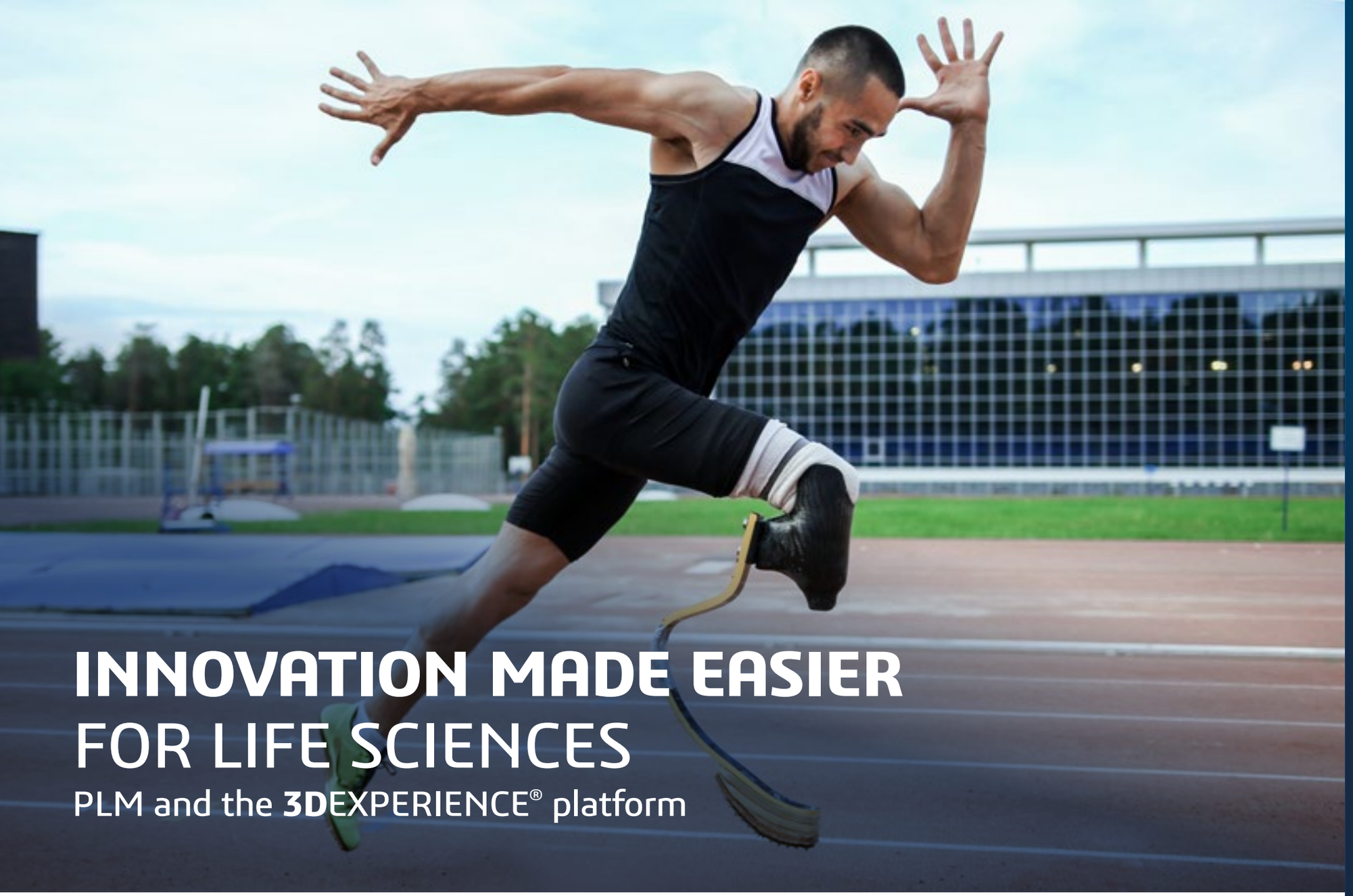


INNOVATION MADE EASIER FOR LIFE SCIENCES

PLM and the **3D**EXPERIENCE® platform

DASSAULT SYSTEMES

INTRODUCTION

The pace of change in the Life Sciences industry is both exciting and extraordinary, resulting in core paradigm shifts in both strategies and processes for key industry stakeholders. Leading Life Sciences manufacturers understand that in order to meet the challenges they must excel in scientific leadership and innovate the processes throughout their ecosystem to create competitive advantage, and deliver holistic, superior patient and physician-centric experiences.

The transformation required by Life Sciences companies includes core shifts in business processes, strategic planning, regulatory frameworks, as well as technological solutions. They are shifting their focus to deliver superior, patient-centric, outcome-driven experiences and create the processes to support them.

This white paper discusses the need and role of PLM to address product development challenges and the imperative to think beyond PLM to connect the entire value network to foster innovation and achieve business objectives.

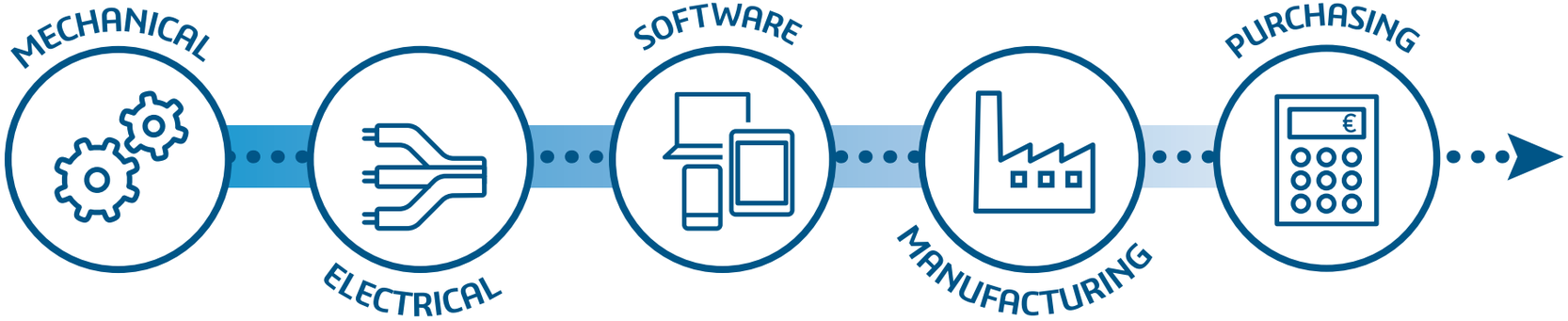
> “Creating sustainable growth and competitive differentiation requires aligning your PLM strategy with your business strategy.

THE ROLE OF PLM

Product lifecycle management is a systematic approach to managing the entire lifecycle of a product from inception, through engineering design and manufacture, to service and end-of-life of manufactured products. PLM is comprised of an integrated set of software tools for managing critical information generated by product development organizations, marrying this data with associated engineering and business processes. Common PLM processes include design management, engineering, change and configuration management, as well as bill of materials management. These common processes have been the foundation for many companies that have made significant productivity, quality, and time-to-market gains from successful PLM adoption. In today’s economy, Life Sciences companies need additional capabilities to address rising complexity and to support additional business processes such as portfolio and program management, quality management, customer relationship management, supplier collaboration and manufacturing execution.

PLM has become more than part of an IT infrastructure; it should now be part of an overall strategy for sustainable growth and competitive differentiation. Now, more than ever, it is critical to evaluate your current and future business needs to ensure your PLM strategy aligns with your business strategy.

