

State of PLM: Today's Market & Leading Trends

2025 Market & Industry Forum—10 April 2025

CIMdata

State of PLM: Today's Market & Leading Trends
PLM Market & Industry Forum
A CIMdata Leadership Event

10 April 2025—Frankfurt, GERMANY

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CIMdata Defining What Comes Next in Digital Transformation

Strategic management consulting for competitive advantage in global markets

The leading independent authority on PLM and its digital transformation. We provide research, education, and strategic consulting to clients around the world.

OUR MISSION:
Maximizing clients' ability to design, acquire, deliver, and support innovative products and services.

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Key Takeaways



State of PLM: Today's Market & Leading Trends

- CIMdata continues to expand & adjust to major PLM market trends
- CIMdata's global A&D PLM Action Group has entered its 11th year in partnership with market leaders—major research continues
- Multiple disconnects still exist, e.g., prioritization of IT systems, and management's narrow understanding of lifecycle management
- The global PLM Economy is growing and continues to add value
- To be successful, companies need to transform people, processes, and technologies—there are at least 12 evolving critical elements
- The AI revolution is finally upon us...what will the future bring?

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Agenda


- What's New from CIMdata
- 2024: The Year in Review
- 2025: Today's Trends & Challenges
- Looking Towards the Future
- MBSE: Optimizing Systems of Systems
- Concluding Remarks

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CIMdata's Contribution


We facilitate and energize the global digital ecosystem

CIMdata sits at the critical intersection of the digital ecosystem, helping define & implement what's next



We address challenges & identify opportunities for both solution providers and industrial organizations

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CIMdata's Services


Strategic advice & counsel through a comprehensive & integrated set of services

RESEARCH



Foresight

- Research & analysis
- Technology evaluations
- Market-specific insights
- Industry news & trends

EDUCATION



Leadership

- Industry conferences
- Seminars & webinars
- Certificate programs
- Best practices

CONSULTING



Success • Invest • Transformation

- Strategic guidance
- Aligning solutions with needs
- Program management advisement
- Market positioning


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Success Methodology

 Services for software & service providers to support their drive toward market success

Driving growth & competitive advantage in a complex, dynamic market



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Select Success Clients



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Invest Methodology

 Optimizing investments in the evolving global digital ecosystem

Informed analysis of global PLM markets for industry analysts, private equity firms, and other financial service organizations



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Sample Invest Clients




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Transformation Methodology




Services for industrial organizations to enable digitalization of their product lifecycles







Supporting growth & evolution of enterprises across a wide range of industries in their pursuit of digitalization

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Select Transformation Clients

Aero & Defense	Auto/Transportation	Fab & Assembly	High-Tech
			

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Select Transformation Clients

CPG/F&B/Process	Medical/Pharma	Emerging Industries	Academic & Research

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Business Transformation Framework

Mapping out the organizations that support business transformation

STRATEGY	SOLUTION	TRANSFORMATION & DEPLOYMENT		OPERATE
C Vision, Strategy & Business Model E C As-is -> To-Be Roadmap E C Need for Change & Business Case E	A Technology Provider Market Analysis A Service Provider Market Analysis C Solution Appraisal SP E	C People/Organization E C Architecture (Data, IS, IT) SP E	C Processes SW E C Configuration & Custom Development SP SW E C Program Management, Governance & Risk Management SP SW E	C Change Management E C Integration SW E C Value & ROI Realization E
SW E	SW E	SW E	SW E	SW E

C Consultant **A** Analyst **SP** Service Provider **SW** Software Provider **E** Enterprise (i.e., customer)
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CIMdata's Team

 *Working closely with clients from industry & technology gives us a unique perspective*


- Extensive team of senior consulting professionals
- Experienced in multiple industries
- Extensive relationships with industrial clients and solution providers




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CIMdata Promotion

 *Alan Mendel promoted to Chief Strategy & Operations Officer*



Alan Mendel
Chief Strategy & Operations Officer
a.mendel@CIMdata.com

Alan Mendel is the Chief Strategy & Operations Officer of CIMdata. In this role, he is responsible for strategic planning and operational execution, including revenue-generation strategies and initiatives and the direction of sales and business development efforts to achieve company objectives. Alan has over 36 years of experience developing, marketing, selling, and implementing business-enabling information technology (IT) solutions and methodologies for research, engineering, discrete and process manufacturing, and services organizations worldwide.


