

**RESEARCH TO PROTECT  
ACCELERATE THERAPEUTIC  
RESEARCH TO BETTER PROTECT  
POPULATIONS**



## EXECUTIVE SUMMARY

As the world focuses its efforts on continued research for diagnostics, treatments and vaccines for SARS-CoV-2, many governments are looking for ways to strengthen their scientific research capabilities and create a stronger foundation to deliver these cutting-edge therapeutics, as well as establish a foundation of collaborative research in preparation for the next crisis.

Governments, health ministries, healthcare and medical agencies, research institutions and partner companies around the world are understanding that in order to meet these challenges they must excel in scientific leadership and transform the processes throughout their highly-networked ecosystem.

### OUR UNDERSTANDING

The COVID-19 pandemic crisis has convinced the world of the necessity to rapidly develop innovative, safe, and well coordinated national medical emergency responses to prevent another devastating pandemic in the future.

The fundamental challenge facing organizations who focus on the innovation of treatments for novel diseases is how to optimize their research efficiency, particularly in early stages of discovery efforts. There is a growing focus on in-silico tools delivering predictive science, improved collaboration with global research networks, and enhanced decision-making to identify higher quality therapeutic candidates ensuring lower quality candidates “fail early”. There are many challenges in achieving this goal, such as:

- Accelerating therapeutic designs in complex and siloed research networks
- Improving innovation and efficiency in discovery on new technology

**“Modeling and simulation can help to inform clinical trial designs, support evidence of effectiveness, identify the most relevant patients to study, and assess product safety. In some cases, in silico clinical trials have already been shown to produce similar results as human clinical trials.”**

— Tina MORRISON, Ph.D., Deputy Director in the Division of Applied Mechanics, Office of Science and Engineering Labs, Center for Devices and Radiological Health, FDA. Quote extracted from 2019 press release titled “Dassault Systèmes and the FDA Extend Collaboration to Inform Cardiovascular Device Review Process and Accelerate Access to New Treatments”

- Enhancing collaboration to provide accessible scientific knowledge across organizations
- Delivering higher quality “drugable” candidates for downstream development and clinical trials

By superseding traditional approaches with Artificial Intelligence (AI) driven therapeutics design based on disease understanding, predictive tools that leverage existing experimental results to rapidly optimize the quality and safety of novel therapeutics, all delivered in an open collaborative platform enabling scientists to work in partnership and share scientific knowledge, are key to overcoming these challenges.

### HOW DASSAULT SYSTÈMES CAN HELP

Dassault Systèmes provides sophisticated scientific solutions to allow government agencies and public research Institutions to manage their innovation life cycle. We provide these institutions & their researchers with a scientific and business platform to imagine sustainable innovations, capable of improving patient & physician experiences in the age of precision medicine.

With over 30 years of investment in Life Sciences and Healthcare solutions, Dassault Systèmes has developed a scientifically enabled collaborative innovation platform to allow public Health Ministries and Departments, and their underlying Research Agencies, to virtualize scientific knowledge and workflows from discovery through patient access. The ability to connect the dots across the innovation continuum and connect people, knowledge and know-how of organizations on a platform with deep science is our differentiation. Imagine being able to understand, model, search, test, and treat a human body as precisely, safely and effectively as we already can today for a plane, a car or a building. We can transform how people are cured and help them live a better life. So to improve life, we have to invent new ways of representing reality. We have to invent the virtual twin experience of life.

Worldwide, we have partnered with many entities in the public and academic sector (e.g. **US FDA, NIH, Harvard, MIT, UCSF, Imperial College London, Cambridge University, Cancer Research UK, Genopole, INSERM, Université de Strasbourg, FAU Erlangen Universität, Shanghai Jiao Tong University, Curtin University**) as well as private sector companies to accelerate their scientific discovery and medical research in biology, chemistry and materials science by leveraging our deep scientific knowledge, technology solutions and services.

We are prepared to offer our support in defining the most efficient approach to solve these complex research challenges, in order to accelerate the discovery and delivery of critical life saving technologies.

### OUR UNDERSTANDING

## GLOBAL INNOVATION CHALLENGES

Public Research Institutions are looking for an end-to-end, collaborative, standards-based, open system that addresses their scientific requirements while also shortening cycle times and helping them get therapeutics and treatments to patients faster, in an traceable and environmentally sustainable way.