CHALLENGES TO THE INNOVATION PROCESS



To keep ahead of the competition and meet increasing customer expectations, manufacturers must continue to innovate. Today's innovations require developing products that include integrated technology through the combination of mechanical, electrical and software. A sustainable innovation process requires early and on-going cross-discipline contributions from quality, costing, manufacturing, and service organizations. Unfortunately, many PLM solutions were initially developed to only support the mechanical design process, and are not well suited to manage and include this wider set of contributors in the product development process.

Sharing basic design information is challenging at best. When information is stored in silos this creates work duplication, errors and wasted time as stakeholder's search across the enterprise for the latest information.

> "A single real-time view of product definition fosters collaboration by doing away with information silos.

Centralizing product design around a single, consolidated, and real-time view of the latest product definition fosters collaboration while eliminating the burden of time-consuming, error-prone synchronization of data.

BEYOND PLM

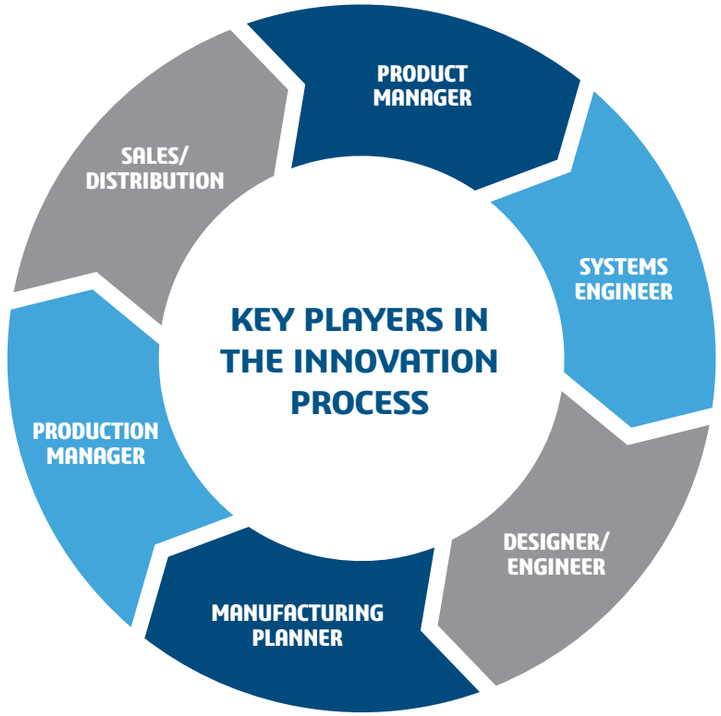
Life Sciences companies are increasingly taking advantage of digitalization to improve the way they do business. Digitalization means sharing information through digital data and processes, rather than through the copying of electronic files. Digitalization facilitates exchange between project stakeholders because it eliminates cumbersome, high-friction file exchanges. Instead, every stakeholder can immediately access and leverage the latest data whenever and wherever they need it, increasing collaboration and fostering innovation.

Even though PLM systems manage product development well, alone they lack the ability to connect the entire value network through digital continuity and to manage a single, holistic representation of the product.

THE NEED FOR AN INNOVATION PLATFORM

To manage the innovation process, more and more companies are adopting a platform business approach to spur innovation and remain competitive as well as support their move to digital. According to Accenture[1], by 2020, 25% of the world's economy will be digital and in this digital age, companies' success hinges on enabling people to learn, adapt and propose new solutions with the help of technology. Ideas can come from anywhere creating a context for social collaboration.

> "An "innovation platform" delivers the critical capabilities necessary to create exceptional products and delightful customer experiences.



Through a single holistic system, with apps that connect various Life Sciences stakeholders into that system, an "innovation platform" delivers the critical capabilities necessary to create exceptional products and delightful patient experiences. An "innovation platform" allows stakeholders to leverage the holistic digital product definition, in real-time, to virtually create and validate their experiences.

