



# **3DEXPERIENCE**<sup>®</sup>

# **3D**EXPERIENCE **PLATFORM**

Your Innovation Platform

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### I. INTRODUCTION

The COVID-19 pandemic revealed the immediate need for a rapid and profound adaptation by companies to operate in a new normal. Dassault Systèmes teams engage continually with CEOs, executive committees, Chief Information and Digital Officers, consulting firms and systems integrators in strategic discussions. The result is unprecedented transformative projects that help our clients.

This whitepaper captures key learnings from these efforts with our customers and partners. It shares the perspective of an ongoing evolution in the ways of

## "It takes a special kind of compass to understand the present and navigate the future."

working, the information systems used today and those needed for tomorrow. It also reflects on what an "enterprise" means and how it can become truly sustainable. The whitepaper validates Dassault Systèmes' **3D**EXPERIENCE platform as a unique Innovation Platform for transforming business and operations.

#### **II. EXECUTIVE SUMMARY**

The COVID-19 pandemic forced companies to organize new methods rapidly to stay connected and enable employees to work from home. Multiple start-ups and large US companies offered technologies and applications to enable connected and continuous communications. However, for many companies, the result was a patchwork of stand-alone point solutions and disconnected communication applications that bloated information channels and left employees with digital fatigue.

Dassault Systèmes offers companies a truly integrated environment to ensure efficient operations, implement efficient transformation programs, enable seamless collaboration and foster sustainable innovation. The environment offers:

- A common model that represents and contextualizes products and services for use by all stakeholders. Dassault Systèmes is the leader in Virtual Twin Experiences that combine 3D modeling and simulation with real-world evidence. Using the virtual world extends and improves the real world.
- Collaborative applications and scientific software adapted to each industry's specific needs at the enterprise, division, department or individual role level. These Industry Solution and Industry Process Experiences support a variety of business needs and data forms:
  - Highly structured supporting defined methods and processes (for example certification).
  - Moderately structured enabling effective planning and orchestration of projects or entire programs.
  - Lightly structured to encourage ideation process, community driven collaboration.
- The highest level of representation and abstraction of the most critical data as key performance indicators (KPIs), while enabling rapid and contextual deep dives for relevant insights and lean decision making.
- True data-driven and content-based digital continuity, with complete interoperability of applications, contents and services. Teams no longer need to swap files, documents or emails, since all materials are available through a "single source of truth." As a result, each individual and the team as a whole benefits from an efficient exchange of knowledge, continuous capitalization of know-how, constant learning and agile execution, driven by the desired outcome and the expected customer experience.

Dassault Systèmes **3DEXPERIENCE** platform is unique in the market. It brings together all aspects of the business in a single platform to increase collaboration, improve execution and accelerate innovation. The **3DEXPERIENCE** platform provides a real-time view of business activity and ecosystem, connecting people, ideas and data in a single collaborative environment that enables businesses and people to innovate in entirely new ways. (See more information at <u>3ds.com/3dexperience</u>)



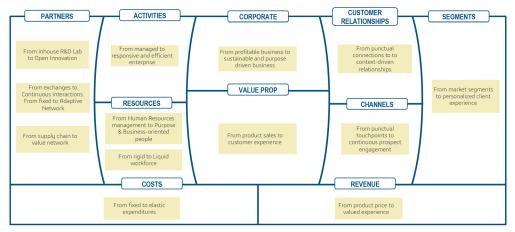
Figure 1. This illustration presents the unique value and capabilities that differentiate the platform – because only the **3DEXPERIENCE** platform offers all three – Multiscale Modeling and Simulation, Data Science and Collaboration – on a single platform.

