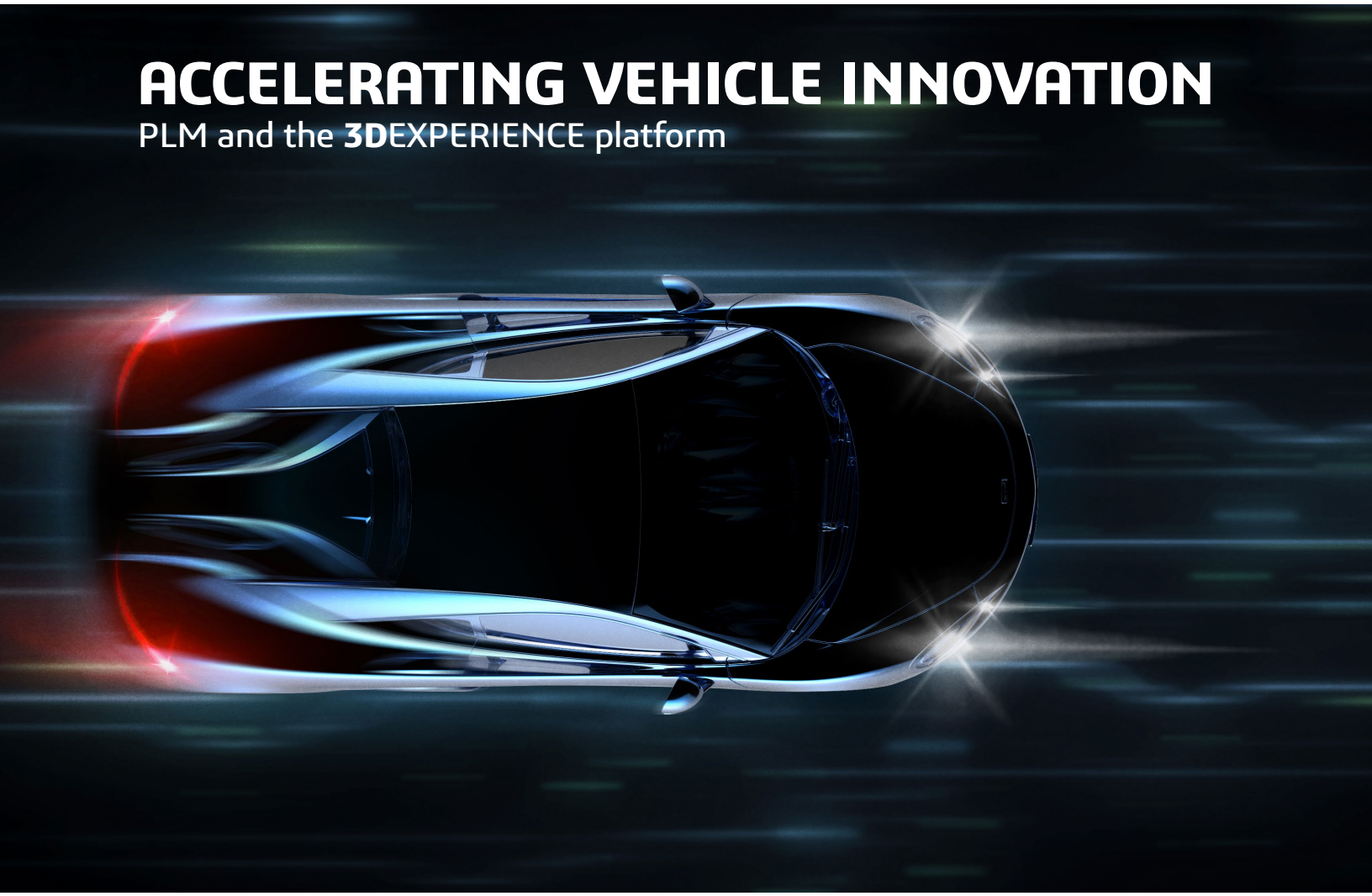
TRANSPORTATION & MOBILITY

ACCELERATING VEHICLE INNOVATION

PLM and the **3D**EXPERIENCE platform



INTRODUCTION

Urbanization and environmental challenges as well as changes in peoples' attitudes and priorities with respect to mobility are shaking the Automotive & Mobility industry to its core. From self-driving cars and smart cities that are reinventing the mobility experience to an increasing shift to on-demand services and vehicle personalization, the time is now for companies to shift gears to transition to a new paradigm. They can no longer imagine, design and develop products with the usual top-down approach that they then replicate on a global scale but instead, must propose vehicles and solutions that are tailored to local and regional needs and preferences, all the way down to the individual. It requires connecting their internal ecosystem with a diversity of external stakeholders that include government officials, drivers, passengers, user groups, psychologists, energy companies and car dealerships to invent new mobility experiences for every citizen.