Over his career, he has participated in numerous Product Lifecycle Management (PLM), digital transformation, and process improvement-related projects, including organizational, process, and enabling technology education, evaluation, roadmap development and business justification, business process re-engineering, solution planning and implementation, and training; sales and marketing of PLM software and services; establishment and management of a global integration and services organization; technology transfer and entrepreneurial startups and acquisition; and competitive intelligence and analysis.


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CIMdata Retirement

 *Gerard Litjens, CIMdata's VP EMEA, has decided to retire at the end of April*



Gerard Litjens
Vice President EMEA
g.litjens@CIMdata.com


Gerard Litjens has over 35 years of experience in information and communication technology, product and plant lifecycle management, and other business-enabling solutions for research, engineering, and manufacturing organizations worldwide. He has held various positions in consulting, management, business development, business analysis, education, and ROI development of PDM/PLM, supply chain management, and ERP solutions.


As a CIMdata consultant, Gerard provides in-depth analysis, strategic and tactical business planning, market and channel development, and training services to a range of IT, PLM, CAD/CAM, and ERP solution providers, systems integrators, and resellers. He also provides PLM strategy assessments, benefits analysis, system selection, education, training, and implementation planning services to a range of companies in both discrete and process manufacturing industries. Prior to joining CIMdata, Gerard held training, development, and management positions at Cap Gemini, and worked at Philips Electronics, where his responsibilities included the development and implementation of a solution for software configuration management.

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CIMdata's New VP EMEA

 *Laurent Finck takes on additional responsibilities and is in the process of transitioning accounts*



Laurent Finck
Vice President EMEA
l.finck@CIMdata.com

Laurent Finck is CIMdata's Vice President, EMEA, a position he assumed in January 2025. In this role, he develops revenue-generation strategies and initiatives for CIMdata in the EMEA region and delivers consulting projects for CIMdata globally. Previously, he was CIMdata's Director General for France.

Laurent has over 30 years of experience developing, selling, and implementing Business Transformation Programs enabled by technologies. Over his career, Laurent has participated in numerous digital transformation and process improvement-related projects, working for consulting firms and leading software providers.

Laurent previously worked as an IT Strategy consultant for Accenture and Gartner, helping CIOs of large worldwide corporations align their IT Strategies with Business Strategies and design and deploy IT governance frameworks.

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CIMdata Team Continues to Expand

 S&A industry veteran has joined CIMdata


S&A industry veteran, **Nick Appleyard**, has joined CIMdata as a Senior Consultant and is part of our Simulation-Driven Systems Development Practice. He is also now the Executive Director NAFEM's ASSESS initiative. He is based in the Detroit metro area.

NAFEMS Announces Change of Leadership for the ASSESS Initiative

Nick Appleyard to Succeed Joe Walsh as head of the Industry Thinktank

JANUARY 23rd, 2025 - NAFEMS, the International Association for the Engineering Analysis, Modelling and Simulation Community, has announced that Joe Walsh, founder and leader of the **ASSESS Initiative**, will step back from his role in March 2025. NAFEMS has appointed Nick Appleyard to lead the next chapter of the initiative as Executive Director of ASSESS.

Outgoing head Joe Walsh commented, "I am proud to have been involved with the ASSESS Initiative from its formation to its integration as a key part of NAFEMS." He went on to say, "Through collaboration with thought leaders in the engineering simulation field, ASSESS has delivered multiple strategic insight papers and the Engineering Simulation Metadata Specification. ASSESS, as part of NAFEMS, is well positioned to take a leadership role in enabling and improving the future of engineering simulation."