## STRATEGIC OBJECTIVES

Speed Discovery  
Across the Biomedical  
Research Enterprise

- Accelerate high potential candidate identification by leveraging in-silico approaches
- Focus research on development of first-in-class therapeutics
- Optimize the quality and safety of novel therapeutics

Leverage Data Science

- In silico models to prioritize experiment design
- Combine “virtual” in-silico prediction with “real” laboratory experimental results
- Calculation of therapeutically relevant end-points

Enhanced Agility

- Develop flexibility necessary to shift resources in response to unexpected scientific breakthroughs
- Enable effective collaboration with comprehensive data access and visualization tools

Commitment to  
Open Innovation &  
Partnerships

- Pursue cutting edge research through networked research ecosystem internal and external to your organization
- Co-development & joint commercialization
- Management of public-private collaborations



## HOW DASSAULT SYSTÈMES CAN HELP?

# DASSAULT SYSTÈMES SOLUTIONS: CATALYZING TRANSFORMATION THROUGH SCIENCE

We believe there is significant opportunity to facilitate key objectives in therapeutic diagnostic and treatment design for public research institutions by leveraging predictive science, reducing time to target and candidate identification, and simplifying access to information through improved collaboration across organizations.

We see further substantial opportunities for increased efficiency and accelerated research timelines by implementing a collaborative framework that standardizes and streamlines scientific operations.

## HOW DASSAULT SYSTÈMES CAN HELP?

# POTENTIAL OPPORTUNITIES FOR PUBLIC RESEARCH INSTITUTIONS

Public Research Institutions can realize significant scientific and operational value while delivering consequential patient impact from adoption of the Dassault Systèmes 3DEXPERIENCE® platform. Outcomes are achieved by leveraging the global digital continuum to accelerate innovation, improve collaboration and enhance discovery.



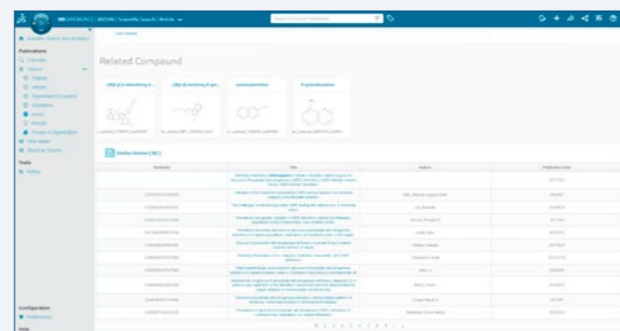
### COLLABORATIVE SCIENTIFIC INNOVATION

Transform the way you run your collaborative research projects connecting cross-disciplinary experts in a single platform on one conversation.

Quickly set up new scientific collaborations and safely share data and results between collaborators.

Empower your virtual teams with a new generation of integrated, cloud-based applications built on a world-class platform.

Stay in touch and communicate with your virtual teams using social networking designed for project-centered science.



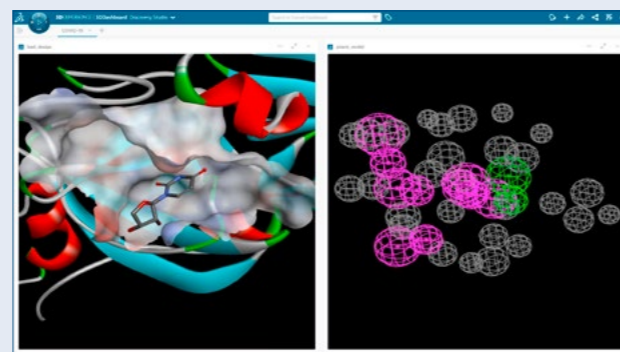
### IN-SILICO EXPERIENCES FOR PREDICTIVE SCIENCE

A suite of industry-leading tools to analyze the molecular interactions between small molecule therapeutics and their protein targets.

Accelerate the identification of novel drugs and/or repurposed candidates.

Develop deeper understanding of target protein function to produce more efficacious treatments.

Rapidly predict safety issues & efficacy trends.



### ACCELERATED THERAPEUTIC DESIGN & DELIVERY

Take more informed decisions through contextualized data.