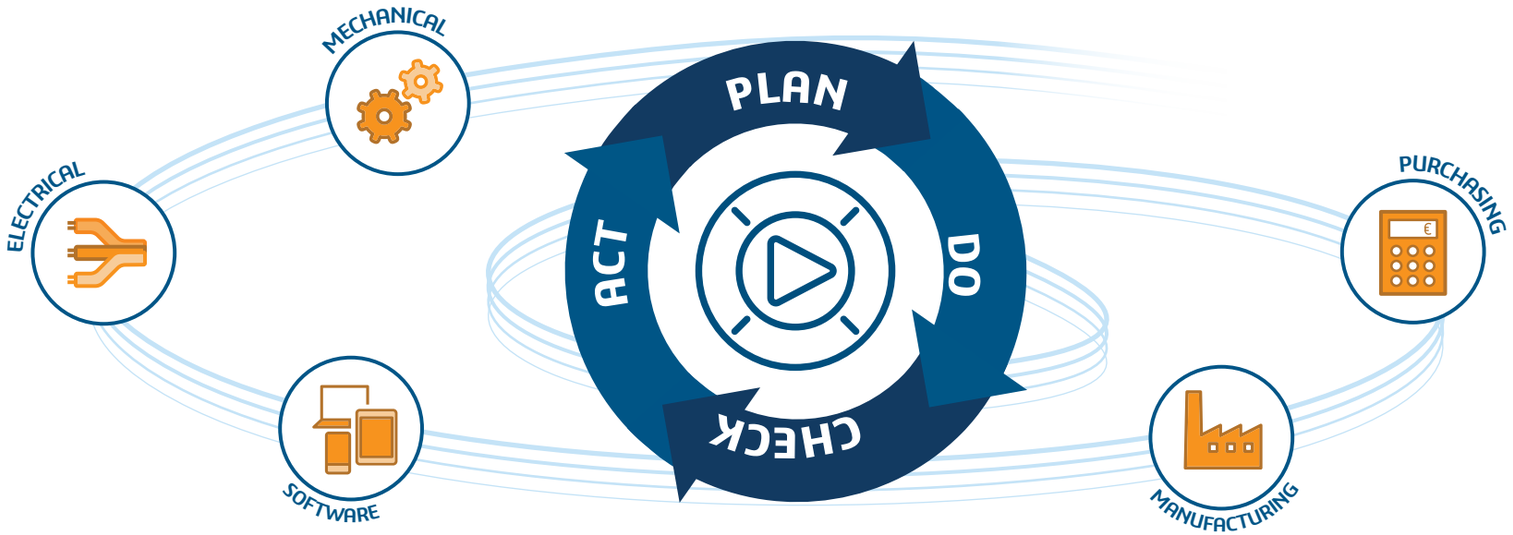
Platforms provide the structure and flexibility to link stakeholders 24/7/365 from diverse locations. They allow the capture and sharing of knowledge and expertise, while managing intellectual assets and processes throughout a product's lifecycle. Platforms become the corner-stone for digital business transformation that weaves a live digital thread through all the functionalities and organizations involved in a therapeutic solution's lifecycle, from development to commercialization, as well as all upstream and downstream applications.

Because it is increasingly difficult to develop tomorrow's products with yesterday's solutions, companies' must adopt a platform-based strategy that connects the value network and supports their critical applications.

1.Accenture - IT Tech Trends Technology Exec Summary 2016

> “Memorable experiences have become the predominant offering in today’s economy. Customers want more than products and services, they want exceptional experiences tailored to their needs, and often pay extra for the higher value these superior experiences bring them. In such a fast-moving and competitive business context, companies need to look beyond their PLM strategy and consider how their business can sustainably deliver innovative experiences.
>
> **THE EXPERIENCE ECONOMY**
>
> B. Joseph Pine II and James H. Gilmore

THE 3DEXPERIENCE PLATFORM



> With the **3D**EXPERIENCE twin, companies model, simulate and perfect the customer experience before releasing a product to market.