#### **III. THE NEED TO RETHINK SUSTAINABILITY**

The pandemic revealed the need to rethink the sustainability of products, organizations and business models. At the beginning of the pandemic, companies experienced the need to reinforce the resilience and flexibility of their information systems. The issues include pervasiveness of mobile devices, reinforcing security protocols, increasing network capacity and wider adoption of teleconferencing, collaboration and instant messaging apps. In response, clients are starting new strategic initiatives and accelerating tactical programs, redefining their business and technical priorities. Priorities include the need to:

- Control operational costs, ensure business continuity and adjust to a new environment.
- Redefine the sustainability of business models, organizations, operations, products.
- Adapt rapidly to new market conditions, fast changing regulations, unprecedented competition.
- Accelerate decision-making, empower teams to collaborate remotely and seamlessly.
- Speed-up efforts and investments in digitalization to become more resilient and agile.
- Transform organizations, developing new methods, skills and competencies.
- Imagine new customer relationships and new interaction models among employees.
- Rethink innovation processes to reinvent products and services portfolios.

At the same time, a modern Industry Renaissance, a profound societal transformation, is underway. Enabled by the rise of new technologies, this Industry Renaissance influences all sectors of society. Industry Renaissance is about new ways of inventing, learning, producing and trading, and driving all companies to rethink the key elements of their business models.



#### **BUSINESS MODEL TRANSFORMATION DRIVEN BY THE INDUSTRY RENAISSANCE**

Figure 2. Business model transformation in the modern Industry Renaissance drives multiple stakeholders addressing multiple interconnected aspects.

Industry Renaissance is enabling new categories of industrial firms to create new categories of solutions for new categories of customers. It transforms business models to delight customers with previously impossible experiences.



Reduce COST

#### Accelerate GROWTH

Figure 3. A simplified mapping of the initiatives observed across industries, based on the degree of expected value creation and the intensity of business transformation.

To establish and accelerate transformation programs and value creation initiatives, clients are converging on a few guiding principles listed below. These principles are the core and most fundamental enablers and priorities for many companies across the 11 industries Dassault Systèmes serves.

#### A people and process-centric approach to business transformation

Applications and services that "digitalize" enterprises must provide a meaningful way for employees, teams and leaders to cooperate on true value creation and sustainable innovation. A measure of success determined by how products and services really have improved.

Efficient teams and organizations reduce almost to zero the distance between virtual and real, imagining and delivering great customer experiences, envisioning and producing sustainable innovation. Each and every team member contributes efficiently and in context to this continuous innovation process.

#### Modeling and simulation as the ultimate enablers of sustainable innovation

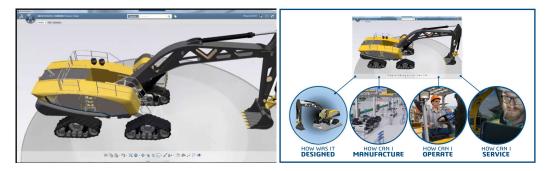
Virtual universes extend and improve the real world. With powerful platforms, companies can enable their teams to imagine, define, research and develop, engineer, manufacture, market and support great new experiences for customers.

Because everyone is able to see development in real-time, is driven by a precise expected outcome, and can connect individual tasks to a bigger picture that is accurate from both product engineering and business operations standpoints, the enterprise can make relevant, contextual, value-driven decisions and becomes more agile and focused.

This applies to products, services and underlying processes. Model-based enterprise and systems engineering have become a strategic priority at the executive committee level.

#### The rise of Virtual Twin Experiences as a new way to decide and act

Virtual Twins model and simulate the end-to-end lifecycle of products and services ("what" a company does and produces) and the core processes ("how" value is created).



# Figure 4. The backhoe model is a Virtual Twin (the "What") which simulates behavior (the "How") in the physical world.

Before making any business or technical decision, the Virtual Twin enables executives, employees, partners and/or suppliers to:

- Monitor and analyze industry and market intelligence.
- Explore and imagine new business models and sustainable product portfolios.
- Define, simulate, test and ultimately validate multiple "what if?" business scenarios and hypotheses, constraints and options. This is due to the power of scientific software and artificial intelligence to continuously capitalize on and make improvements from a company's deep knowledge and know-how.