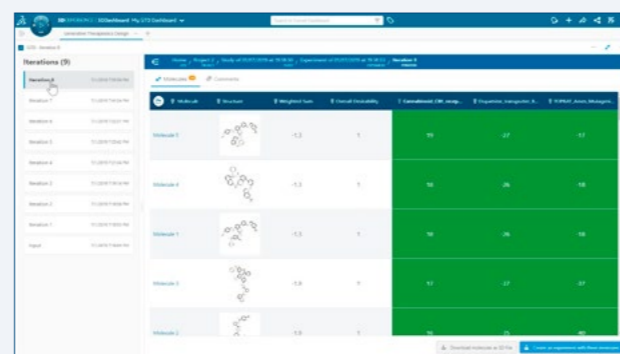
Virtual property prediction.

Run thousands of experiments virtually before running one experiment in the lab.

Reuse of more than up to 85% of experimental data.

Advanced data visualizations and analytics.

Established best practices with shared data and science services.



### HIGH IMPACT OPPORTUNITIES

**Enhance collaboration to provide accessible scientific knowledge across organizations**

### DASSAULT SYSTÈMES SOLUTION VALUE

Globally-networked scientific collaboration for internal and external partners.

Open collaborative platform enabling scientists to work in partnership and share scientific results.

### POTENTIAL IMPROVEMENTS<sup>1</sup>

↓ Effort to collaboration with external research partners (80%)

↑ Speed up R&D cycle in multi partner environment (25%)

**Improve innovation by combining in-silico and physical experimentation**

Predictive tools that leverage existing experimental results to rapidly optimize the quality and safety of novel therapeutics.

Design of Experiment (DoE) to optimize activities with statistical analysis.

AI driven therapeutics design based on disease understanding, predictive efficacy & safety and preclinical data.

↑ R&D capacity and cycle-time (25%)

↑ Digital transformation time to benefit (25%)

↓ Time and resources spent on projects with poor probability of success (20%)

**Accelerate therapeutic design and efficiency delivering higher quality candidates for downstream progression**

Increased visibility into R&D activities.

Embed robust scientific visualization for faster decision making.

Leverage historical data to minimize redundant experimentation.

Identification of potential downstream manufacturability issues, to improve formulations and stability of therapeutics.

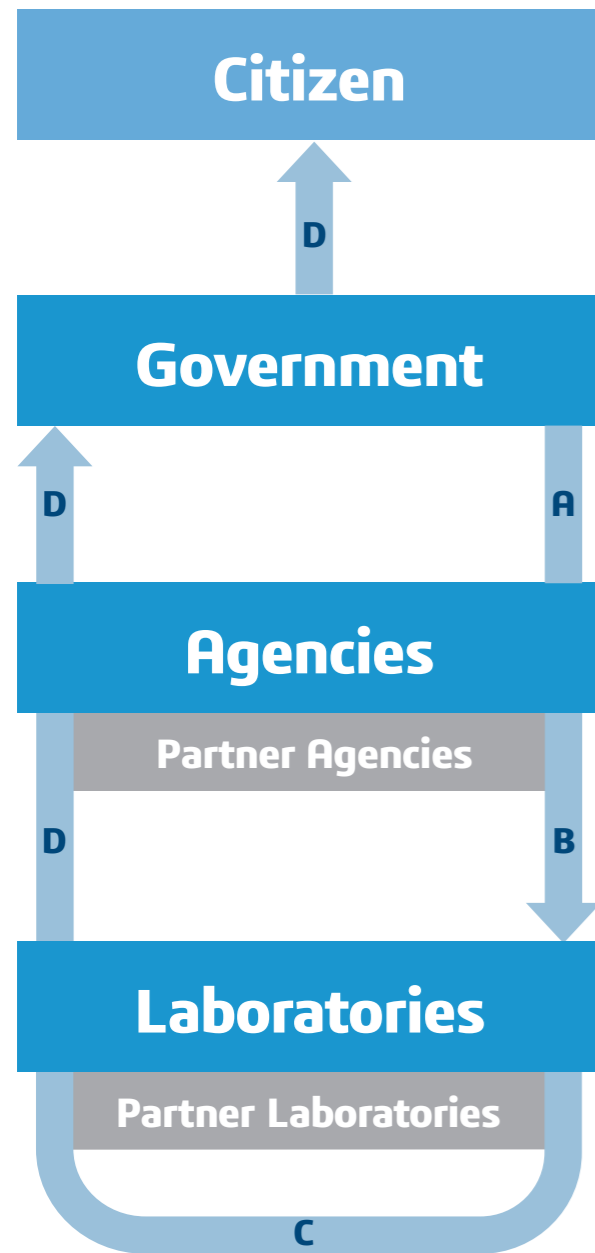
↓ Stage-gate decision cycle times (25%)