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CIMdata Team Continues to Expand

 Industry veteran with extensive SAP PLM experience has joined CIMdata



Industry veteran **Martin Bachmann** has joined CIMdata as a Senior Consultant. Martin comes to CIMdata from SAP and is based in Germany.

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CIMdata Foresight

Delivering actionable research to the global digital economy

- Market Research
 - Global and regional market analysis reports
 - PLM benefits appraisal guide, pricing analysis, etc.
- CIMdata Communities
 - Industrial organizations and solution providers
- CAM Market Service
- Publications
 - Late-breaking news, commentaries, etc.
- Custom Research Projects



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Consulting Practice Areas

Guidance & insight focused on multiple facets of digital transformation

- Additive Manufacturing
- AEC & Manufacturing Convergence
- Aerospace & Defense
- Data Governance
- Digital Skills Transformation
- Collaborative Innovation & Social Product Development
- Manufacturing Systems Engineering
- Organizational Change Management
- Simulation-Driven Systems Development
- Sustainability & Green Energy



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Aerospace & Defense PLM Action Group

Group Overview



Jim Roche
A&D Practice Director


























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Aerospace & Defense PLM Action Group


Significance of collaboration with A&D PLM Action Group members

Member companies' rankings within the global Aerospace industry

- 11 of the top 40
- 9 of the top 20
- 6 of the top 10
- 2 of the top 2

Leadership Meetings

- Annual Meeting
 - In person, 2 ½-3 days
- Mid-year Checkpoint
 - In person, 1 ½-2 days
- Monthly Business Meetings
 - Online, 2 hours


Titles of A&D PLM Action Group member company representatives:

- Associate Director, PLM Collaboration and Data Exchange
- Director, Corporate PLM
- Engineering CIO
- Head of Digital Manufacturing
- Head of PLM Architecture and Innovation
- Principal Analyst
- Product Development Systems - Solution Development Lead & Senior Architect
- Senior Director for Model Based Enterprise
- Senior Manager - Architecture Integration & Interoperability
- Vice President, Engineering 4.0
- Senior Global Technology Manager - Digital Engineering


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Aerospace & Defense PLM Action Group



Founded in February 2014; 11 years of PLM advocacy for the A&D industry

Mission

An association of aerospace & defense companies within CIMdata's globally recognized PLM Community Program, which functions as a **PLM advocacy group** to:

- Set the direction for the aerospace & defense industry on PLM-related topics that matter to members
- Promote common industry PLM processes and practices
- Define requirements for common interest PLM-related capabilities
- Communicate with a unified voice to PLM solution providers
- Sponsor collaborative PLM research on member-prioritized industry and technology topics

Project Workstreams


- PLM Technology Obsolescence Management
- Global Collaboration
- Model-Based Definition (MBD)
- Multiple View Bill of Material (Multi-view BoM)
- **Model-Based Systems Engineering (MBSE)**
- Interoperability Standards
- **Digital Twin/Digital Thread**

Collaborative Research w/Solution Providers


- Digital Thread
- Model-Based Systems Engineering

Website: www.ad-pag.com

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AD PAG Digital Twin/Thread Project



Purpose

- Define the objectives, requirements, and roadmaps for Digital Twin/Thread solutions for creating and managing the digital representation of a product through the product lifecycle within the A&D ecosystem
- Identify, define & demonstrate use case level value propositions
- Validate benefits to the PLM ecosystem
 - Improved data portability and transparency of PLM events
 - Reduced operational friction resulting in lower operations costs
 - Improved product operational transparency resulted in improved safety, operational efficiencies, and product design

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AD PAG Digital Twin/Thread Project



