

From Things to Life: 2021 Dassault Systèmes Analyst Event

Envisioning the next 10 years

CIMdata Commentary

Key takeaways:

- *Dassault Systèmes expanded their vision in 2020 from things to life, with an increased emphasis on life sciences, healthcare, infrastructure, and cities. Virtual twins play a key role in each sector.*
- *Overall, the **3DEXPERIENCE** platform is central to Dassault Systèmes' strategy, but nowhere more important than in Infrastructure & Cities where it centralizes, harmonizes, and leverages the many disparate sources and data formats to support diverse construction value chains.*
- *BIOVIA, MEDIDATA, and the **3DEXPERIENCE** platform are being used to transform the end-to-end healthcare lifecycle from molecular discovery and design, device development and production, critical testing and validation processes, to deep data analyses with advanced technology and virtual twin capabilities.*

On June 9 and 10, 2021 Dassault Systèmes (3DS) held a virtual industry analyst event. The company stated that 80 analysts were in attendance with 30 attending for the first time. The first day consisted of a plenary session that began with remarks by Mr. Bernard Charlès, Vice Chairman of the Board and Chief Executive Officer, Mr. Pascal Daloz, Chief Operating Officer and Chief Financial Officer, and Ms. Florence Verzelen, Executive Vice President of Industry, Marketing, Global Affairs, and Workforce of the Future. A lengthy and informative demonstration of the **3DEXPERIENCE** platform followed and day one closed with a presentation by Mr. Patrick Johnson, Senior Vice President of Sciences & Corporate Research.

Day two was broken into three parallel tracks: Manufacturing Industries, Life Sciences & Healthcare, and Infrastructure & Cities, with presentations by senior leaders for each industry. The commentary that follows is roughly structured to follow the event agenda.

Plenary Session

Mr. Charlès brought his usual enthusiasm to his opening remarks, focusing on the shift in strategic emphasis 3DS announced on February 6, 2020. In 2012, the company announced a strategy shift from a focus on product to a focus on experience. In 2020, they moved from a focus on things to a focus on life. Mr. Charlès stated that this shift was essential to 3DS continued growth and that the company thought it could bring the benefit of their 40 years of experience in Manufacturing Industries to the Life Sciences & Healthcare, and Infrastructure & Cities sectors. More importantly, as stated by Mr. Johnson, SVP of Sciences & Corporate Research, later in the day, 3DS sees itself as a scientific company, and they feel they can bring the appropriate science and best practices to address the significant challenges facing these two sectors.

Mr. Charlès stated that one way to do this is to “push the boundaries of virtualization” applying their vision of virtual twins to transform how systems are designed. He cited how virtual twins of the value chain for COVID-19 vaccines contributed to speeding their time to market. Additionally, Mr. Charlès sees the virtual twin offering a unique combination of science and technology in the service of collaboration that helps make dreams possible. CIMdata agrees

about the broad applicability of twins across the lifecycle and has witnessed the use of digital twins delivering significant benefits to our industrial clients.

Mr. Charlès cited some impressive statistics about the company's reach in life sciences with the combination of BIOVIA and MEDIDATA, acquired in October 2019. He claimed that the use of virtualization approaches in response to COVID-19 opened people's eyes to its power in healthcare applications. Again, CIMdata would agree. Many medical device makers are pushing regulatory agencies to accept more virtual testing, as the automotive and aerospace agencies have over time. CIMdata believes this would be a huge step forward.

Mr. Daloz provided some financial highlights stating that in 2020, the company revenue grew 10% (12% in constant currencies), with software revenue up 14%. License revenue outside of MEDIDATA took a hit in 2020 but it gradually recovered. He commented that for the full year 80% of software revenue was recurring, which he suggested is a typical level for a Software-as-a-Service (SaaS) company. When the pandemic hit, 3DS was clear that they would maintain their headcount, a commitment they fulfilled, with the company actually increasing R&D spend by 10% last year during the crisis. Mr. Daloz also noted that Centric Software has grown significantly since 3DS' investment in them and has charted a successful expansion into retail and food & beverage. 3DS is bullish on their prospects and CIMdata would have to agree. Centric, soon to be wholly owned by 3DS, built a lot of industry knowledge into their solution and have also built a large, experienced global team to sell and support it.