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 be first to market with profitable, new customer experiences.

DASSAULT SYSTEMES

THE ROLE OF PLM

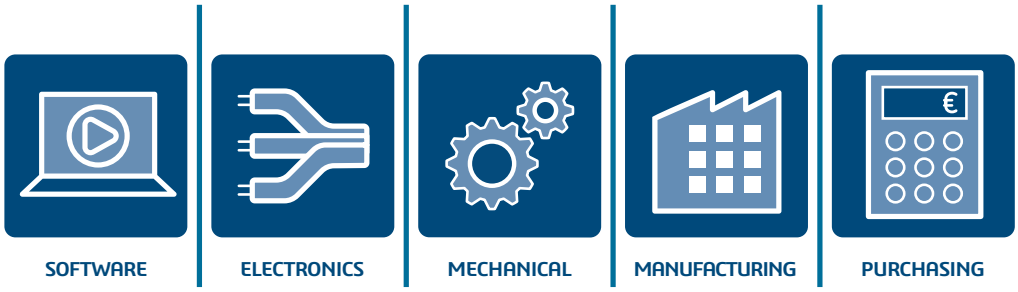
Product lifecycle management is a systematic approach to managing the entire lifecycle of a product from inception, through engineering design and manufacture, to service and end-of-life of manufactured products. PLM comprises an integrated set of software tools for managing critical information generated 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.

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

Many companies have made significant productivity, quality, and time-to-market gains from successful PLM implementations that streamline common process. In today's economy, however, 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 stay ahead of the competition while meeting customer expectations for new vehicle experiences, Automotive & Mobility companies must integrate new technologies to accelerate innovation. A sustainable innovation process requires early and on-going cross-discipline contributions from all stakeholders (e.g., engineering, quality, costing, manufacturing, administration and services). Unfortunately, many PLM solutions were initially developed to support the mechanical design process, and are not well suited to encompass the full set of contributors in the product development process. Consequently, these extended disciplines typically maintain their set of product data in their own system and database, creating silos of information and various file formats all representing some aspect of the product under development.

For Automotive & Mobility companies with multiple sites or with globally dispersed partners and suppliers, 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.

Centralizing product design around a single, consolidated, real-time view of the latest product definition fosters collaboration and better decision-making and eliminates time-consuming, error-prone data synchronization.

BEYOND PLM

The Automotive & Mobility industry must find ways to address today's business challenges that include the need to significantly increase innovation, rapidly address end-customer demand, and successfully mitigate the rising business, process and product complexities. Consequently, vehicle development 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 storing and copying electronic files. Digitalization facilitates exchange between project stakeholders because it does not involve cumbersome, file exchanges. Instead, every stakeholder can immediately access and leverage the latest data whenever and wherever needed. This speeds up collaboration and fosters greater innovation.

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

Since new product or vehicle ideas can arise from anyone in the value network, a single, up-to-date digital master becomes essential to define the product at any one point in time. Combining inputs from design, engineering, sales, supply chain, end-customer or after sales creates a "holistic digital product definition" that evolves with every new stakeholder contribution. To encourage and enable these contributions, a solution must be user-friendly and offer instant communications, real-time collaboration and real-time updates of data.

Even though PLM systems today 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 spur the innovation process and raise competitiveness, more companies are adopting a platform business approach to support the move to digital. According to Accenture[1], i very soon, 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.

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

> **An "innovation platform" weaves a live digital thread throughout the value network.**