Approach

- Agile methods employed to publish at the speed of consensus
- Release five position papers addressing varying aspects of Digital Twin/Thread concepts & capabilities related to the aerospace industry
 - Phase 1: Digital Twin/Thread – Research & Scoping
 - Phase 2: Digital Twin/Thread Position Paper
 - Phase 3: Digital Twin/Thread Business Architecture/Methodologies paper
 - Phase 4: Digital Twin/Thread Comparative Analysis of Industry Standards paper
 - ➔ Phase 5: Value proposition of the Digital Twin/Thread to the A&D industry
 - Phase 6: Forward-looking Digital Twin/Thread Strategy and Roadmap
 - Phase 7: Project Consolidation
- Scope the project to deliver value early & iterate
 - Scope to the A&D industry, and time box the effort to approximately 24 months

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Digital Twin/Thread Benchmark


What's next

Event	Target Date
Solution demonstrations	4 Apr
Analysis	11 Apr
Report out presentation*	7 May
Report release	13 Jun

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CIMdata Leadership

 Industry leading conferences, seminars, and educational programs (1 of 3)

- Speakers at international conferences
 - India A&D PLMSS Workshop, Bangalore, INDIA
 - @PTC MedTech Exchange – April 2025, St. Petersburg, FL USA
 - PDT Europe 2025 – November 2025, Paris, FRANCE
- PLM Market & Industry Forums for PLM solution providers
 - North America 2025 – March 27
 - EMEA 2025 – April 10
 - India 2025 – April 14
 - China 2025 – April 18
 - Japan 2025 – April 22



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CIMdata Leadership

 Industry leading conferences, seminars, and educational programs (2 of 3)

- CIMdata Community Events
 - A&D PLM Action Group Workshops
 - Industry PLM Action Group Workshops
 - Others to be announced
- PLM Road Map™ Series (33rd year)
 - PLM Road Map™ NA 2025—7-8 May, Washington D.C. area USA
 - PLM Road Map™ Europe 2025—5-6 November, Paris, FRANCE



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CIMdata Leadership


 Industry leading conferences, seminars, and educational programs (3 of 3)

- PLM Certificate Programs
 - Schedule: <https://www.cimdata.com/en/events/cimdata-plm-certificate-program>
- Self-paced E-Learning courses
 - <https://www.cimdata.com/en/education/plm-basics-e-learning-course>
- Digital Transformation Short Course
 - Schedule: <https://www.cimdata.com/en/education/digital-transformation-short-course>
- Systems Modeling and Simulation Certificate Program
 - <https://www.cimdata.com/en/education/sms-certificate-program>
- Monthly Complimentary Educational Webinars
 - Schedule: <http://www.cimdata.com/en/education/educational-webinars>

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PLM Certificate Program Outline

 5-day, 9-session certificate program outline. Rich set of advanced classes. Customizable.

Day 1	Day 2	Day 3	Day 4	Day 5
Session 1 PLM: Key Concepts & Learning	Session 2 PLM Benefits and Potential Value Session 3 PLM Strategy & Solution Definition	Session 4 Solution Appraisal Session 5 PLM Implementation, Monitoring & Continuous Improvement	Session 6 Business Process Development, Testing, and Process Ownership Session 7 Integrating PLM within the Enterprise	Session 8 Expanding PLM Across the Value Chain Session 9 Configuration Management's Role in PLM

Public and Private Classes Offered

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PLM Certificate Program: Advanced Classes



CIMdata offers an extensive set of advanced courses in support of the global PLM economy