Ms. Verzelen has a large portfolio to cover given her title but her remarks mainly provided more details on 3DS' results, strategic direction, and portfolio. She too came with many customer references, including Ball Aerospace in manufacturing, Stellis Biopharma in Life Sciences, and Fangda in Infrastructure, all citing the benefits of the **3DEXPERIENCE** platform. She also provided more details on the growth opportunities 3DS sees in its three sectors. Ms. Verlezen suggested that 3DS sees greater opportunity to grow faster than the market in the two new sectors they are targeting. For example, in manufacturing they predict market growth of 5%, with their growth at 6-8%. In contrast, they see market growth in Infrastructure & Cities at 7% while they expect growth of 12-14%. This makes sense in that in manufacturing the players are well known and growth is often about replacing competitors, a tougher business than new areas, like the chosen two, where the offerings and competitors are fragmented and there are many opportunities to bring their manufacturing expertise and experience to bear to help companies in those sectors.

Both Ms. Verzelen and Mr. Charlès emphasized the company's commitment to global environmental and sustainability objectives, and that their portfolio is well positioned with applications of science, technology, and manufacturing expertise. Their remarks also noted one key product addition: integrating Life Cycle Analysis, a staple measurement process for environmental impact, into the **3DEXPERIENCE** platform by 2022. The extended team repeatedly mentioned the Circular Economy and circular thinking-ideas CIMdata first promoted in our PLM Market & Industry Forum in 2014. Implementing these concepts is crucial for industries and the global economy to meet environmental targets and 3DS clearly sees this as core to their strategy.

The **3DEXPERIENCE** platform demonstration was hosted by Mr. Philippe Laufer, Executive Vice President of 3DS Global Brands, supported by Mr. Morgan Zimmermann, CEO of NETVIBES, Mr. Guillaume Vendroux, CEO of DELMIA, and Mr. Vincent Merlino, Business Experience Solution Portfolio Director of ENOVIA. Mr. Laufer emphasized that brands remain critical to 3DS' strategy, in part because they establish the emotional connection with the user. He claimed that the company has 35 million users across their brands. Today, 3DS believes

their platform allows them to establish and maintain connections with their users in real-time. 3DS can understand how their customers are using the product, provide guidance, and, important to 3DS' growth, offer them new capabilities to purchase and (nearly) immediately use on the platform. They also announced that by 2023 the majority of **3DEXPERIENCE** platform capabilities will be available only on the cloud.

The team spent some time discussing their **3DEXPERIENCE** Works portfolio, their approach to leveraging their broad portfolio for benefit of their SOLIDWORKS user base. They stated that their goal is to get all of their SOLIDWORKS customers on the platform. Works offerings also include simulation from SIMULIA and DELMIAworks ERP, their rebranding of IQMS, as well as legacy MES and MOM offerings. According to Mr. Vendroux, since the beginning of 2021 the company added several new clients for the Works portfolio. CIMdata believes this is a good start but converting the SOLIDWORKS customers to become **3DEXPERIENCE** platform users will be a long process.

The last presentation of this session, “Science for a Purpose”, saw Mr. Johnson focus on scientific innovations coming out of 3DS R&D with a practical importance. For example, he detailed their work on next generation bioproduction capabilities. Mr. Johnson stated that virtual twins play a big role in this process, ranging from twins of the stem cell lines to twins of the manufacturing lines and equipment used to produce them. 3DS is working with multiple partners and customers to explore this vision, applying modeling and simulation, big data, and artificial intelligence to help in this exploration. In healthcare, they are building on the shoulders of their human heart virtual twin to create virtual twins of entire humans. Mr. Johnson stated that 3DS is partnering with several hospitals on a living brain project to help epileptics. In an example closer to 3DS' manufacturing roots, Mr. Johnson spoke about data centric engineering. Supported by a video, he described tools to “understand” a company's portfolio of products, analyzing not only their geometry, but their properties and intended performance on a wide range of parameters. A video showed how the “patrimony” of such a portfolio could help guide future designs. He also showed research work on embedding simulation into the design process. When asked, Mr. Johnson said that users could expect to see these capabilities in generally available products next year.

