

“Redefining Humanly Possible”: Siemens Realize LIVE and U2U

Adapting to New Challenges

CIMdata Commentary

Key takeaways:

- *Realize LIVE and User2User (U2U) showcased the breadth and depth of Siemens’ solutions and how rapidly they are now able to add new capabilities spanning all domains of their Xcelerator portfolio.*
- *Siemens is rapidly expanding the use of new and emerging technologies such as Artificial Intelligence within their solution portfolio to enable higher ease of use and automating selected functionality.*
- *Siemens is committed to a hybrid on-premises/cloud strategy that enables their customers to deploy and use computing resources where it makes the most sense for them and migrate solution functionality, data, and processes as their business needs evolve.*

On May 26, 2021, Siemens Digital Industries Software (Siemens) conducted their virtual Realize LIVE and User2User events,¹ with session replays available until June 25. Siemens stated that over 4,200 people from 42 countries registered for the day’s virtual sessions. These sessions covered a wide variety of topics and customer use cases. This commentary provides highlights of some of the sessions that CIMdata attended and is by no means an exhaustive review of all that was presented.²

Ms. Sinead Bovell, Futurist, AI and Future of Work Expert hosted the mainstage opening session. She invited Mr. Tony Hemmelgarn, President and CEO of Siemens, to discuss how companies around the world are trusting Siemens’ software to meet their challenges and create products that are redefining “what is humanly possible.” According to Mr. Hemmelgarn, many Siemens customers are shining examples of how to adapt to the many changes wrought by the global COVID-19 pandemic, and he sees digitalization as key to this ability.

Citing that some problems cry out for the application of digital technology, Mr. Hemmelgarn posed a thoughtful analogy. The Wright Brothers built a flying machine that even they were not certain would fly. Imagine if those pioneers had access to today’s digital tools. They could understand the stresses on their gossamer-thin design elements and be confident in its flight capabilities. Contrast this with Space X, the Elon Musk company that leverages digital tools to the utmost to create a commercial space leader from scratch. That is the promise of digital transformation that Siemens looks to enable. But making a digital transformation requires trust, which Mr. Hemmelgarn described as having two pillars: (1) will you do what you say you are going to do and (2) are you capable of doing it? Digitalization helps prove the second statement and allows companies to focus on achieving the first. Leveraging the Siemens solution portfolio will help companies get there, claimed Mr. Hemmelgarn.

A key enabling capability is the comprehensive digital twin, describing both virtual products and the means of their physical production and support. According to Mr. Hemmelgarn, this is a unique competitive advantage for Siemens customers, delivered using modern, adaptable

¹ For more information, please see <https://events.sw.siemens.com/en-US/realizelive?stc=wwdi112140>.

² Research for this commentary was partially supported by Siemens.

solutions that easily enable personalization, supported by a flexible open ecosystem. Mr. Hemmelgarn cited some examples, including:

- Siemens Xcelerator portfolio, specifically Opcenter, helped BioNTech and Pfizer quickly scale their COVID-19 vaccine production.
- SRI International uses Siemens’ offerings to recreate obsolete integrated circuits in defense systems, an important problem to all companies who create long-lived electronic assets.

According to Mr. Hemmelgarn, 24 of the top 25 automotive original equipment manufacturers (OEMs) use Teamcenter. He further emphasized Siemens approach for customers to adopt and deploy the Xcelerator portfolio “their way” stating that Siemens supports on-premises, private cloud, and public cloud deployments (or any hybrid combination). CIMdata believes that Siemens (through internal development, targeted acquisitions, and open ecosystem third-party relationships) is enabling their customers to effectively undergo the digital transformations needed to maintain their product and market competitiveness and redefine what is humanly possible.

Following Mr. Hemmelgarn was Mr. Easton LaChappelle, Founder and CEO of Unlimited Tomorrow, who first designed a prosthetic hand at the age of 14.³ He presented the inspiring story of Unlimited Tomorrow, a Rheinbeck, New York, USA, startup that is revolutionizing prosthetics by ingenious applications of 3D scanning, additive manufacturing, and sensors/IoT. Applying these technologies is changing the economics of prosthetics, putting superior, personalized devices in reach for many children needing upper limb replacement. It was wonderful to watch young children quickly adapt to their new devices, controlling artificial fingers that replaced their lost limbs gripping everyday objects as they never had before. Unlimited Tomorrow is redefining what is humanly possible and CIMdata found the speaker and his company’s solutions to be very impactful.

Ms. Brenda Discher, Chief Marketing Officer, Siemens, led a discussion of research into digitalization adoption maturity. A key research outcome was that success requires balancing the combination of people, process, and technology. Just applying technology does not deliver the maximum benefit. This is a position that CIMdata has been telling our clients (and students in our PLM Certificate classes) for many years and we are happy to see additional research support this position.