The summary of the strategic value of Virtual Twins is in four categories:

- Customer centricity: A focus on the customer experience and simulate various operational scenarios, transform product development to make the customer the absolute focus of all activity.
- Robustness and performance: Running multiple simulations goes beyond physical tests and improves system robustness to achieve breakthrough performance by purposefully designing for each customer's unique requirements.
- Product and business twin: Deliver a digital twin to transform customer experience during the operating life of the system.
- Transformation to a platform business: Transform products into smart, connected platforms and leverage connected, intelligent systems to provide unique customer services and value.

#### The redefinition of enterprise boundaries and structure

Historically, companies formed to group and structure resources, organize value creation and delivery and control activity according to norms and standards. The last few years have seen a profound transformation, largely accelerated by the challenges of the pandemic.

Both small and large companies are reinventing work as communities of humans who need to stay connected, forge strong relationships, continuously capitalize on their know-how and create breakthroughs with sustainable innovation.

This is why many companies are evolving their organizational fundamentals and principles:

- Empower smaller group structures driven by a strong focus on customer experience.
- Expand broader ecosystems of partners and suppliers for co-innovation.
- Trade intellectual property (IP) and resources across market places.
- Move from "function based" job descriptions to "project driven" value creation, with a focus on roles, missions, expertise and a network of knowledge of each individual.

#### The need for a true Innovation Platform

These exciting and unique times present an opportunity to imagine and shape the world we want. An Innovation Platform enables the higher levels of creativity in a company and across entire value networks. It increases the number of fruitful interactions and improves the speed and volume of value flowing to unleash open and nimble innovation.

The extraordinary speed to develop a COVID-19 vaccine demonstrates how new networks of expertise and intelligence are now connecting rapidly to find concrete answers to the most arduous challenges. Real solutions accelerate how innovative concepts and breakthrough ideas become sustainable experiences.

The next section outlines the business and technological rationale for adopting and deploying an Innovation Platform to accompany and enable these changes in a company, and across an entire value network.

#### **IV. THE 3DEXPERIENCE PLATFORM**

Dassault Systèmes' **3DEXPERIENCE** platform provides real industry solutions to millions of users every day. It is both an innovation platform and a business platform. It is the first commercially available platform to enable company-wide transformation – including departments or divisions, industry processes, end-to-end integrations, as well as scientific and business applications, content and services. The **3DEXPERIENCE** platform enables all individuals in the organization to understand and perform their specific roles, focused on innovation and the customer experience.

#### Dassault Systemes contributes to the competitiveness of industries

As a pioneer in Product Lifecycle Management (PLM), Dassault Systèmes helps industries adopt 3D modeling and simulation for design, engineering, manufacturing, marketing and service. The company delivers two key benefits:

- Reduced product development cycle times: moving from 2D drawings to 3D modeling and simulation, manufacturers engineer a new product in half the time. This cycle time reduction directly contributes to profitable growth.
- Improved quality and safety: exhaustively simulating operating conditions, product performance, durability and reliability help discover and correct issues early – improving product quality and safety.<sup>1</sup>

#### A unique platform transforms the enterprise

The **3DEXPERIENCE** platform eliminates silos between design, engineering, testing and manufacturing organizations by providing a secure, common infrastructure with advanced 3D modeling, simulation, data science and collaboration capabilities. The platform is available on-premises and on public and private cloud. Businesses using the **3DEXPERIENCE** platform can execute the entire product development process on the platform without any handoffs.



Figure 5. The **3DEXPERIENCE** platform is a Business Experience Platform that enables our clients to create delightful experiences for their ultimate customers or consumers.

Industry leaders like Airbus<sup>2</sup> have adopted the platform approach to drive collaboration throughout the value network from engineering to manufacturing. Breakthroughs in new product design, operational performance, support and maintenance, customer satisfaction and new business models represent a move from sequential to parallel development processes. In addition, modeling and simulating multi-disciplinary (mechanical, electrical and software) systems enables engineers to test how systems work together using a virtual prototype before building a physical prototype. This paves the way for optimizing the elements of multi-disciplinary systems simultaneously.

#### The result of decades of collaboration with industrial leaders

Dassault Systèmes serves many business sectors for Manufacturing, Infrastructure (Energy, Construction, Cities) and Life Sciences (drugs and pharma, medical devices, clinic trials, patient care).