The **3DEXPERIENCE** platform is an innovation platform developed by Dassault Systèmes to enable Life Sciences companies to embrace their value network to explore their possibilities in a social way. The platform provides companies with a holistic approach to creating patient value by enabling all the players in the innovation process from ideation, design, engineering, manufacturing, marketing, sales and services to share a single source of truth and collaborate more effectively.

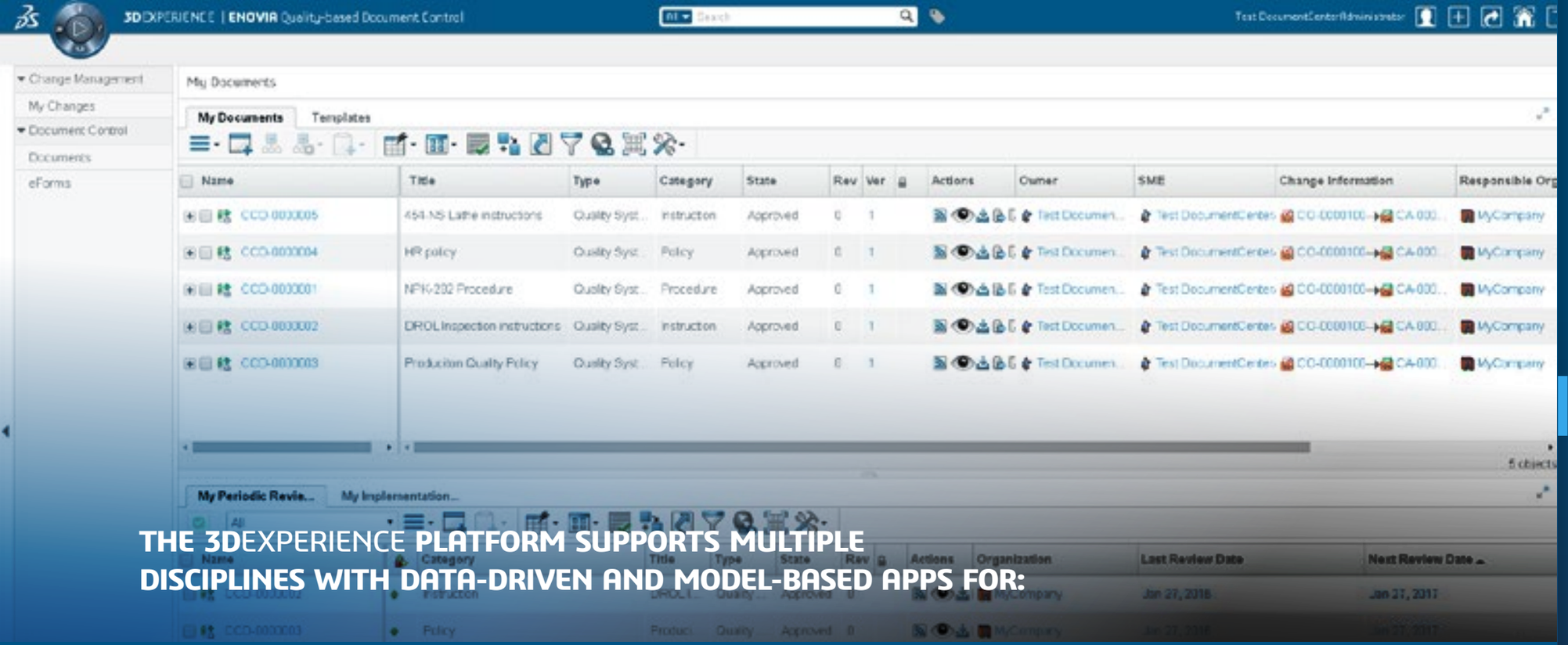
In addition to being data-driven, the **3DEXPERIENCE** platform adds model-based capabilities to define a **3DEXPERIENCE** twin—which provides more than a virtual representation, it provides ways to create and test new possibilities, new innovations, and new enhancements. It comprises applications to model, simulate and virtually perfect all aspects of the customer experience before launching a product on the market.