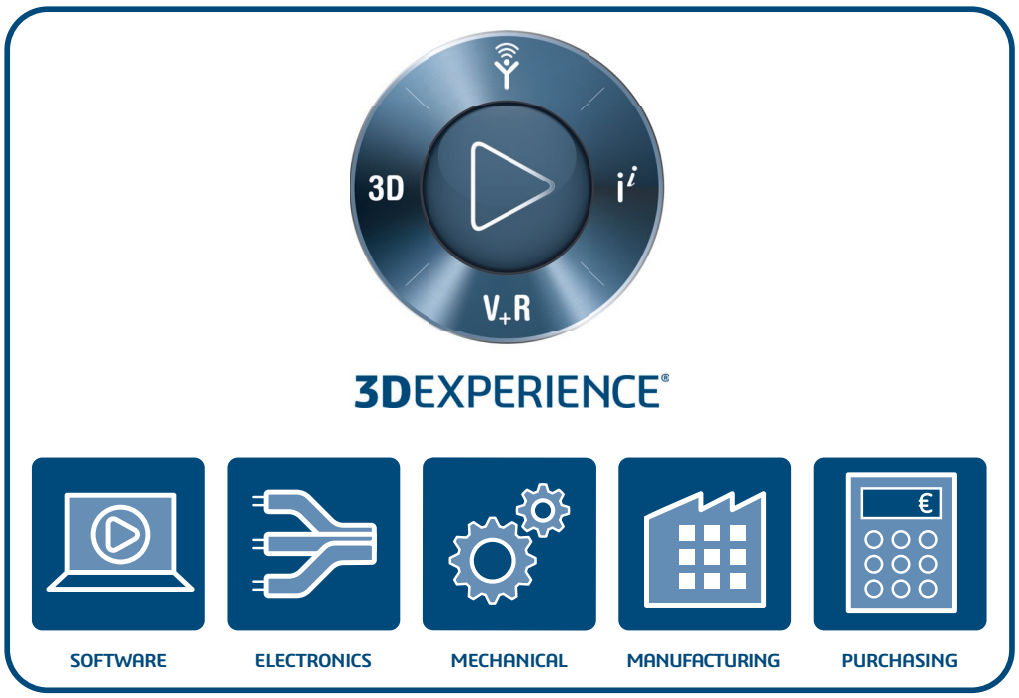
Platforms provide the structure and flexibility to link stakeholders 24/7/365 from diverse locations. They allow the capture and sharing of knowledge and expertise, while managing intellectual assets and processes throughout a product's lifecycle. Platforms become the cornerstone for digital business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

Digitalizing a business means moving from a document-based, "siloed" system to a data-driven centralized environment that fosters innovation and increases productivity across functional, role-based domains. In a file-based world, electronic documents such as PDF files do not automatically update when data changes, and require processes for data synchronization and the creation of new file versions. However, digitally connected applications update in real-time because they are data-driven and always are views on the latest digital product definition. At the core is a virtual representation of the real-world project, allowing those in the value network to explore and contribute to the product definition throughout the development process. The virtual representation acts as the single source of truth for companies to optimize their innovation process. Unlike a value chain, which connects and collects contributions in a serial way (up and down the chain), the connected value network works in parallel to drive innovation and readily adapt to new contributions and changes because everyone experiences them in real-time.

From the most remote sales office to the edge of the supply chain, an innovation platform eliminates silos by providing a single, up-to-date and holistic view of the product definition to foster collaboration and optimize the development of products and experiences that exceed the consumers expectations.

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

THE 3DEXPERIENCE PLATFORM



According to Joseph Pine II and James H. Gilmore in *The Experience Economy*, 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, Automotive & Mobility companies need to look beyond their PLM strategy and consider how their business can sustainably deliver innovative experiences.

With the 3DEXPERIENCE twin, companies model, simulate and perfect the customer experience before releasing a product to market.

The **3D**EXPERIENCE platform is an innovation platform developed by Dassault Systèmes to enable companies to embrace their value network to explore their possibilities in a social way. The platform provides companies with a holistic approach to creating 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 **3D**EXPERIENCE platform adds model-based capabilities to define a **3D**EXPERIENCE twin – which provides more than a virtual representation, it provides ways to create and test new possibilities, new innovations, and new enhancements by enabling mobility designers and thinkers to put themselves in the end customer's shoes in advance of production in the most realistic and immersive manner possible.

In this way, they can create better experiences. The **3D**EXPERIENCE platform has 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 Automotive & Mobility companies accelerate the digitalization of their businesses to support sustainable innovation. The **3D**EXPERIENCE 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;
- **value network collaboration** for sustainable innovation across the extended enterprise;
- **manufacturing excellence** via virtual simulation of **planning, management and optimization** of their global operations;
- **product validation via simulation technology** dedicated to structures, fluids, plastic injection molding, acoustics and structural applications that rapidly evaluate the performance, reliability and safety of materials and complex assemblies before committing to physical prototypes;
- **real-time information intelligence** by gathering, aligning and enriching big data-whether internal or external, structured or unstructured, simple or complex;
- **rich, emotional feedback** when testing new designs and end-customer experiences using immersive and augmented reality.

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 **3D**EXPERIENCE platform natively supports social networking and information intelligence for instant communication and data access throughout the extended enterprise. Project teams can, for example, engage in social collaboration, share, view and simulate 3D models on line 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 access to 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 worldwide.

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 products to market; Bill of Materials management to ensure everyone has their required view on the holistic digital product definition; document management for version and change control; and requirements management and traceability.

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;
- support lead global and local regulatory requirements;
- 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.

AUTOMOTIVE & MOBILITY INDUSTRY ADOPTION

Revolutionary trends in autonomous mobility and the emergence of new business models based on vehicle personalization, on-demand services, and vehicle autonomy are forcing automotive companies to re-shape how they engage with their value network. They are challenged to provide better experiences that go beyond simply selling vehicles to producing increasingly tailored offerings that address the changing mobility requirements of customers over time. For example, a company cannot develop new mobility experiences on its own; it must be done in partnership with cities. This means cultivating relationships with various stakeholders to better understand constantly evolving requirements and relying on digitalization to facilitate and enhance the way mobility solutions are conceived, designed, marketed, delivered and serviced.