↓ Duplicate experimentation (30-40%)

<sup>1</sup> Dassault Systèmes Estimate based on internal business expertise & analysis, as well as Voice of the customer: Customer Value Engagements (Assessment, Definition, Commitment and Delivery)

CASE FOR CHANGE

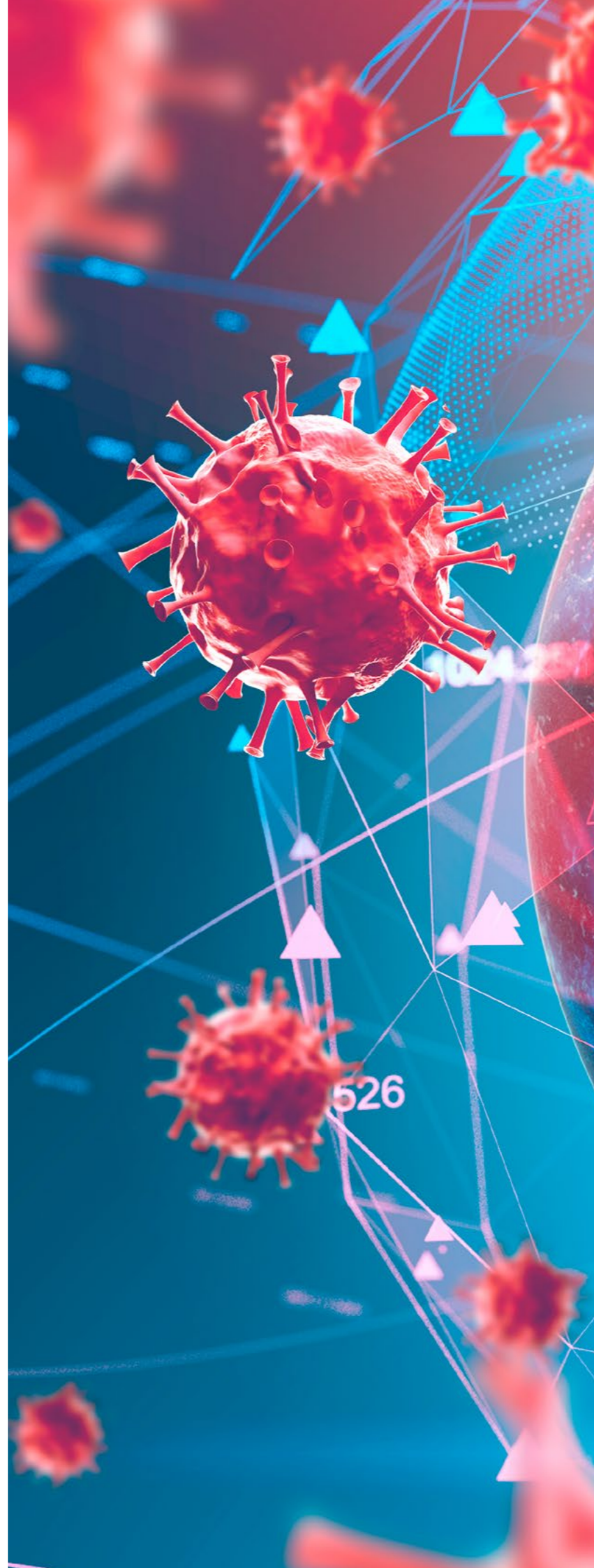
## STRATEGIC BENEFITS FOR THE ECOSYSTEM



- A** Foundation of innovation through national wide research platform
- B** Management of national scientific initiatives in response to epidemiological threats
- C** Culture of collaboration facilitating cross-organization links and management of public-private partnerships
- D** Bottom up progress monitoring to feed global planning scenarios and citizen communication

“Understanding how influenza viruses become human pandemic threats is vitally important to global health preparedness.”