The company designs and develops solutions in collaboration with leaders in industry and embodies the best practices of each industry.

Dassault Systèmes is a sustainable innovation leader, providing virtual worlds that allow clients to create innovative experiences for their customers. It is a science-based company serving over 270,000 companies worldwide and a de facto standard in the aerospace, automotive and industrial equipment industries. New industry partnerships, for example with Bouygues Construction<sup>3</sup> for the construction industry, aim at accelerating transformation to smart cities and infrastructure.

After 3D design and simulation, the next level of competitive advantage derives from companies adopting digital and social technologies across the entire enterprise and its value network. For product development, this means providing modeling and simulation capabilities that break the silos created by disparate tools adopted over the years. The capabilities connect every engineer from every discipline across the value chain in a secure manner.

#### A major R&D investment effort

Dassault Systèmes' R&D investment totaled €935 million for 2020, with a team of 7,500 scientists and engineers developing capabilities for multiple domains and industries. The R&D team continuously delivers new apps on the **3DEXPERIENCE** platform supporting newly available technologies.

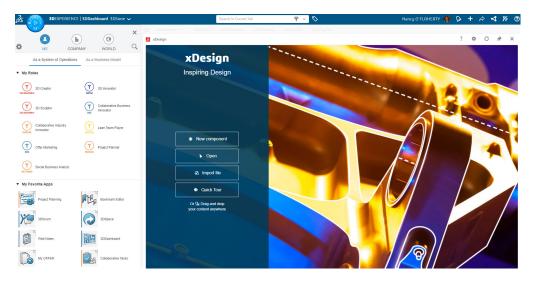


Figure 6. The **3DEXPERIENCE** platform provides ready access Roles and Apps, such as xDesign, to drive technical and business innovation.

For example, in the automotive industry, as game-changing technologies emerge, Dassault Systèmes' R&D organization delivered modeling and simulation capabilities for batteries and fuel cells and advanced driver-assistance systems on the multi-disciplinary **3DEXPERIENCE** platform.

#### A powerful infrastructure to foster innovation

The availability of the **3DEXPERIENCE** platform solutions on the cloud has accelerated adoption across all industries. Startups, such as electric vehicle maker Canoo<sup>4</sup>, are building next generation vehicles. OEMs connect partners and suppliers into the platform to enable real-time collaboration.

The **3DEXPERIENCE** Marketplace provides on-demand access to design, engineering and manufacturing services from providers around the globe. As supply chains transform into value networks, these OEMs seek to dynamically reconfigure their networks in line with a customer's scope, time and cost requirements.

Furthermore, to achieve a greater competitive advantage, companies are increasingly relying on Data Science and Artificial Intelligence (AI) technologies. Using generative design methods on the **3DEXPERIENCE** platform, customers can optimize designs based on functional requirements and constraints. Across every industry, these methods are the cornerstone for developing next generation intelligent and autonomous products. For example, in the life sciences industry, AI techniques guide identification, targeting and evaluation of safety and toxicity profiles of molecules.

#### A human-centric Virtual Twin of your company

Because Dassault Systèmes believes in the power of people and the multiple facets of each individual, a central element of the **3DEXPERIENCE** is the notion of a Role. Each user on the **3DEXPERIENCE** platform can have multiple Roles.

Roles define the different missions, processes and teams of an individual, the tasks to accomplish and access to applications. A Role complements an individual's "rich profile" that describes skills, competencies, background and domains of expertise. Roles connect the "Who" of the individual with the "What" the individual can do. With this innovative design, unique in the software industry, an enterprise can reconstruct dynamically and continuously a Virtual Twin of the organization. The Virtual Twin is extremely rich and constantly updated, thus eliminating the need to rely on static, outdated representations of the organization. In short, these days what people do matters more than where they appear on the organizational chart. The Virtual Twin reveals the new Workforce of the Future.

This also gives a unique and powerful mechanism to reveal and connect talents, uncover invisible networks of expertise and encourage creative thinking, realigning resources and competencies very rapidly.

