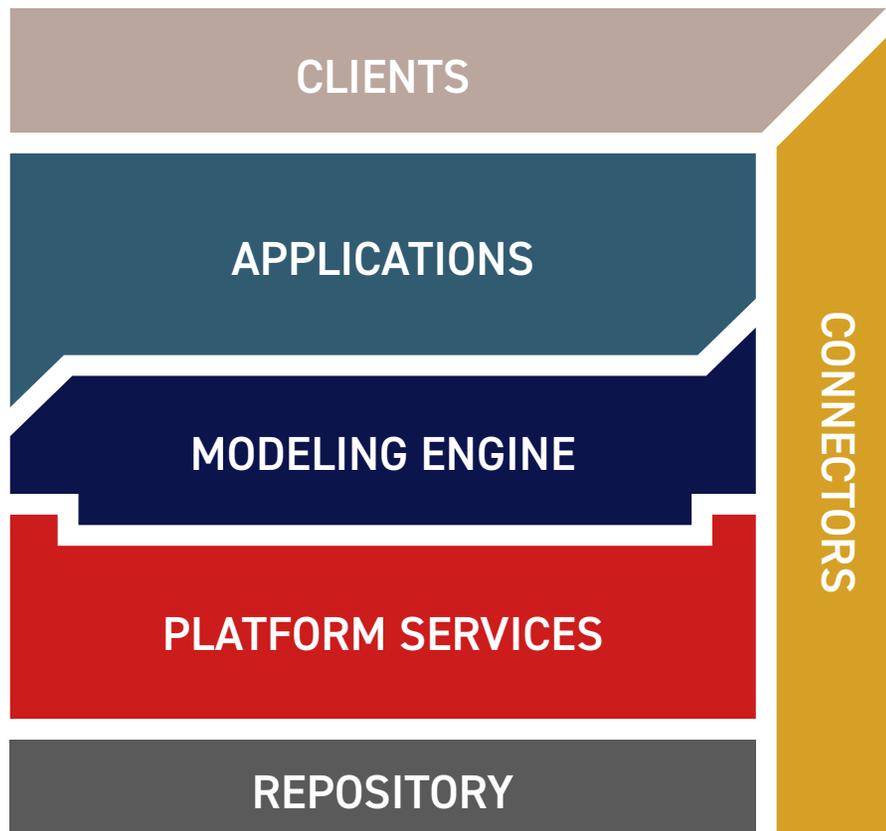
In a baseline study conducted by Aras in 2019,

84%

of Aras subscribers were on a platform version three years old or less.

THE ARAS PLATFORM DESIGN

By using the design principles of the resilient platform, Aras has developed the following model that drives today's platform and provides the ability to adapt to future technologies. Let's look at each layer to see how it supports the resilient platform.



“While growth by acquisition is common in the enterprise software industry, Aras does not follow the common model of integration and reselling legacy code. They incorporate the acquired technology into new platform services so capabilities can be used in solutions across the platform. The platform service strategy enables Aras to reuse common services such as security, effectivity, and configuration when incorporating new capabilities and ensuring compatibility capability with existing implementations.”

From CIMdata commentary
on the Aras ACE 2019 conference

MODELING ENGINE

Starting with the modeling engine layer, the development process is based on the establishment of a company's business model, not the code to support it. The modeling engine allows the organization to model the business rules and requirements using a convenient, configurable front-end instead of forcing hard coded customizations into a static application. Since the business rules, data models, and relationships are defined as a declarative model, as opposed to hard code, all customizations are portable and can adapt to the changing technologies being utilized to run the application. This is a major reason the Aras team can perform regular upgrades for each of their subscribers while other software vendors simply generate long-cycle projects to accomplish the same goal. When custom code is introduced in other PLM systems, it is often specific to the technology being used at the time. Changes to the code become difficult and require even more work to manage during upgrade efforts. Furthermore, the modeling engine is what allows the Aras platform to complete an implementation using a fraction of the code required for other PLM products. Since the implementation team is entering the business model in the modeling engine instead of developing code for the same tasks, little to no code is required to get the same results. Better known as low-code in today's nomenclature, Aras utilized this advanced concept years before any other product development software. While other PLM vendors are trying to catch up to these advanced practices by purchasing their competitor's low-code software packages and integrating them into their platform to claim a low-code system, the Aras platform has already completed this journey.

It should be noted that the modeling engine drives the creation of the logical and the physical data models. This means the database is created through the modeling engine and guarantees alignment of the application with the database design. As cross functional applications are built using the unified platform, a digital thread, using a consistent definition of data attributes across applications is automatically developed as part of the process.