– Dr Francis S. COLLINS, NIH Director ,  
Dr Anthony S. FAUCI, Director,  
NIAID NIHNIH Statement  
January 24<sup>th</sup>, 2013



CASE FOR CHANGE

## DIRECT BENEFITS FOR ORGANIZATIONS

Dassault Systèmes’ customers have achieved significant benefits in this area of the innovation cycle. As noted previously, key areas where we see maximum benefits are modelling, simulation and scientific collaboration.

**Modeling and simulation** for molecular therapeutic design offers the most dramatic long-term impact on innovation in the next decade. The future of chemical and biological research depends on building virtual experience twin molecular and device therapies that can be used to simulate and predict critical material characteristics, behaviors and system interactions.

A virtual twin experience of the human body with the **3DEXPERIENCE** platform integrates modeling, simulation, information intelligence and collaboration. It brings together biosciences, material sciences and information sciences to project the data from an object into a complete living virtual model that can be fully configured and simulated. By combining art, science and technology, it makes it possible to understand the invisible to represent the visible. Researchers, physicians, industry and even patients can visualize, test, understand and predict what cannot be seen – from the way therapies affect a disease to medical outcomes – before a patient is treated.

**Scientific collaboration** across organizational boundaries is critical to take full advantage of Technology and expertise. The most savvy researchers are quickly moving from simply sharing data with external partners to sharing methods, tools and models in the cloud to eliminate time-consuming orchestration and translational efforts.

**Benefits include<sup>2</sup>:**

- 25% improvement in candidate identification & quality by leveraging in-silico approaches and acceleration of high potential candidate identification
- Increased speed of innovation by leveraging contextualized data and taking more informed decisions delivering a time savings of 33%
- Improved success rate of identified candidates through leveraging of data science
- **Improved collaboration** across research sites and partners by connecting cross-disciplinary experts in a shared collaborative platform results in an 85% reduction in time and resources needed to exchange data.

While these are a snapshot of some of the benefits our customers see, we believe that the true value generated by deployment of our solutions is a multiple of that, which your research teams will realise as they adopt new ways of working, facilitated by the digital continuum. Additionally, integrating Dassault Systèmes innovation platform with existing systems creates an additional multiplier for overall efficiency, carrying momentum downstream.

“Modeling & simulation plays a critical role in organizing diverse data sets and exploring alternate study designs. This enables safe and effective new therapeutics to advance more efficiently through the different stages of clinical trials.”

– Dr. Scott GOTTLIEB  
Former FDA Commissioner

<sup>2</sup>Dassault Systèmes Estimate based on internal business expertise & analysis, as well as Voice of the customer: Customer Value Engagements (Assessment, Definition, Commitment and Delivery).



## CASE FOR CHANGE

### IMPACT TO CITIZENS

- Faster delivery of innovative vaccines, therapeutics and diagnostics
- Public updates on each step of key operations and scientific milestones
- Linking of scientific achievements to treatment and distribution models
- Connect patient care directly to basic research discoveries

While these are a snapshot of some of the benefits our customers see, we believe that the true value generated by deployment of our solutions is a multiple of that, which your research teams will realize as they adopt new ways of working, facilitated by the digital continuum. Additionally, integrating Dassault Systèmes technology with existing systems creates an additional multiplier for overall efficiency, carrying momentum downstream.

**Opening the way to tests, drugs and vaccines.**



**“This infection is not going to disappear... without science leading us to vaccines.”**

— Jeremy Farrar, Director of UK Wellcome Trust (WEF Covid Action Platform, March 8<sup>th</sup>, 2020)

## WHY DASSAULT SYSTÈMES

### VALUE OF PARTNERING WITH DASSAULT SYSTÈMES

Dassault Systèmes offers a strategic partnership with unparalleled experience in transforming organisations in highly complex regulatory environments to assist with innovation transformation. Now more than ever, public health organizations and associated research institutions need a trusted, strategic partner that understands their vision and shares their passion for what is possible in today’s rapidly changing global and technology-driven environment.



#### INTEGRATED LIFE SCIENCES & HEALTHCARE SOLUTIONS

Our innovative software solutions have been widely used by public and academic institutions (e.g. Harvard, MIT, US FDA, NIH, UCSF, Imperial College London, Cambridge University, Cancer Research UK, Genopole, INSERM, Université de Strasbourg, FAU Erlangen Universität, Shanghai Jiao Tong University, Curtin University) and private companies around the world specializing medical, pharmaceutical and healthcare industries.