The **3DEXPERIENCE** platform provides Automotive & Mobility companies with the opportunity to realize this integrated digital journey with their customers, placing them at the heart of the product development process. It allows auto companies and suppliers to go from ideation to final delivery in one virtual environment. Insights across the value network are captured and the product digitally verified with the customer before actual production. Through the broad ENOVIA portfolio of technical and business applications that include powerful requirements and change management features, configuration and project management, and collaborative capabilities, Automotive & Mobility companies can engage with their customers to help ensure that mobility solutions comply with their needs. Through this closer collaboration, customers gain confidence that the solution will meet their needs. The result is higher satisfaction that deepens brand loyalty and drives an automotive company's revenue growth.

> **Higher customer satfisfaction deepens brand loyalty and drives an automotive company's revenue growth.**

NEW VEHICLE EXPERIENCE SUCCESS: PSA GROUP: DS AUTOMOBILES

DS Automobiles is the luxury division of PSA Group. To enhance the buying experience, the company created DS Virtual Vision an immersive virtual reality application, powered by the 3DEXPERIENCE platform, which allows end-customers to configure the car of their dreams by mixing and matching up to three million attributes such as colors, dashboard, upholstery, trims, engines and equipment and then visualizing it in 3D in a totally immersive environment. Unveiled at the 87th Geneva Motor Show for the launch of its SUV DS 7 Crossback, this immersive application transforms the showroom by creating a unique buying experience that enables all its dealerships around the world to promote and sell their entire product line, regardless of available surface area.

During the show, visitors sat on a DS seat and with an HTC Vibe Headset, experienced the car by exploring its interior or by walking around it to discover its exterior. "Our goal is to create the network of the 21st century, a network of points of sale that are not necessarily big but that can provide a powerful experience," said Arnaud Ribault, DS vice president of sales and marketing. Through DS Virtual Vision, DS Automobiles links dealerships with one another and with end-customers to create a global digital sales network to present the entire product line on a limited surface. "Immersive experiences allow us to offer our end-customers more possibilities and to more easily put them in real life situations. For example, they can experience their car on the open road and personalize their vehicle. With the DS Virtual Vision experience, we have a tool that allows us to export knowhow with respect to French luxury since we can create the same experience here in Geneva or in Shanghai or even in Tokyo. This is the benefit of using DS Virtual Vision.

> **"Immersive experiences allow us to offer our end-customers more possibilities and to more easily put them in real life situations."**
>
> Arnaud Ribault, DS Vice President of Sales and Marketing

CONCLUSION

Product lifecycle management must be a key component of an Automotive & Mobility company's product development process. However, increasing business, product and process complexity demand implementing a platform-based approach to connect the value network and drive sustainable innovation. The **3D**EXPERIENCE platform provides value to every stakeholder, connecting everyone to a single source of product definition. The platform provides digital continuity across a comprehensive and robust set of data-driven applications, ensuring everyone is working with the most up-to-date information resulting in:

- increased efficiency,
- improved collaboration,
- lower costs,
- faster time-to-market,
- a better experience for their customers.

Automotive & Mobility companies searching for a PLM solution to address today's challenges should ask themselves if the solution they select is able to manage the innovation process required to be competitive today and in the future. While solutions exist today to independently manage the product development process, only the **3D**EXPERIENCE platform connects the entire value network to a single version of the truth. As their business objectives evolve, companies can rely on the **3D**EXPERIENCE platform's robust and flexible architecture and breadth of applications to solve today's, and tomorrow's, challenges. It is the foundation upon which companies can deliver true innovation and better customer experiences.

WANT TO DISCOVER MORE?

See how your organization can make a significant change in the way you work and engage with customers.

[1] www.accenture.com/_acnmedia/PDF-5/Accenture-IT-Tech-Trends-Technology-Vision-Exec-Summary-2016.pdf

Our **3D**EXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE® 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 220,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

3DEXPERIENCE®

DASSAULT SYSTEMES | The **3D**EXPERIENCE® Company

Americas
Dassault Systèmes
175 Wyman Street
Waltham, Massachusetts
02451-1223
USA

Europe/Middle East/Africa
Dassault Systèmes
10, rue Marcel Dassault
CS 40501
78946 Vélizy-Villacoublay Cedex
France

Asia-Pacific
Dassault Systèmes K.K.
ThinkPark Tower
2-1-1 Osaki, Shinagawa-ku,
Tokyo 141-6020
Japan