With the **3D**EXPERIENCE platform, an enterprise is digitally connected through its data-driven apps working from a single and complete product definition with different functional views on the same data, rather than separate data repositories for each function. This real time access to the digital product definition helps companies accelerate the digitalization of their businesses to support a sustainable innovation process.

Existing CAD systems can be connected to the platform, providing designers the benefits of the platform and additional capabilities without requiring them to change their CAD application, migrate data or author designs in a new environment.

The platform supports social networking and information intelligence, natively delivered on the **3D**EXPERIENCE platform, for instant communication and data access throughout the corporate ecosystem. Stakeholders can, for example, engage in social collaboration, share, view and simulate 3D models online and transform big data into insights in the context of a user's needs through the creation of customized business dashboards—all in the same environment.

The **3D**EXPERIENCE platform offers a part supply marketplace. This **3D**EXPERIENCE Marketplace offers a comprehensive and intelligent catalog of components for designers to search, download and insert into their designs. The marketplace also includes a seamless way to get parts made and collaborate with leading digital manufactures world-wide.



THE 3DEXPERIENCE PLATFORM SUPPORTS MULTIPLE DISCIPLINES WITH DATA-DRIVEN AND MODEL-BASED APPS FOR:

Product modeling with design, engineering and systems engineering applications that revolutionize the way organizations conceive, develop and realize new products and that support additive and subtractive manufacturing

Stakeholder collaboration and sustainable innovation across the global ecosystem

Manufacturing excellence by enabling manufacturers to plan, manage and optimize their global industrial operations through virtual simulation of their production environment

Accelerating the process of evaluating the performance, reliability and safety of materials and complex assemblies before committing to physical prototypes using simulation technology for structures, fluids, plastic injection molding, acoustics and structural applications

Gathering, aligning and enriching big data-whether internal or external, structured or unstructured, simple or complex and delivering that information in a way that supports real-time information intelligence