Hosting the session titled “A Teamcenter Strategic Update: Orchestrating the Digital Enterprise with the Leading Choice for PLM” was Mr. Joe Bohman, Senior Vice President Lifecycle Collaboration Software, Siemens. He was joined by Frances Evans, Senior Director, Siemens, and Bill Lewis, Director of Marketing, Siemens. This very informative session covered many new and expanded Teamcenter capabilities.

Mr. Bohman spoke about how highly Teamcenter is being rated by various analyst firms and noted that in one evaluation it was the only solution to receive a 5 out of 5 on architecture. He listed Siemens Teamcenter’s five focus areas: Instant-on with best practices out of the box, Digital Twin, Apps for Everyone, Modern Platform, and Open Ecosystem. He noted that today all Teamcenter applications are available in the Active Workspace HTML5 client—a development eagerly awaited by many customers. CIMdata is pleased to see more emphasis on making Teamcenter with its very deep and broad functionality easier to be deployed and adopted.

³ See <https://www.unlimitedtomorrow.com/>

Ms. Evans discussed Teamcenter’s support for xDT (Siemens acronym for the executable digital twin described later in this Commentary). She also provided an overview of significant new structure and BOM management capabilities that expand Teamcenter’s expertise in this important functional area. While Teamcenter has always been one of the leading structure management solutions, she described how new requirements management capabilities such as Parameter Management across all domains and integrated program planning offer deeper, improved support for model-based systems engineering. CIMdata was pleased to see both expanded functionality and new ease of use capabilities and thinks these improvements in structure, BOM management, and requirements management will enable Siemens customers to better deal with developing increasingly complex products and support a more holistic systems engineering development paradigm.

Mr. Bill Lewis announced several new “Apps for Everyone” capabilities, including a new Discussions functionality that enables “water cooler” like discussions managed securely and in context. He also described a new capability called “Simple Change” that is a significant enhancement to Teamcenter Change Management.

Mr. Bohman closed the session with an announcement of a new Teamcenter Carbon Footprint Calculator module that will help companies compute the overall carbon footprint impact of their products across the supply chain. He also described new capabilities that will support quicker upgrades, including having a Reference Architecture, a test tool to perform comparisons of APIs and data models, and a Teamcenter Assistant Tutor Mode to embed and automate training. He stated that using Deployment Center had shown a two- to three-X reduction in upgrade time. Mr. Bohman reiterated Siemens commitment to enabling their customers to develop extended open ecosystems and not be required to use only Siemens solutions and technology.

CIMdata was pleased to see many new/expanded Teamcenter capabilities and believes that Siemens work in rearchitecting Teamcenter, while preserving upward migration from versions of the software in long-time use at customers, is enabling such rapid evolution.

Realize LIVE included a much-anticipated update on the Siemens-SAP partnership.⁴ The session was structured as a series of questions that leaders from Siemens and SAP answered. Mr. Keith Zobott, Global Vice President of Digital Products and Projects, SAP, recapped the overall scope of the partnership announced on July 14, 2020.⁵ According to Mr. Zobott, it was clear from their early discussions that the Siemens-SAP combination could help their customers realize the capability and potential of the digital thread, which became a key aspect of the partnership. The initial focus of the “match pair teams” of Siemens and SAP leaders for their respective offerings was on six process threads: Portfolio & Project Management; Systems Engineering; Configurators; Supplier Collaboration; Visualization; and Intelligent Asset Management. Mr. Pete Lamoreux, Senior Technical Director, Siemens, focused his comments on who benefits from their integrated solutions as individuals and organizations. These two market leaders are building a rich digital thread using data from Information Technology (IT) applications, operational technology (OT), and PLM. Both firms are committed to openness to other applications their customers might desire to add to their digital thread. When asked what is most important to know about the partnership, Mr. Lamoreux said that it is not completed, they are just getting started. They are also working on other topics of mutual interest, like cloud solutions and plan to cross-sell other complementary solutions. Other industries being considered for future collaboration include process, high-tech, and consumer

⁴ <https://event.sw.siemens.com/realizeliveU2U/agenda/session/530067>

⁵ <https://news.sap.com/2020/07/siemens-and-sap-accelerate-industrial-transformation/>

packaged goods. They are also nearing the release of their next generation integration co-developed by both companies that will be the “secret sauce” when combining ERP and PLM. They expect the first release in Q3 or Q4 of 2021.

Mr. Patrick Crampton-Thomas, Vice President of Digital Asset and Service Management, SAP, focused on their joint work on Intelligent Service and Asset Lifecycle. The service part of the lifecycle is very important to both companies, and each brings their mostly complementary assets to the combined offering. As CIMdata expected at the time of the announcement, the SAP Asset Intelligence Network (AIN) is a key element, and will allow Teamcenter customers to create content and share data published in the SAP AIN. This network approach is important because it enables support of predictive maintenance and the associated services that many manufacturers see as a great revenue opportunity.