All in all, the day-one sessions provided an excellent update on company strategy, results, and more than enough teasers to ensure attendance at day two.

Manufacturing Industries Track

On June 10th, Mr. Dominique Florack and his team provided a summary of 3DS' Manufacturing Industries business during the past challenging year and their positioning for resurging economies as the world begins to recover from the pandemic. They accurately summarized the sectors that struggled, e.g., commercial aerospace, and sectors that expanded, e.g., military and defense. In 2020, 3DS introduced Virtual Twin Experience of Humans and their timing could not have been better given the need for life sciences companies to quickly find cures and treatments for COVID. Modeling of human systems provides a platform for scientist to consider treatments for skin therapies and even human/biological material properties as they are discovered. Observing the weaknesses of a supply chain and then modeling it to allow a logistics manager to consider alternatives is essential to recover from the on-going logistics challenges. Even understanding how to modify a factory to quickly resume mass production or produce urgently needed medical supplies is improved with 3DS' advanced **3DEXPERIENCE** platform. 3DS' Manufacturing Sector is building upon their market strength by providing services beyond engineering and manufacturing—the focus is more inclusive of the product

and consumer lifecycle. The ability to learn as criteria are discovered in use and then quickly improve the operation of a product is a focus of 3DS' Virtual Twin Experience of Humans. Figure 1 emphasizes the need for constant lifecycle learning and adjustment.

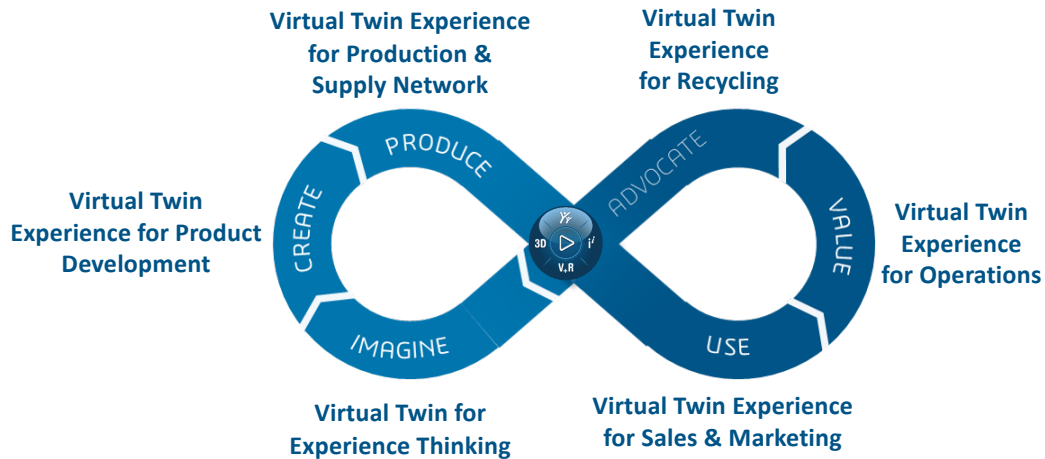


Figure 1--Virtual Twin Experience for Lifecycle Management
(Courtesy of Dassault Systèmes)

3DS' Manufacturing Sector leaders also presented Virtual Twin Experience for Product Development, Production Systems, and Operations. Some key points from those presentations include:

- Performance engineers can interactively understand carbon footprint while trading off key performance targets—like weight.
- Parts design inventory and library management using AI techniques while finding similar shapes, key attributes, and other classification knowledge that enables fast identification and reuse of proven parts.
- Applying AI to service notes, the digital twin, performance KPI data, to predict and resolve failures before they happen.
- Combining factory digital twin with the actual product and IoT measurements improves assessment and repair, and even optimizes manufacturing.