3DCompass | New navigation experience







in personal life. It's a full SaaS offering with 6 roles: Collaborative Business Innovator to foster innovation in all domains: 3D Creator, 3D Sculptor and 3D Innovator to unleash creativity in 3D; and Project Planner and Lean Team Player to guide team collaboration and maximize team contributions



Figure 7. The "Roles" in the **3DEXPERIENCE** platform connect each individual "Who" and the "What" the individual does.

#### From documentation management to experience definition

Because the **3DEXPERIENCE** platform is truly data-driven, it is possible to develop and manage process and product documentation in a controlled, structured and searchable way.

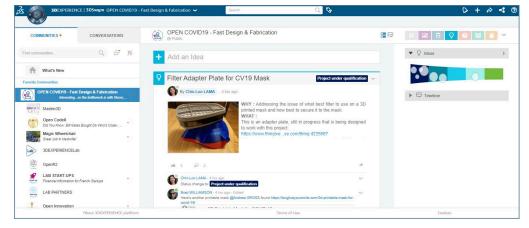


Figure 8. An example of Open Design: Dassault Systèmes sponsors open challenges worldwide and supports designers and engineers by providing the SOLIDWORKS xDesign online environment to help them rapidly develop solutions to COVID-19. Experts collaborate with scientists to carry out simulations on targeted projects such as open ventilators.

Team members connect to the platform and innovate together using one single and holistic product definition. The definition incorporates multi-domains, multi-physics and multi-systems, and leverages a perfect Virtual Twin of the programs, products and processes they comprise. This eliminates the risks of exchanging and relying on outdated documents, cryptic emails or esoteric out-of-context presentations.

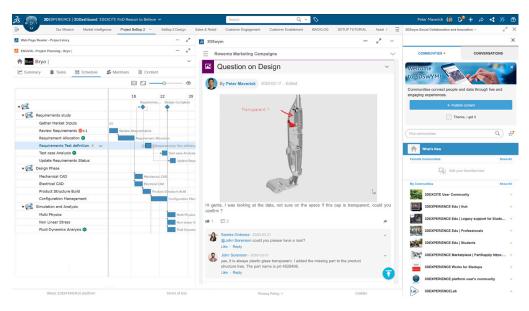


Figure 9. The **3DEXPERIENCE** platform is people and data-driven. It provides in one place all the needed information including engineering, manufacturing, financial, logistics, marketing, planning and costing data.

The unique data-and-content-driven navigation keeps the focus on a profound understanding of the products and services to envision, develop, prototype, manufacture and maintain for customers.

The basis of understanding is due to a "helicopter view" enabled by the business experience platform. This allows the CEO to go from an overall status based on critical KPIs linked to the strategic vision to a view of the latest simulation test on fluid dynamics completed by the simulation specialist.

#### Delivering personalized contextual intelligence and powerful insights

Through secured and personalized dashboards and communities, users can navigate and interact with all information, including engineering and business applications, content, analytics, notification services, shared storage space, widgets and viewers to accomplish the job. Users review project status, monitor progress and prepare the next decisions.



Figure 10. **3DEXPERIENCE** data analytics and insights bring visualization and contextualization capabilities. This chart shows the spread of COVID-19 from Nov 28, 2019 to May 17, 2020.

Because each individual in the company has a set of identified Roles, the entire organization becomes more agile, customer-centric and experience-driven. The **3DEXPERIENCE** platform seamlessly manages and continuously contextualizes projects, programs or initiatives. Users can go back in time, monitor the present and prepare the future by tapping into the applications of the **3DEXPERIENCE** platform and other information systems.

Supporting hundreds of international standards, the **3DEXPERIENCE** platform connects the dots, reveals untapped knowledge and know-how. It monitors the execution of decisions, models and simulates potential outcomes, and enables continuous and rapid improvement across all the functions of the enterprise.

#### V. THE 3DEXPERIENCE PLATFORM IS THE ONLY INNOVATION PLATFORM

The **3DEXPERIENCE** platform singularly provides in one place what other technologies offer in a disconnected way. It links people, data and processes within a continuum of unstructured to structured collaboration. Embedded data science services enable an enterprise to understand, decide, learn, capitalize and normalize its knowledge and know-how, using business experiences and methods. It is the only Innovation Platform.

