ANSYS Dimensions Innovation Conference 2016

CIMdata Commentary

Key takeaways:

- *A major transformation is underway across multiple industries toward model-based systems engineering (MBSE) processes for the design and deployment of complex products and systems that span multiple domains within the engineering discipline (e.g., mechanical, electronics, embedded software, and controls) as well as multiple disciplines across the entire product lifecycle*
- *The need to accurately simulate and predict the behavior of today's complex systems, especially in the cyber-physical realm, has led to a number of strategic acquisitions by ANSYS over the past decade in the areas of electronics and embedded software engineering—the latest of these occurred in early November, 2016 with the acquisition of KPIT Medini Technologies AG*
- *Tomorrow's interconnected smart systems will require new capabilities that ANSYS is now developing with a partner ecosystem that includes PTC and GE in preparation for the widespread adoption of new Internet of Things (IoT) and digital twin technologies*
- *ANSYS is committed to providing best-in-class multi-physics and multi-domain systems modeling and simulation capabilities to enable Simulation-Driven Product Development; ANSYS 18.0 to be released in Q1, 2017 will add many new modeling and simulation capabilities to support engineers across the mechanical, electronic, and software engineering domains*

Significant global product development trends are making multi-domain, systems-level virtual prototyping and performance simulation capabilities an indispensable element in enabling the transformation to simulation-driven product development, especially for complex cyber-physical systems. These major business trends include:

- Smart systems and machine learning being driven by the IoT and Industry 4.0
- Mass customization with software features being a key differentiator
- Design-for-purpose materials and new manufacturing methods (e.g., additive)
- Design-for-energy efficiency and sustainability, green, conservation, and re-use
- Products delivered as services; an on-going innovation and utility business model with customer feedback loops based on in-service data analytics)

From these, it is clear that systems-level digital prototyping and in-service performance emulation (i.e., the enablement and maintenance of a digital twin) will be a foundational element in developing MBSE processes that enable product innovation, quality, and profitability throughout the product lifecycle from ideation to manufacture and throughout the operational life. While still relatively new, the use of physics-based and software driven digital twins promises to revolutionize the product engineering and manufacturing domains over the next decade.

In-service applications for digital twins, such as machinery condition monitoring, will help optimize as-built and as-deployed performance characteristics and avoid product failures. As well, capturing and assessing actual customer usage behavior via always-on data feedback will enable engineers to design and build more reliable and innovative products that are fit for purpose. And do this much faster than today's disconnected development processes.

ANSYS Dimensions Innovation Conference 2016

CIMdata recently participated in the ANSYS Dimensions Innovation event held in Paris, France, a customer-focused event which replaced the former Esterel SCADE Users Group Conference. On day one, the presentations were tailored towards management participants with a focus on highlighting the global industry trends cited above and how ANSYS is developing an integrated product innovation platform to enable simulation-driven systems development. Day two consisted of a series of in-depth technical presentations across three concurrent tracks on IoT, System Simulation, and Embedded Software.

Attendees heard from a number of ANSYS customers (e.g., Airbus, Dyson, Ferrari, Schneider Electric, and the Avicenna Alliance for Predictive Medicine) on their use of the ANSYS product portfolio and their future plans for deploying more systems modeling and simulation capabilities as well as from solution partners such as PTC, Microsoft, Modelon, and CoreAVI.

Mr. Mark Hindsbo, VP of Marketing at ANSYS, outlined the ANSYS vision for enabling engineers to simulate and optimize the performance of tomorrow's products and manufacturing systems across the entire product lifecycle (see Figure 1).