An expanded focus on material science and chemistry—now including human and plant organic biological systems—and the expansion of affordable data science techniques will help expand the virtual twin experience. 3DS suggested that putting humans, customers, and healthcare providers at the center of the virtual experience is the key to 3DS' success. While aerospace and automotive are mature industries having used 3DS tools for a few decades, they continue to benefit from **3DEXPERIENCE** platform adoption by roles outside of engineering.

Finally, there was a timely discussion on the need for resilience as we all recover from the pandemic. 3DS presented five rules of resilience and described how their Virtual Human Experience is helping each one.

1. Simulate scenarios and their outcomes to accurately simulate the outcomes of multiple planning scenarios.
2. Realign forecasting with reality, measure continuously.
3. Get the best plans by considering all constraints, even new ones discovered in operations.

4. Meet critical KPIs with real-time supply plan re-optimization.
5. Leverage collective intelligence from multidisciplinary teams.

The **3DEXPERIENCE** platform expansion to support the Virtual Human Experience offers capabilities to new manufacturing segments driven by consumer demands and to mature industries like automotive and aerospace. According to the presenters, many new mobility electric vehicle engineering and manufacturing companies worldwide are using the platform. New customers are likely choosing 3DS' suite of tools and services based on the need for a quick start.

Life Sciences & Healthcare Track

Medidata is a big part of the recent Dassault Systèmes storyline. (As part of 3DS it is now known as MEDIDATA.) It was an expensive acquisition, and it has worked out very well both from financial and strategic perspectives. MEDIDATA provides cloud software to support clinical trials for pharmaceutical and medical device products, and 3DS claims that it has powered tens of thousands of clinical trials, with millions of patients and billions of patient records. MEDIDATA Co-CEOs and Co-Founders, Mr. Tarek Sherif and Mr. Glenn de Vries (Mr. Sherif also has the role of Chairman, Dassault Systèmes Life Sciences & Healthcare) opened the Life Sciences & Healthcare track with a review of how MEDIDATA provided support for the COVID-19 pandemic response.

Regarding the COVID-19 response, the presenters stated that the MEDIDATA platform supported over 360 studies with more than 350,000 patients across more than 73 countries, which were about 60% of the trials related to COVID. The easy data access enabled by the cloud platform allowed researchers to work much faster than ever before getting a commercial product out at scale in 11 months; historically this has taken seven to ten years.

Mr. Sherif and Mr. de Vries spent time reviewing MEDIDATA's two-decade journey and then moved on to talk about where 3DS is going within the life sciences and healthcare industry. Both were very bullish on what will be accomplished in both digital and biologics development. The BIOVIA brand, MEDIDATA, and other platform capabilities are being used to create an end-to-end digital thread for product development and realization for biologic, medical device, and combined products segments. Artificial Intelligence (AI) and Machine Learning (ML) are enabled using MEDIDATA's Acorn AI solution that is fed from the vast stores of data captured in clinical trials. CIMdata agrees with Mr. Sherif and Mr. de Vries that connecting the BIOVIA and medical device capabilities of the **3DEXPERIENCE** platform with MEDIDATA will create a comprehensive digital thread that will be hard to compete with in these application areas. It is also exciting that data from clinical trials can be processed to uncover insights faster that can improve products and shorten time to market.

