

# PLM Road Map 2019

## *CIMdata Commentary*

### *Key takeaways:*

- *Digital Transformation is accelerating in product development companies.*
- *Model-based definition and systems engineering are being actively pursued.*
- *The PLM industry is growing in both depth and breadth.*

On May 29-30, 2019, CIMdata and Eurostep jointly hosted the PLM Road Map™ & PDT<sup>1</sup> North America 2019 conference in the Washington D.C. metro area. Mr. Peter Bilello, President, CIMdata (<https://www.cimdata.com>), and Mr. Håkan Kårdén, Director of Marketing, Eurostep (<https://www.eurostep.com>), together welcomed the attendees. Mr. Bilello proceeded to deliver the keynote address, “The State of PLM: Today’s Market and Leading Trends.” He affirmed that the PLM market continues to grow in both depth and breadth, however, many companies appear stuck on PLM as PDM (Product Data Management) or only CAD data management. Mr. Bilello reported from CIMdata’s market analysis that in 2018 the overall PLM market grew 9.4% to \$47.8 billion and continues to be strong.

Mr. Bilello touched on a series of industry trends and potential disruptors including generative design and augmented reality. He also noted that machine learning, a subset of artificial intelligence, was delivering “predictive and learning, data-driven algorithms for design, operations, and maintenance.” He spoke of Digital Transformation, the often-mentioned trend in industry today, emphasizing it requires organizational, cultural, and technical changes in the way companies do business. He ended his presentation with a warning to industrial companies, “Change is the name of the game. Either change, be changed, or no longer exist!”

Mr. Kårdén returned to the stage to introduce Mr. Bruce Mayer, Engineering Application Technology and Strategy Manager, Northrop Grumman, who spoke about “Integrating ‘Smart Documents’ into PLM and the Digital Thread.” Mr. Mayer related details of Northrop Grumman’s experience with the application of a Smart Connected Documents engine to product definition and manufacturing instruction documentation. He posed the question “What if one document could actually ‘talk’ to another document? A document which talks could tell others that reference it that something changed!” Later in the day, that engine was presented by Mr. Rupert Hopkins, Founder and CEO of XSB, Inc. (<https://www.xsb.com>) and the developers of SWISS (Semantic Web for Interoperable Specifications and Standard) a model-based approach to represent concepts buried in unstructured, non-geometric data, such as specifications and work instructions.

Mr. Ken Versprille, Ph.D., Executive Consultant, CIMdata, took the hosting duties and introduced a series of short vignettes from the conference’s sponsors, including Mr. Marc Lind, SVP of Strategy, Aras Corporation (<https://www.aras.com>), Mr. Garrett Clark, Configit (<https://www.configit.com>), and Mr. Joseph Anderson, President of the Institute for Process Excellence (IpX) (<https://www.ipxhq.com>).

These were followed by a presentation from Mr. David Sherburne, Technology Consultant, titled “An Executive Perspective: Selling an IT Transformation Strategy.” Mr. Sherburne spoke of globalization and the Digital Transformation occurring in industry. He offered his ideas on an

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<sup>1</sup> PDT (Product Data Technologies).

Enterprise Operational Framework focused on integrating processes and tools used to manage configuration baselines from concept to customer.

This was followed by another short presentation from a conference sponsor, Vertex Software (<https://www.vertexvis.com>). Mr. Craig Brown, retired, General Motors and Mr. Matt Heying, Director of Product, Vertex Software, highlighted the company's new cloud-based, high performance visualization technology.

In the afternoon, Mr. Kårdén returned to introduce Mr. Roger Hobley, Technology Development Manager—Maritime Services IS&S, BAE Systems Surface Ships. Mr. Hobley captured the audience's attention by describing the United Kingdom Royal Navy's new aircraft carrier HMS Queen Elizabeth commissioned in late 2017. Mr. Hobley noted that an aircraft carrier system is one of the most complex pieces of engineering one can imagine. His presentation illustrated the project from a product information management viewpoint, with all its complexity, diversity of stakeholders, and the value of data over time.

Next, Dr. Versprille, the conference host, took the stage to report on the status of the Aerospace & Defense PLM Action Group's project for defining the Minimum Model-Based Definition and BOM Definition needed for certification. The Group is administered by CIMdata and Dr. Versprille is liaison to the project. The ten member companies<sup>2</sup> have thus far identified 17 different part types, such as machined parts, castings, and wire harness parts, within which they are specifying the numerous data items necessary for model-based definition as the models are presented for regulatory body certification. The results of their study will be used by both the international standards bodies as well as solution providers of data exchange software.

Afterwards, Mr. Kårdén hosted a panel discussion on "PLM and Complexity." He invited on stage a number of company executives and industry analysts to offer their ideas about what can be done to make PLM simpler. The conversations looked at investments in technology, people, and processes.

The first day of the conference ended with a presentation from Mr. Kurt Woodham, Aerospace Engineer, Systems Engineering and Engineering Methods, NASA. Mr. Woodham spoke to "The Challenges of Model-Based Systems Engineering (MBSE) for NASA." He described the MBSE and Infusion and Modernization Initiative (MIAMI) within NASA. The project's goal is to modernize their Systems Engineering Workforce and calls for:

- Informed decision making, increased transparency, and greater insight.
- Linking technical and programmatic insight and data driven decisions.
- Increased understanding for greater flexibility and adaptability in design.
- Increased confidence that any system-of-interest will perform as expected.
- Easier, efficient, connected communication to keep people aligned.
- Closing the chasm between systems analysis and systems engineering (show trade traceability).