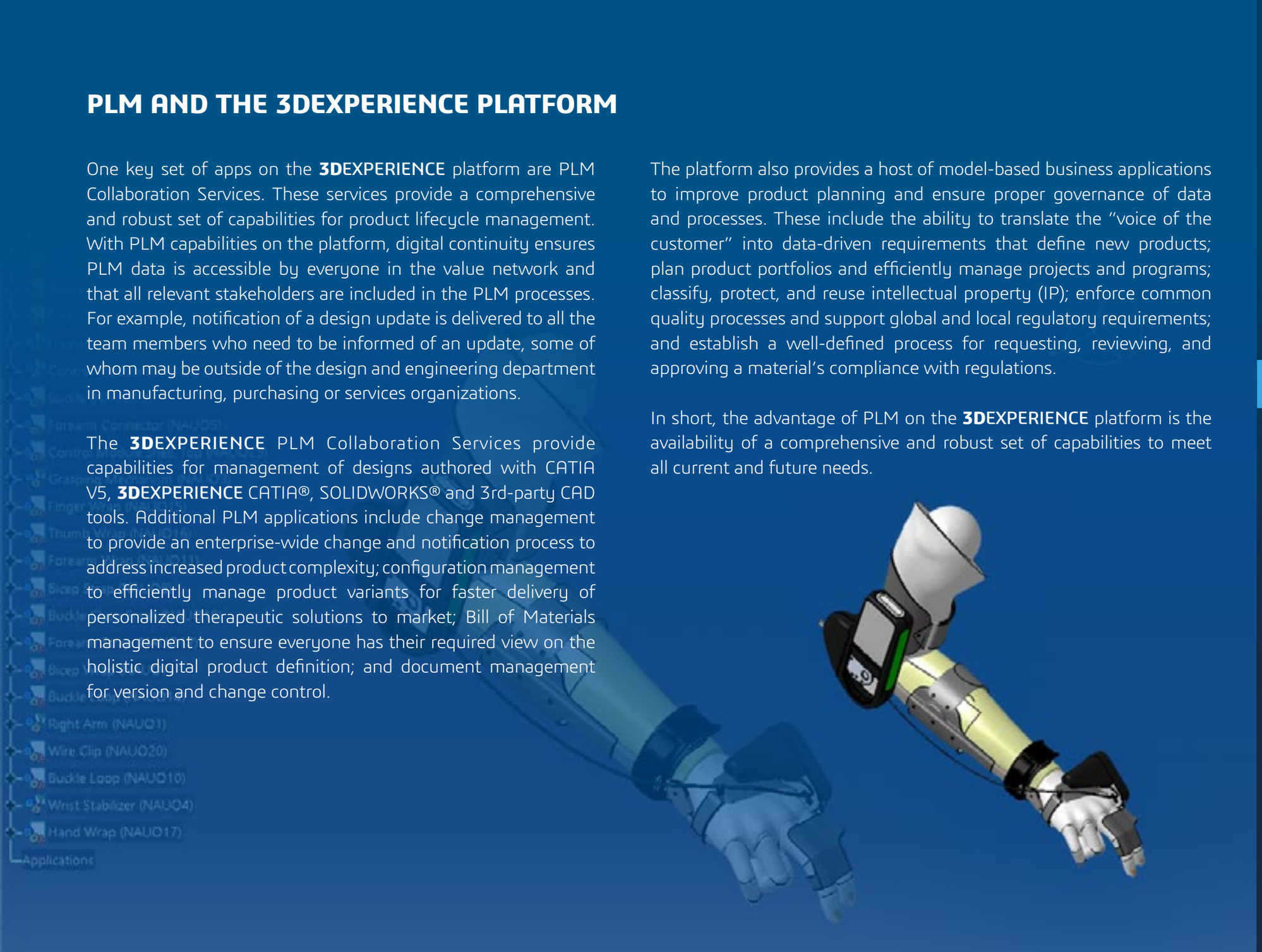
PLM AND THE 3DEXPERIENCE PLATFORM

One key set of apps on the **3DEXPERIENCE** platform are PLM Collaboration Services. These services provide a comprehensive and robust set of capabilities for product lifecycle management. With PLM capabilities on the platform, digital continuity ensures PLM data is accessible by everyone in the value network and that all relevant stakeholders are included in the PLM processes. For example, notification of a design update is delivered to all the team members who need to be informed of an update, some of whom may be outside of the design and engineering department in manufacturing, purchasing or services organizations.

The **3DEXPERIENCE** PLM Collaboration Services provide capabilities for management of designs authored with CATIA V5, **3DEXPERIENCE** CATIA®, SOLIDWORKS® and 3rd-party CAD tools. Additional PLM applications include change management to provide an enterprise-wide change and notification process to address increased product complexity; configuration management to efficiently manage product variants for faster delivery of personalized therapeutic solutions to market; Bill of Materials management to ensure everyone has their required view on the holistic digital product definition; and document management for version and change control.

The platform also provides a host of model-based business applications to improve product planning and ensure proper governance of data and processes. These include the ability to translate the "voice of the customer" into data-driven requirements that define new products; plan product portfolios and efficiently manage projects and programs; classify, protect, and reuse intellectual property (IP); enforce common quality processes and support global and local regulatory requirements; and establish a well-defined process for requesting, reviewing, and approving a material's compliance with regulations.

In short, the advantage of PLM on the **3DEXPERIENCE** platform is the availability of a comprehensive and robust set of capabilities to meet all current and future needs.