Ms. Claire Biot, PhD, Vice President Life Sciences & Healthcare Industry, delivered a presentation entitled "Creating Value for Life Sciences & Healthcare." She talked about the scope that 3DS is covering: molecular therapies, digital therapies, medical devices, and health care services with the goal of improving both the patient experience and health outcomes. The strategy is to have a scientific and business platform for sustainable innovation with the application of 3DS' virtual twin with biopharma manufacturing as a key target. Within this approach the **3DEXPERIENCE** platform offers end-to-end capabilities from requirements gathering through production operations. Applying an agile approach to product development enables the platform to shorten the time to production and time to value. CIMdata is seeing more industrial companies moving from waterfall to agile product development approaches for physical products beyond software, and it is good to see 3DS enabling this powerful approach

on their platform. The platform allows customers to model, simulate, and evaluate using an agile approach enabling them to optimize the virtual twin improving the product launch and operation once it is instantiated. Furthermore it paves the way towards proactive quality, as the virtual twin can help companies anticipate quality events and limit the number and severity of issues. Mrs. Biot finished her presentation with a focus on Dassault Systèmes' emphasis in medical device development: (a) towards automation and democratization of simulation; and (b) the virtual twin of the human body as a way to anticipate how a device interacts with the human body.

Finally, Dr. Reza Sadeghi, VP and BIOVIA Chief Strategy Officer, presented 3DS' approach to improving molecular therapy development using BIOVIA ONE Lab. Sanofi, an early adopter, is using the solution to identify opportunities with fully traceable research, develop solutions with generative design and optimized lab processes, and efficiently transfer designs to production improving the value delivery. Dr. Sadeghi emphasized that AI/ML is a critical capability and 3DS has enabled the training of ML models from simulations rather than physical testing, shortening the development lifecycle. He then described how this was applied to designing COVID-19 vaccines and is driving the digital transformation to personalized medicine, an exciting transformation for humanity.

Based on the presentations in this track, 3DS has already made great strides in integrating MEDIDATA and BIOVIA, and in leveraging the **3DEXPERIENCE** platform for these industry segments.

Infrastructure & Cities Track

In 2008, 3DS took their first steps to organize offerings by industry. At that time, the industries were organized differently than today, with more focus on the architecture, engineering, and construction (AEC) segment. At the core, their offering in the AEC space was the same as today's offering in Infrastructure & Cities. Historically, the lifecycle of the built world and the associated value chains to be managed from idea through life have been disjointed and produced a very heterogeneous and disconnected set of intellectual property. Today, 3DS' vision and objectives go far beyond those early roots and, based on what was presented in this track, 3DS has leveraged their platform and brands to support this sector.

The track host, Mr. Sylvain Laurent, Executive Vice President and Chairman, Infrastructure & Cities, reinforced the day one key messages about this sector and 3DS' views of its potential, both financially and in helping 3DS and their customers address pressing global environmental and sustainability issues. Mr. Laurent broke down this sector into three segments: Energy & Materials; Cities, Construction & Territories; and Business Services. Like construction, energy has to transform to wring the "last drop" out of oil and gas assets, and mines. Companies in this industry segment also have to work in a more sustainable manner. Mr. Laurent suggested that the next decade is critical to transform country infrastructure and cities to build more sustainable businesses and establish a more sustainable future.

3DS sees its platform as a new generation of platform that can play a critical role in the necessary IT, business processes, and business model changes to get to this sustainable future. Cloud, mobile, and virtual twins also help the far-flung value chains of this sector readily collaborate to advance their collective enterprise. 3DS also saw the need to expand their team and Mr. Laurent highlighted new team members and their extensive backgrounds. Building a strong bench with deep subject matter expertise is essential in any software business, but it is even more important when bringing technology and ideas from outside the segment. Changing

paradigms in any situation requires leveraging subject matter expertise to gain the trust of the target customers to open their eyes to consider what might be possible.