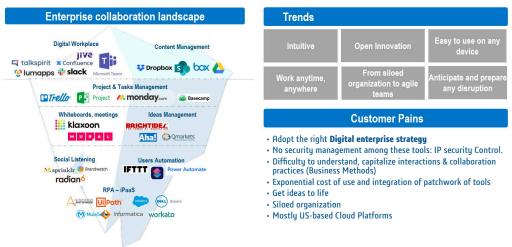
Why is the **3DEXPERIENCE** platform unique?

- No other platform offers industry-leading 3D modeling and simulation technologies to simulate in a range from molecules at nanoscale to aircraft and entire cities.
- The **3DEXPERIENCE** platform connects every participant in the value network, making an agile network to design and optimize multi-disciplinary, complex products and systems.
- **3DEXPERIENCE** technology can be implemented on-premises or accessible on public and private cloud as a service.

These factors make Dassault Systémes' solutions unique in the market and a competitive advantage in an industry.

When looking to improve collaboration, companies often find a patchwork of stand-alone tools. Implementing these tools incurs exponential costs for use and integration, and results in low IP control and security.

Such a patchwork makes it impossible to capture all activities in one place. It is very difficult to understand and capitalize on the entirety of enterprise interactions, as well as standardize business methods for efficiency and scale.



### ENTERPRISE COLLABORATION LANDSCAPE SUMMARY

Figure 11. The collection of the disparate tools for collaboration (shown on the left) does not answer the requirement trends for enterprise collaboration (shown on the right), leading to customer pain points.

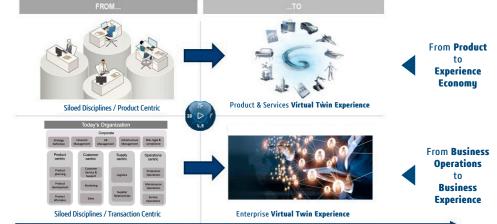
The **3DEXPERIENCE** platform connects all employees, their work, all processes and all tools to gain an end-to-end view of the enterprise, embracing:

- Value Creation: Products and Services development from idea to market with Product Virtual Twins.
- Enterprise Operations: connecting all departments together, with an enterprise Virtual Twin.

This enables businesses to:

- Accelerate collaboration processes and break silos, thanks to the Virtual Twin.
- Monitor, normalize, capitalize and improve by owning knowledge and know-how.
- Harmonize and scale with business experiences and methods.
- Protect and trace data with advanced security and IP control, taking into account sovereignty issues.

### **3D**EXPERIENCE PLATFORM IS A CATALYST FOR INNOVATION



Transformation

Figure 12. The **3DEXPERIENCE** platform is a catalyst for both technical (from products to experiences) and business (from operations to experiences) innovation.

The **3DEXPERIENCE** platform enables an integrated continuum of unstructured to structured collaboration, from sticky note style ideation with the 3DLean app to strictly scheduled project management well suited for enterprise business needs.

#### **CONNECTING UNSTRUCTURED & STRUCTURED COLLABORATION**

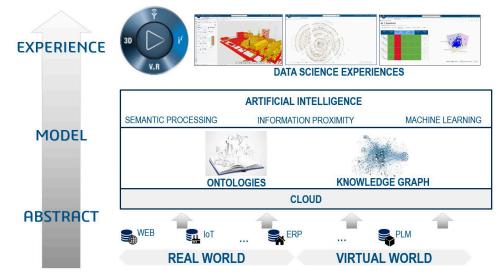


Figure 13. The **3DEXPERIENCE** platform ideation process from unstructured collaboration (for sharing ideas and data) to creation of a structured project to formalize and realize the original ideas.

The **3DEXPERIENCE** platform also embeds data science tools with the following capabilities:

- Data is enriched with context and mapped onto the right ontologies.
- Datasets, data models, ontologies and AI models are lifecycled.
- Past decisions are capitalized and turned into new insights.
- Insights and predictions are explainable, traceable and actionable.
- Decisions remain connected to data sources and context, as well as associated actions and assignments.