The second day of the conference started with a keynote from Dr. Marc Halpern, Ph.D., P.E., Vice President, Gartner, titled "Navigating the Journey to Industrie 4.0. The Good, The Bad, and Making the Ugly—Less Ugly!" Dr. Halpern noted that Industrie 4.0 presents the "Greatest disruption in business models and platform-based technology opportunities in more than a generation." He warned that adaptive emergent systems that worked in the past are hard to

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<sup>2</sup> The A&D PLM Action Group member companies include Airbus, The Boeing Company, Gulfstream, Embraer, Rolls-Royce, GE Aviation, Dassault Aviation, Pratt & Whitney Canada, Safran, and Mitsubishi Regional Jet.

change and may not be best for the future. He recommended objectives-driven business planning supported by goals, strategies, and measures, as well as by disciplined systems-centric technology roadmap planning and adoption, all guided by change management.

Dr. Halpern was followed by Dr. Thomas Hedberg, Jr., Ph.D., P.E., Research Mechanical Engineer, NIST. Dr. Hedberg's talk was titled "Identifying Value in Product Lifecycle Innovation using Integrated Product, Process, and Logistics Viewpoints." He explained that when executing a digital engineering strategy, the United States Department of Defense believes a successful digital transformation of manufacturing using digital and model-based engineering practices will address enduring challenges associated with complexity, uncertainty, and rapid changes in deploying and using systems. Small-to-medium enterprises, however, must take a more cautious approach to going digital. One of his key observations was that deploying digital thread via standard interfaces between "things" using consensus-based, voluntary, open standards will enable rapid data exploration, knowledge extraction, and model generation.

Next up, Mr. Neil Lichty, Subject Matter Expert, The Boeing Company, offered status of a second A&D PLM Action Group project—Global Collaboration. The charter of the Global Collaboration project is to provide templates for a data integration and exchange setup, process, and practice protocols consistent with industry standards. Mr. Lichty listed the various system architectures currently used between OEMs and suppliers in the aerospace industry, as well as the Group's thinking about a future state for data exchange and sharing. He continued by explaining Boeing's current approach: interfacing with their supply chain called Supplier Requirements eXchange (SRX). He described how SRX offers all participants a virtual shared workspace.

This was followed by an interest-grabbing presentation from Ms. Philomena "Phil" Zimmerman, the Deputy Director of Engineering Tools and Environments in the Office of the Deputy Assistant Secretary of Defense for Systems Engineering (DASDSE). Ms. Zimmerman leads the effort to advance the use of model-based techniques to advance systems engineering concepts in acquisition. She spoke of the focus on digital engineering strategy and implementation. Their goals are to ensure technological superiority for the U.S. Military and to bolster modernization, specifically champion and pursue new capabilities, concepts, and prototyping activities throughout the DoD research and development enterprise. She identified focus areas similar to those found in industry today.

Mr. Nigel Shaw, Technical Fellow, Eurostep, turned his presentation to "PLM, Model-Based Systems Engineering, and the Supply Chain" reflecting on challenges and opportunities. He noted that many enterprises have document-based processes in place and their shift to go fully digitalized and really apply MBSE presents real issues with:

- Requirements and their management
- Configuration and change management
- Interoperability of tools
- Traceability
- Integration and consistency

Mr. Shaw spoke of industry standards and their role in supporting systems engineering, however, admitting the current standards situation is "messy." He recommended adding a cross application capability to manage shared data as a hub with traceability and audit capabilities cross-enterprise.

Mr. Don Tolle, Director Simulation-Driven Systems Development Consulting Practice, CIMdata, presented the third A&D PLM Action Group status of their Model-Based Systems Engineering

project. He summarized the project's research into two-way SysML data exchanges and its failure today. He indicated that "An in-depth analysis of XMI (XML Metadata Interchange) files exported from the different SysML modeling tools would provide important insight on whether the poor model interchange is to be traced back to non-compliance of the modeling tools with the XMI specification or is related to the vagueness of the specification in certain areas."

Mr. Craig Brown, General Motors (retired) returned to the stage to offer that "Speed to Value" is about optimizing and delivering strategic programs across the entire PLM lifecycle such that the PLM portfolio will realize maximum value in the shortest amount of time. He offered, as an example, General Motors' approach designed specifically for PLM portfolios containing innovation, product development, and digital transformation initiatives.

The conference concluded with a "fire-side chat" between Mr. Peter Bilello and Dr. Marc Halpern with questions posed by Dr. Versprille. They gave their opinions on the diverse topics of the changing nature of product with increased electrical and software components, product as a service as seen in both the automotive and aerospace industries, the landscape of mergers and acquisitions in PLM, and whether other providers might enter the market. Finally, they discussed the impact of additive manufacturing in product development.

Overall the conference was well received and praised for its content. Attendees participated from a diverse range of industrial and solution provider companies, including The Boeing Company, Deere & Company, Oshkosh Defense, Cummins, and Microsoft. CIMdata and Eurostep appreciate the support of our sponsors, Aras Corporation, Configit, IpX, Vertex Software, XSB, CMstat, and ArcherGrey,

## **About CIMdata**

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through 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.