During the course of the track, 3DS highlighted many of their early customers who helped them formulate their strategy and adapt and extend their portfolio for this sector. Traditionally, projects in this sector were executed sequentially, with little data and process integration, and limited data continuity, all of which made collaboration more difficult. Mr. Remi Dornier, Vice President of Cities, Construction and Territories, stated that having a common data environment (CDE) is critical to manage all of the disparate data. It is even more effective if the solution environment can provide process and project management support, and synthesize all of the disparate information into actionable dashboards available to a wide range of consumers. In a customer example, Mr. Laurent stated that SNC-Lavalin invested in moving from Building Information Modeling (BIM) and 2D drawings to an integrated model-based approach employing PLM concepts. Mr. Dornier spoke about their partnership with Bouygues Construction, for whom Mr. Dornier was 3DS' Client Executive in 2019-2020, one of many of his roles during his 15 years with the company. He stated that Bouygues chose the **3DEXPERIENCE** platform as their cloud platform to connect their extended construction ecosystem, starting in their Building domain in 2020 on a one-year project.

Mr. Simon Huffeteau, Vice President of Infrastructure & Cities Strategy, reviewed some of the company's early work in this segment, including their partnership with Frank Gehry who leveraged CATIA V5 for his innovative, often sheet metal-intensive designs. Wind turbines are extremely complex machines that work in a complex system of systems environment, and Mr. Huffeteau claimed that about 75% of newly installed wind turbines leverage 3DS solutions. Early DELMIA applications to nuclear facility safety and maintenance helped establish them in that segment. He claimed that about 95% of nuclear operators use their solutions. A major trend in construction is expanding use of modular construction techniques, which he stated can directly leverage 3DS' vast experience and portfolio in manufacturing. He noted that being able to construct more building elements precisely off-site and then assemble them on-site makes construction easier, more predictable, and significantly lowers its environmental impact.

Mr. Dornier provided an overview of 3DS' strategy for this industry segment. The segment includes: Cities and Territorial Authorities; Utilities; Civil Infrastructure; Building and Facilities; Construction Products and Services; and Agriculture and Forestry. Just as in other Industries, 3DS describes their Industry Solution Experiences around a spiral representing the lifecycle: Integrated Built Environment, Civil Infrastructure Engineering, Building Design for Fabrication, and Inclusive Urban Future. While his remarks talked about many drivers for change, he claimed that sustainability was a huge challenge for the construction industry, one that he felt would push companies toward a disruptive approach. To help industry respond, Mr. Dornier positioned the **3DEXPERIENCE** as the "platform for the full construction value chain." 3DS' approach relies on applying model-based systems engineering (MBSE) principles to help their customers transform from document-centric paradigms to object-oriented paradigms.

Finally, Mr. Dornier stated that the virtual twin is crucial in this segment as well, and highlighted some very new technology termed Generative Experience. The demo video showed what others term generative design technology applied to building construction. CIMdata thinks this is an important application, in an area that needs improvement. Changing paradigms can be difficult, but by using instrumented virtual twins coupled with dashboards it can be easier to make a convincing virtual case. In Infrastructure, 3DS' focus goes beyond just a CDE to providing integrated project management leveraging virtual twins to support real-time collaboration across disparate value chains, time, and space.

Conclusion

In their two-day session, Dassault Systèmes did a great job laying out their change in strategic direction, and then providing some details on their plans, offerings, and successes in their three sectors: Manufacturing Industries; Life Sciences & Healthcare; and Infrastructure & Cities. The company plans to leverage their scientific roots, their 40+ years of experience in manufacturing, and considerable portfolio for the benefit of all three sectors. The **3DEXPERIENCE** platform is at the core of their offering, powering extended value chains and enabling virtual twins from the microscopic to global in scale, spanning the natural and built world.

As the company stated, they saw this shift in direction as necessary to continue their history of rapid growth. The Manufacturing Industries segment is very competitive, with battles over brownfields in many industries. In contrast, Life Sciences & Healthcare and Infrastructure & Cities are much earlier in their digital journey, with markets less concentrated than in Dassault Systèmes' historical industries. CIMdata agrees that they have much experience to bring to these sectors and, as usual, their approach is to create and promote new paradigms. Or at least paradigms new to the target sectors who are less digitally mature. Based on the presentations, the company is off to a great start on that new future.

About CIMdata

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