#### DEDICATION TO SUSTAINABLE INNOVATION

Dassault Systèmes provides business & people with 3DEXPERIENCE universes to imagine sustainable innovations capable of harmonizing product, nature and life. Dassault Systèmes was ranked #1 by Corporate Knights in their 2018 Top 100 Most Sustainable Company In The World. The ranking highlights our environmental, social, financial and innovation ability as well as the sustainability value of our company’s solutions.



#### DELIVERING VALUE TO SCIENCE BASED ORGANIZATIONS

Dassault Systèmes is a proven partner that can help public research institutions discover life changing therapeutics that are more patient-centric within a complex scientific environment. Dassault Systèmes established partnership with multiple governmental institutions through the world, including US FDA, NIH and INSERM.

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 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit [www.3ds.com](http://www.3ds.com).

## DASSAULT SYSTÈMES COMPANY PURPOSE

“Dassault Systèmes provides business and people with **3DEXPERIENCE** universes to imagine **sustainable** innovations capable of harmonizing product, nature and life.”

– Bernard Charlès, CEO Dassault Systèmes



## NEXT STEPS

Our team is prepared to jointly engage with you to identify high value opportunities, develop a benefit case and build an implementation roadmap aligned with your priorities. We propose initial reviews with key stakeholders to explain the opportunities Dassault Systèmes can bring to their organizations. At the conclusion of our findings, we propose an executive workshop to define the approach, scope, and timelines necessary to codify the opportunity potential and develop a roadmap for implementation.

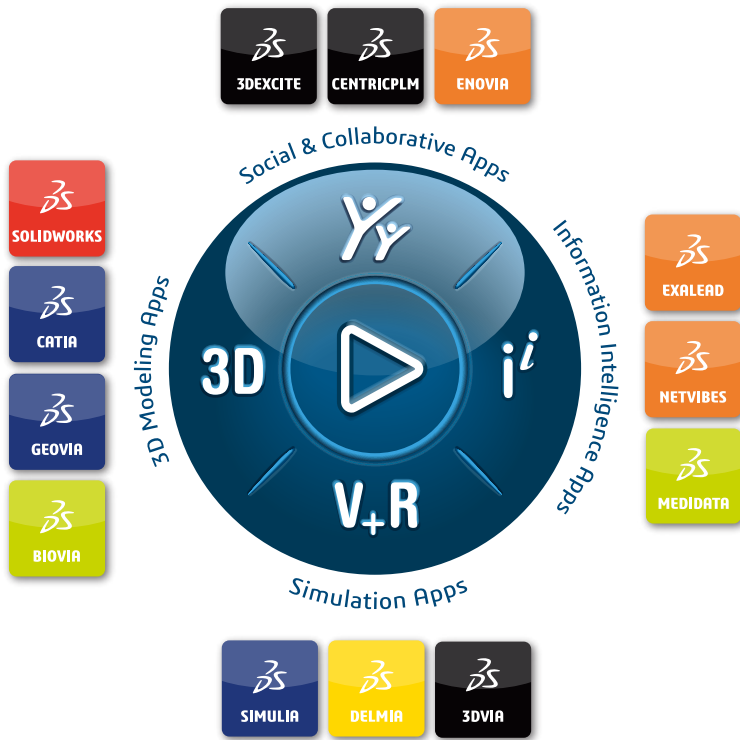
Recommended next steps for the transformation journey:

- Share and review Dassault Systèmes’ Value Perspective with leaders and key stakeholders across the organization
- Plan a Value Assessment to build a mutual understanding of your specific strategy and challenges. Confirm and clarify any specific objectives and initiatives as well as any barrier towards this achievement
- Develop an agreed high level implementation roadmap aligned directly to high value opportunities, with established KPIs to measure success and a robust business case to justify any required investment

Achieving this bold vision for transforming the approach to game-changing therapeutics will require significant focus and leadership commitment along with a strategic business partnership with a company like Dassault Systèmes that is committed to enabling a successful outcome. Dassault Systèmes brings unparalleled experience and a strong track record that will help you drive innovation, quality and excellence to deliver sustainable solutions and improve public health.

Dassault Systèmes is committed to enabling a successful transformation program for you and your researchers. We look forward to growing the relationship and assisting you to achieve sustainable innovation strategy objectives.





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

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