DIGITAL ORTHOPEDICS

USE OF REALISTIC SIMULATION TO DETERMINE THE TREATMENT

BREAKTHROUGH IDEA

Digital Orthopaedics is a startup that transforms the planning and execution of orthopedic surgeries and treatment with the ultimate goal of Personalizing Orthopedic Treatment through the innovative use of ideation, modeling and simulation. This journey accelerates the progress of various Precision Medicine Initiatives worldwide by demonstrating what can be done when good engineering and medical teams work closely together.

Therefore, instead of relying on the geometry-based, mass or generic approach, the breakthrough idea is to create personalized foot models for each patient starting from imaging and then determine via the use of realistic simulation the best possible treatment for that individual.

Digital Orthopaedics' Clinical Decision Support System value proposition is articulated around three technological platforms:

Knowledge base and diagnostic support platform for foot and ankle pathologies. It will allow physicians, healthcare professionals and patients to collect clinical signs, understand the pathology and choose treatments based on the knowledge from the best experts.

A personalized surgical simulation platform to assist primarily the orthopedic surgeons to develop surgical plan with a clear Root-cause analysis of the disease. The platform includes tools for patient image analysis and segmentation.

A machine learning and clinical cases platform that will enrich the company knowledge and will allow improving the outcomes of the diagnostic support and personalized surgical simulation platforms.

BENEFITS TO USING 3DEXPERIENCE® PLATFORM ON CLOUD

The **3D**EXPERIENCE® platform on cloud is a key enabler to the success of Digital Orthopedics, offering:

The framework necessary to capture and automate the "Medical Image to 3D virtual models to Realistic Simulation" workflow.

The potential to connect to hospital imaging systems enables the solution proposed as a clinical decision making service to orthopedic surgeons worldwide.

The 3D modeling and realistic simulation solutions allowing the development, testing, and deployment of the clinical service much more efficiently.

Discover in 360 video the innovative use of a personalized surgical platform.

▶ Watch the Video

LEARN MORE:

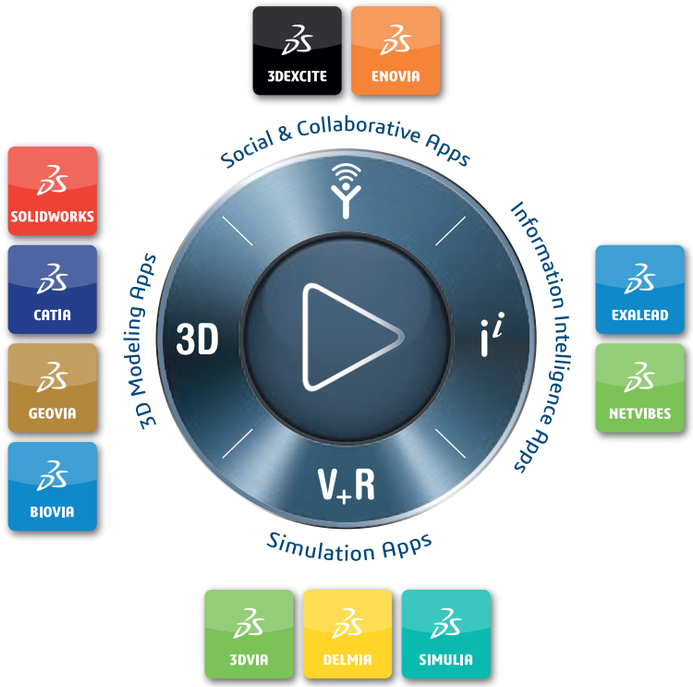
As medical device companies look to leapfrog their competition by accelerating innovation, maximizing ROI and creating new, connected patient experiences, leaders will see significant growth in collaborative invention and new models will emerge throughout manufacturing and value chain beyond CROs, CMOs and traditional supply chains.

Services-based experiences will provide for more intelligent, efficient and collaborative open innovation and medical device companies will drive toward more personalized experiences, embracing the consumerization of health.

HTTPS://IFWE.3DS.COM/LIFE-SCIENCES/MEDICAL-DEVICE

Our **3D**EXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE®** Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 250,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.



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