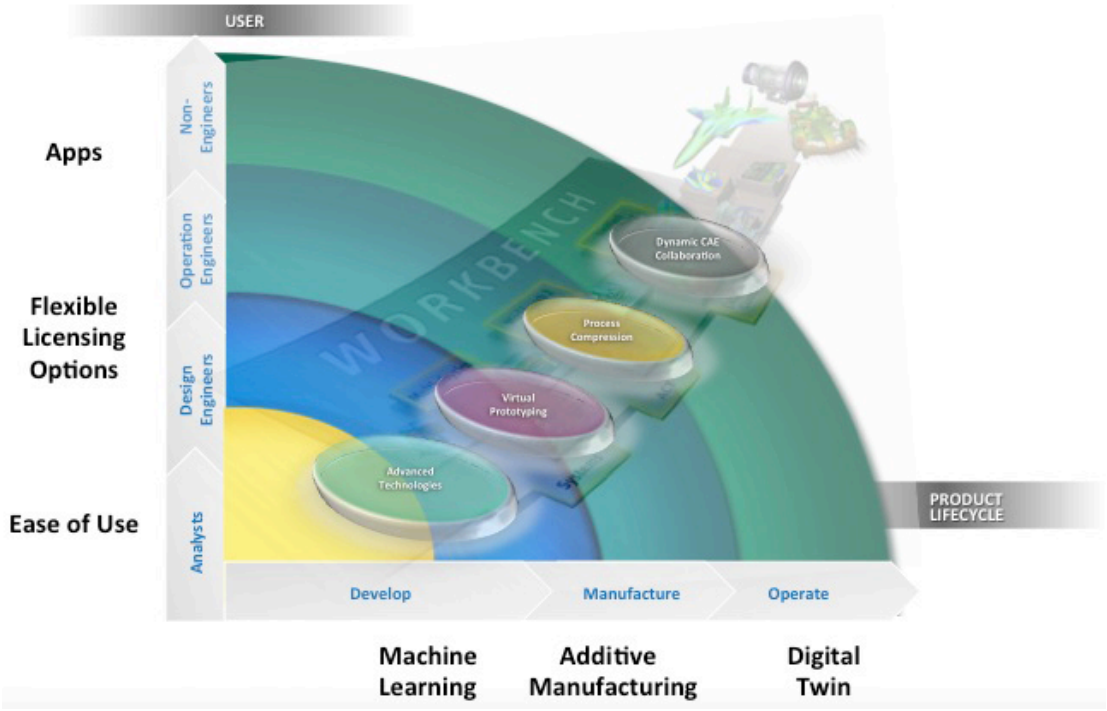

Figure 1—ANSYS' Vision for the Next Generation of Engineering Simulation
(Courtesy of ANSYS)

Mr. Eric Bantegnie, VP/GM of the ANSYS Systems Business, subsequently discussed the ANSYS simulation platform strategy to create a unified and collaborative model-driven systems engineering environment that ties together the key engineering domains required to simulate, predict, and optimize the performance of complex cyber-physical systems that consist of highly interdependent physical, electronic, and software components (see Figure 2).

Of particular note was the live demonstration of an operating digital twin application for real-time predictive monitoring of an industrial pumping system created by ANSYS in partnership

with Flowserve, PTC, and National Instruments. Applications for leveraging physics-based digital models as part of a digital twin strategy are still emerging but the forecasts for business and financial impacts of digital twins are both substantial and relatively near term.

"Coupling physics-based simulation insight and existing digital design information with IoT enabled sensor data streaming from in-service assets is the secret sauce that engineering teams can use for making real-time predictions of what will happen and when to deploy high value assets to prevent catastrophic in-service system failures as well as to provide real world design insights used to optimize future systems performance," stated Mr. Bantegnie.

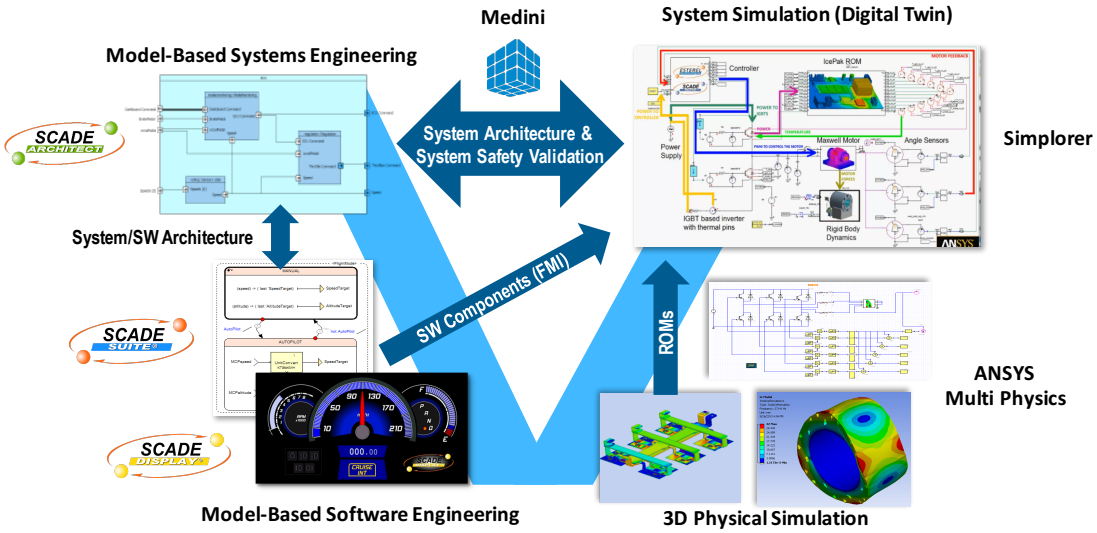

Figure 2—Medini Products within ANSYS' Portfolio for Systems Engineering Across the Product Lifecycle
(Courtesy of ANSYS)

An additional proof point of the ANSYS systems-centric lifecycle simulation strategy was a presentation by Dr. Olaf Kath of KPIT Medini Technologies AG, a very recent acquisition of ANSYS. Dr. Kath highlighted the medini™ software functionality that will be integrated within the ANSYS systems simulation platform to address software architecture configuration and system safety validation for automotive, aerospace, and industrial systems (see Figure 2 above for positioning of the Medini products within the overall ANSYS portfolio for model-based systems engineering).

In summary, CIMdata continues to be impressed with the ANSYS vision and platform strategy for simulation-driven product development and, in particular, the focused execution on bringing together advanced system simulation technologies and workflow processes across the often highly disconnected domains of mechanical engineering, electronics engineering, and embedded software and controls engineering. ANSYS continues to successfully acquire and integrate simulation solutions into a unified platform that will enable engineers in different engineering disciplines to better collaborate within the global and synchronous work flows that are required to design tomorrow's complex cyber-physical systems.

While a great deal of work remains to be done by ANSYS and industry as a whole to realize the vision and promised benefits of model-based systems engineering approaches, we expect ANSYS to continue to be a leader in helping industry to be highly innovative and efficient in successfully adopting new simulation technologies in the emerging new worlds of the IoT and Industry 4.0.

About CIMdata

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