As CIMdata wrote at the time of the announcement, the Siemens-SAP relationship is a powerful combination that should enable their customers to deploy comprehensive digital threads that span the lifecycle from idea through life—something that neither could offer separately. It now appears to be delivering new and expanding lifecycle capabilities for both parties and their customers.

Another session, entitled “The Role of Simcenter in the Executable Digital Twin Initiative,” provided a significant amount of detail on their solutions and plans in the simulation area. It is important to first mention Siemens’ definition of the phrase “digital twin.” To Siemens, Simcenter and other components of its solution portfolio enable a comprehensive digital twin environment. For Siemens, a digital twin is a precise virtual representation of a physical product or process. It can be used across the lifecycle to simulate, predict, and optimize the product and production system. It can be made up of multiple representations or models for different aspects of an asset’s behavior within a lifecycle that needs to be accurately (and actively) configuration-managed. This definition is consistent with CIMdata’s and with others in the market. It is in contrast with what some solution providers who consider a digital twin that leverages analytics to optimize manufacturing and product usage but does not require a physics-based validation.⁶ Siemens’ focus is on their executable digital twin (xDT), which they described as delivering a “self-contained executable digital behavior of an asset that can be leveraged at any point in the lifecycle, and reside at the edge or on-device.”

Siemens’ offering leverages their strengths in manufacturing execution, model-based testing, industrial edge devices, and cloud-based applications (such as MindSphere). They claimed that if companies maintain an xDT, any changes made by an engineer can be easily deployed to a fleet of machines or other products. The session also included an extensive set of examples of how to create and deploy xDTs, including a detailed video that showed process steps, screen captures, and relevant customer examples. This session highlighted to CIMdata just how wide and deep Siemens’ capabilities are in this area.

In the session titled, “Product Engineering Executive Outlook,” Mr. George Rendell, Vice President of Product Engineering Software presented what users can expect from product engineering in the future. He claimed that during the Early Access Program, Siemens NX team implemented 761 customer requested enhancements. He described the four aspects of the NX architecture that provides benefits to NX users: Proven, Open, Scalable, and Flexible. He noted that NX is not just a mechanical design application but rather an engineering solution with an added focus on automation extending workflow from design to factory, and electrical with integration to the Mentor Capital solution, for electronics systems design, and Mentor Xpedition

⁶ <https://www.cimdata.com/en/resources/complimentary-reports-research/commentaries/item/12809-oracle-openworld-2019-augmenting-intelligence-across-the-portfolio-commentary>

for printed circuit board development. CIMdata believes the NX architecture strategy plays a major role in offering its users the breadth of capabilities that deserves to be characterized as a complete engineering solution.

Artificial intelligence (AI) is a hot topic, applicable across the product lifecycle. In his session titled “AI Driven NX,” Mr. Shirish More, NX Product Manager, presented how users could gain a competitive edge by leveraging the AI features found within NX. Those features include NX command prediction, show/hide similar components, selection prediction, and the NX voice command assistant. He noted that for command prediction, the system collects data while the user works and uses that information to provide the best choice or set of choices for what to do next. It serves up one or more command choices in the correct order for the current task based on their success in the past. CIMdata believes this capability can ease the burden placed on users when doing repetitive design operations and helps the user adhere to best practices.

In a session titled “NX Model Based Definition—Driving the Comprehensive Digital Twin,” Mr. Dave Wingrave, NX Product Manager, noted that model-based definition is a paradigm shift and that NX’s implementation delivers automation, validation, and consumption innovations that offer productivity gains for the user. He discussed two of the more recent enhancements to the NX model-based definition (MBD) portfolio: automated authoring of product manufacturing information (PMI) and the PMI Advisor for validation and guidance. Users can rapidly author PMI with user-defined rules that capture-specific business logic. An interactive Logic Editor allows the user to diagram rules using NX predefined logic building blocks resulting in the creation of PMI objects on the 3D product model. The capability includes topological feature recognition with associative updating. CIMdata has previously written a Commentary on this capability and the new PMI Advisor. The Advisor provides validation that PMI on the product model adheres to industry and company-specific standards. It can issue warnings on poorly defined PMI with advice on corrective actions that the user can take. As CIMdata has previously noted, these advancements in model-based definition keep Siemens NX at the forefront of MBD solutions.

CIMdata was pleased to see the rapid advances and incorporation of new functionality (e.g., automated PMI authoring) and technologies (e.g., AI) within the NX solution portfolio that should enable users to design easier, faster, and more effectively.