PLATFORM SERVICES

Aras' extensive use of service-oriented architecture (SOA) is the second major differentiator from traditional PLM systems. Aras provides a growing number of platform services to support the data (data federation, content services), the processes (configuration services, workflow, lifecycles), and the user experience (collaboration, visualization) in an open environment. The platform services work with the modeling engine to provide key building blocks that allow the applications to operate as required, while providing consistent functionality—the "look and feel"—to users across all end-to-end applications. Platform services also give subscribers the flexibility to utilize different types of platform services together in new ways without having to write new customized code. Aras continues to develop new platform services to extend functionality across the enterprise without locking it to any specific application.

CONTENT

COLLABORATION

VISUALIZATION

SEARCH

SCHEDULING

PUBLISHING

PROCESS

CONFIGURATION

CALCULATING

ACCESS

FEDERATION

UX

PE
Product Engineering

RE
Requirements Engineering

PM
Program Management

OC
Office Connector

DPN
Dynamic Product Navigation

MPP
Manufacturing Process Planning

SM
Simulation Management

CE
Component Engineering

QMS
Quality Management System

VC
Visual Collaboration

DM
Document Management

TP
Technical Publications

MM
Maintenance Management

Available applications.

APPLICATIONS

The application layer represents specific functions commonly used by engineering to support their operations. These applications are built using the modeling engine and platform services as described above. A critical advantage of the Aras platform is that all existing and future applications (developed by Aras or a subscriber) will use the same data model across the end-to-end processes.

While most PLM companies typically weave applications together through integrations or reverse engineering of their latest acquisition to simulate a single end-to-end application, Aras manages the growing application base by ensuring the single data model is completely aligned across applications from the beginning. As organizations navigate their entry into the digital transformation world, they find their system landscapes difficult to connect because of differing logical and physical data models. Aras users will clearly see the competitive advantage of their applications utilizing this aligned model approach as represented by the high level of data quality and consistency across the end-to-end process.

Aras subscribers not only have access to all the existing applications, but they can also modify them through the modeling engine to meet their needs. Changes can be made to the data model, business rules, or relationships using the modeling engine as previously discussed. Again, it is important that the underlying data model and relationships stay aligned across all applications to ensure the basis of a tight-knit digital thread.

REPOSITORY

The repository layer refers to the physical database and vaults utilized by the Aras platform. The repository layer, like the other layers in the Aras platform, is designed to eliminate dependencies to specific technologies. This approach allows new technologies to replace existing technologies, when appropriate, for providing the most adaptable platform in the marketplace. The portability of the data structures, relationships, and business rules built from the modeling engine support the actual processes necessary to execute such a migration. Aras' philosophy of resiliency demands that the data be stored and available in a way that is easily accessible and understood by the customer without requiring a "decoder ring." With the Aras platform, customers are able to utilize today's data in any technology relevant in the future.

The repository layer is built to be flexible and scalable. With Aras' open environment, the platform can adapt to any deployment strategy, such as on-premise, cloud, or a hybrid solution.

CONNECTORS

The ability to seamlessly connect applications is critical in today's complex system environments. Aras connectors are an example of the platform's open architecture allowing the creation of new capabilities that extend and customize technology. External systems can be integrated via connectors using Aras' open APIs and modeling techniques. There are many existing connectors to external applications like MCAD, ECAD, Microsoft Office, and others. These connectors are available through Aras and Aras' partners to meet an organization's specific requirements.

CLIENTS

The Client layer represents the software used to access applications within the platform. Again, the Aras platform is designed to eliminate dependencies on specific technologies and adapt to new software when appropriate. There are several ways to connect to the platform. Users can connect via various clients, including web and mobile interfaces. The platform utilizes a thin client and works with major browsers.

CONCLUSION

According to Forrester's 2019 Predictions guide, *Transformation Goes Pragmatic*:

“The CIO sits at the center of a storm, waging a three-front battle: addressing aging systems and long-standing data issues; driving a business strategy that harnesses the value of a wide range of new, powerful technologies; and maximizing the value and security of today’s environment. This battle rages as the company tries to figure out what it means—from a strategic, operational, and financial standpoint—to be a digital-first organization.”

While this statement does not focus specifically on the product development space, it certainly hits close to home. As products increase in complexity, so do product development processes and the applications that support them. Siloed applications have yielded to open platforms with the ability to effectively connect end-to-end applications and utilize data from multiple sources in ways never before anticipated. The challenge for these platforms is to not only deliver the functionality required, but to also have the capability to change over time without disrupting the product development pipeline or time to market. These platform modifications may be process changes or technical in nature, but the most important factor is the ability of the platform to accomplish this strategically in a digital-first organization.

The Aras platform provides a resilient foundation not seen anywhere else in the industry. With low-code modeling functionality and a commitment to openness, the Aras platform is built to adapt and evolve. Aras applications not only provide the basis for critical functionalities, but also the ability to customize the applications for specific business needs without accumulating technical debt or affecting future platform upgrades. The single unified data model ensures a consistent and high-quality data model across applications, allowing subscribers to create a digital thread.

When it is time for your organization to move ahead with a new generation of product development systems, start with a platform that gives you the capabilities to be a digital-first organization.

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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