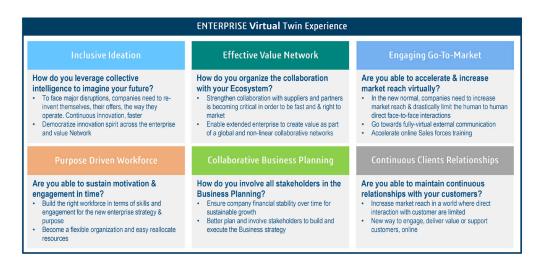
# **3DEXPERIENCE** Data Science



#### Figure 14. The **3DEXPERIENCE** platform is also a data science platform.

Transformation is capitalizing on and normalizing knowledge and know-how within and outside the enterprise using business experiences and methods. It is about people, culture and processes across an organization and its ecosystem. To reach resiliency and sustainable growth, companies in all sectors need to connect and respond to market changes and transform issues into opportunities. To achieve this new mindset and operating model, businesses need to accelerate the following transformations:

- Inclusive Ideation: How can a business leverage collective intelligence to imagine the future?
- Engaging Go-to-Market: Can a business accelerate and increase market reach virtually?
- Effective Value Network: How can a business organize collaboration within its ecosystem?
- Agile Workforce: How can a business sustain motivation and engagement in time?
- Collaborative Business Planning: How can a business involve all stakeholders in business planning?
- Continuous Customer Interactions: Can a business maintain continuous relationships with customers?



#### Figure 15. The **3DEXPERIENCE** platform acts as a catalyst for enterprise transformation.

With a patchwork of tools, it is impossible to tackle such transformation challenges, as you cannot capitalize on a fragmented knowledge. Virtual Twin Experience enables companies to normalize business activities, through replicable business experiences and methods.



Figure 16. Examples of potential business experiences to become available with the **3DEXPERIENCE** platform for solving transformation challenges.

#### **VI. A PROPOSED PATH FORWARD**

Dassault Systèmes uses a defined Value Engagement Model with clients looking to adopt the **3DEXPERIENCE** platform. The model has been developed and implemented successfully for many years, structuring each stage of value creation: value assessment, definition, commitment and delivery. It provides a powerful and proven framework to enable and drive large and small transformation programs. The steps include:

- Form a team of experts (business processes, engineering, IT) from all relevant disciplines to champion the model-based initiative.
- Assess current processes and capabilities related to modeling and simulation and identify areas for improvement. Adopt the Value Assessment methodology (Assessment, Definition, Commitment, Delivery).
- Measure the value of data-driven/content-driven Virtual Twins in terms of time to market, cost reduction and quality, customer satisfaction and business model evolution.

- Evaluate the strategic impact offered by adopting a model-based approach to help accelerate value creation and differentiation.
- Select programs to engage the model-based approach. Devise KPIs to measure the impact. Plan to scale usage and adoption for value realization.

With this framework for developing a customized transformation roadmap, clients can prioritize initiatives to leap to maximum return for a data-driven, model-based engineering investment.

To learn more how the **3DEXPERIENCE** platform can help you transform your business and operations, please contact Dassault Systèmes or visit <u>www.3ds.com</u>

#### **VII. REFERENCES AND RESOURCES**

1. Moving towards zero-prototyping for automotive passive safety. https://www.3ds.com/sites/default/files/2020-06/bmw-customer-story.pdf

2. Airbus; Aerospace & Defense Case Study https://www.3ds.com/insights/customer-stories/airbus

3. Bouygues Construction partners with Dassault Systèmes and Accenture to accelerate the digital transformation of its project activities <u>https://www.bouygues-construction.com/presse/communique/bouygues-construction-sassocie-dassault-systemes-accenture</u>

4. EV startup designs vehicle for new models of mobility <u>https://www.3ds.com/insights/customer-stories/canoo</u>

# Our **3D**EXPERIENCE<sup>®</sup> Platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE** Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our **3DEXPERIENCE** platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 290,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **www.3ds.com**.







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