Mr. Jean-Claude Ercolanelli, Senior Vice President - Simulation & Test Solutions, Siemens, delivered an overview of Simcenter making it clear that it is core to the Xcelerator portfolio and a catalyst for the digital enterprise and enabling the comprehensive digital twin. He detailed the four pillars Simcenter is built to support:

- Model the complexity to ensure decision confidence
- Explore the possibilities to enable insights
- Go faster to achieve speed and agility
- Stay integrated to connect all activities

Within each of these areas Mr. Ercolanelli described how Simcenter addresses simulation in the context of real-world activities such as developing autonomous solutions from the chip to the vehicle to the city or infrastructure. The simulation domains spanned a wide range from systems architecture, product design, simulation and optimization to the structural, thermal, fluid, and topological areas. Simcenter supports electrical and electronics related analysis such as electromagnetic interference. CIMdata is impressed with the growth in capability of Simcenter and believes they are on the right track with their four pillar tenets.

Artificial Intelligence and Machine Learning (AI/ML) are in the news daily, and Siemens has had AI embedded within its user interface for a few years. As described in this presentation, it was also noted that Siemens is using AI to make performance predictions based on learning from simulation results. This is an intriguing area that CIMdata wants to hear more about in the future.

Mr. Martin O'Brien, Senior Vice President, Integrated Electrical Systems (IES), Siemens, presented on the topic of electrical and electronic (E/E) systems development. The presentation, “Capital: Transforming Model Based E/E Systems Development”⁷ opened with a description of disruption and innovation within the transportation industry, noting the impact of E/E systems and software on the products. Mr. O'Brien's team described various Capital solutions that support multi-domain system modeling, E/E architectural functions including electrical, electronics, software, wire/cabling, hardware, and networks. An MBSE approach can help optimize functions and a generative approach is used to design hardware and wiring, creating designs faster with higher quality and lower cost. Many of CIMdata's consulting clients are moving to MBSE-based approaches to product development so we are glad to see the integration Siemens is providing across all the relevant domains.

Mr. Douglas Bellin, AWS Global Business Development, Smart Factory and Industrie 4.0, delivered a session on “Migrating to Modern PLM in the Cloud.” He said the major migration challenges are: product development cost and cycle time, changing customer and market requirements, and design-production quality. He also commented on several barriers that must be overcome to address these challenges:

- Reliability must be maintained
- Training is required
- PLM is tightly integrated with other critical IT systems, e.g., ERP, MES, SCM
- Heavy migration of legacy data
- Many customized and legacy engineering systems

Mr. Bellin described how AWS and Siemens are working together to address the challenges and barriers, including how the two companies are providing pre-packaged, validated solutions delivered on a flexible, scalable global platform. He closed by describing how AWS and Siemens helped a customer move to PLM in the cloud by first having an Alignment Workshop to determine objectives and a roadmap, identify stakeholders, and define the desired cloud strategy, and then assess the existing challenges and options. This is followed by an Innovation Workshop in which AWS and Siemens personnel conduct a 360-degree digital transformation workshop to scope the migration plan and schedule, outline a Proof of Concept (PoC), and define migration options. CIMdata thought Mr. Bellin provided a good framework for understanding the issues and options for migrating to PLM in the cloud.

On May 27th, Mr. Hemmelgarn and Ms. Discher held a question and answer session for industry analysts and media. The following are a few highlights from that session. Mr. Hemmelgarn described Siemens acquisition of SupplyFrame as an expansion of their overall strategy to extend the digital thread with links to procurement and supply chain—thereby linking the supply side with the demand side. He stated that adoption of Teamcenter X was going faster than originally expected and announced that Fujitsu had signed a partnership to sell and use Teamcenter as part of its PLM offerings. Mr. Hemmelgarn noted that SAP now has Teamcenter

in its price book while Siemens now includes SAP Intelligent Asset Management solutions and SAP Project and Portfolio Management applications in their price book.

Realize LIVE 2021 and U2U showcased Siemens Digital Industries Software’s solutions, customer success stories, and most importantly their strategy and initiatives for enabling their customers to rapidly move forward in their digital transformations. CIMdata continues to be impressed with the breadth and depth of Siemens solution portfolio and their commitment to provide solutions that cover and integrate all product lifecycle domains—development (mechanical, electrical, electronic, and software), manufacturing, and service/operations. CIMdata was pleased with the scope and richness of the new and expanded functionality announced during this event across all areas of their solution portfolio and the speed at which Siemens is now able to develop and incorporate them.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise’s ability to design, deliver, and support innovative products and services through the identification and implementation of appropriate digital initiatives. Since its founding over thirty-five years ago, CIMdata has delivered world-class knowledge, expertise, and best-practice methods on a broad set of product lifecycle management (PLM) solutions and the digital transformation they enable. CIMdata also offers research, subscription services, publications, and education through certificate programs and international conferences. To learn more about CIMdata’s services, visit our website at <http://www.CIMdata.com> or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.