<ul style="list-style-type: none"> • PLM's Role in Digital Transformation • PLM's Place within an EAA • Today's Trends & Challenges Impacting PLM • The "Platformization" of PLM • Digital Deep Dive: Digital Thread/Twin • PLM's Role in Additive Manufacturing • PLM's Role in Enabling the Circular Economy • PLM & Social Media • Model-Based Systems Engineering • PLMisGreen: PLM & Sustainability • The PLM Commercial Landscape 	<ul style="list-style-type: none"> • PLM & Organizational Change Mgt. • Requirements Management • Systems Engineering & Mechatronics • Simulation-Driven Systems Dvlpmt. • Simulation Process & Data Management • Enterprise Simulation Management • Collaborative Product Development • Application Lifecycle Management & PLM • Product Portfolio Management • PLM & Enterprise Program Mgt. • Enterprise Content Management 	<ul style="list-style-type: none"> • Maintenance, Repair & Overhaul/Operations • Strategic Sourcing • Digital Manufacturing • PLM Implementation Best Practices • Data Modeling within PLM • Classification and Data Search & Retrieve • Security & IP Management • Integrating PLM & ERP • Advanced Configuration Mgt. & PLM • PLM in a Specification-Driven Industry • Others on request
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Naval Surface Warfare Center Configuration


A Basics & Advanced course outlines, each executed over 3.5 days—Private program example

<h3>PLM Basic: PLM in a Digital Environment</h3> <ul style="list-style-type: none"> • 1.1 PLM Key Concepts & Learnings • 2.1 PLM's Role in Digital Transformation • 2.2 The "Platformization" of PLM • 3.1 Digital Deep Dive: Digital Thread/Twin • 3.2 PLM support of Maintenance, Repair & Overhaul Operations (MRO) • 4.1 PLM & Organizational Change Mgt. 	<h3>PLM Advanced: PLM in a Model-Based Enterprise</h3> <ul style="list-style-type: none"> • 1.1 Data Modeling within PLM • 1.2 Classification and Data Search & Retrieve • 2.1 Configuration Mgt. Role in PLM • 2.2 Requirements Mgt. • 3.1 Model-Based Enterprise Solutions (MBE = MBSE + MBPS) • 3.2 Simulation Data & Process Mgt. (SPDM) • 4.1 Application Lifecycle Mgt. & PLM
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Agenda

- What's New from CIMdata
- 2024: The Year in Review
- 2025: Today's Trends & Challenges
- Looking Towards the Future
- MBSE: Optimizing Systems of Systems
- Concluding Remarks

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Defining PLM

 Digital transformation of the lifecycle, enabled by the product innovation platform

PLM is...

- A strategic business approach powered by a consistent set of solutions
- Enabled by product innovation platforms that support the extended enterprise
- An approach that spans the full lifecycle, from idea through life
- Enables a set of evolving functional domains orchestrated by an extended enterprise-level "systems of systems" approach




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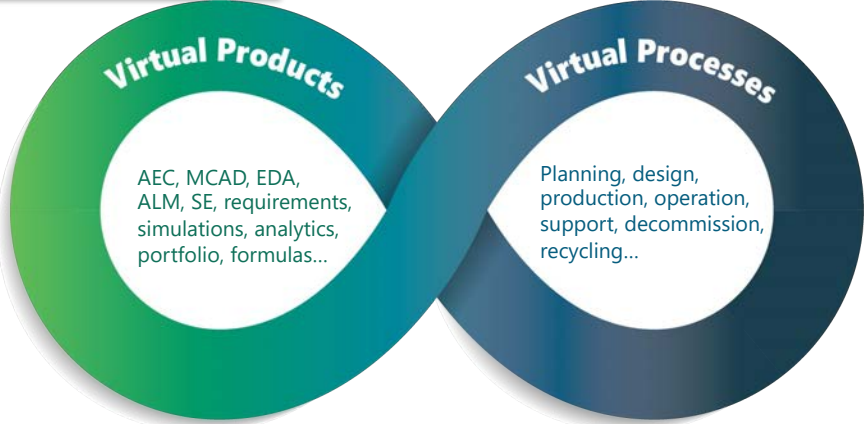
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PLM's Critical Role

 Spans the full lifecycle: from concept through launch and beyond


PLM is the collaborative creation, use, management, and dissemination of product-related **intellectual assets**



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CIMdata's PLM Status & Trends Survey

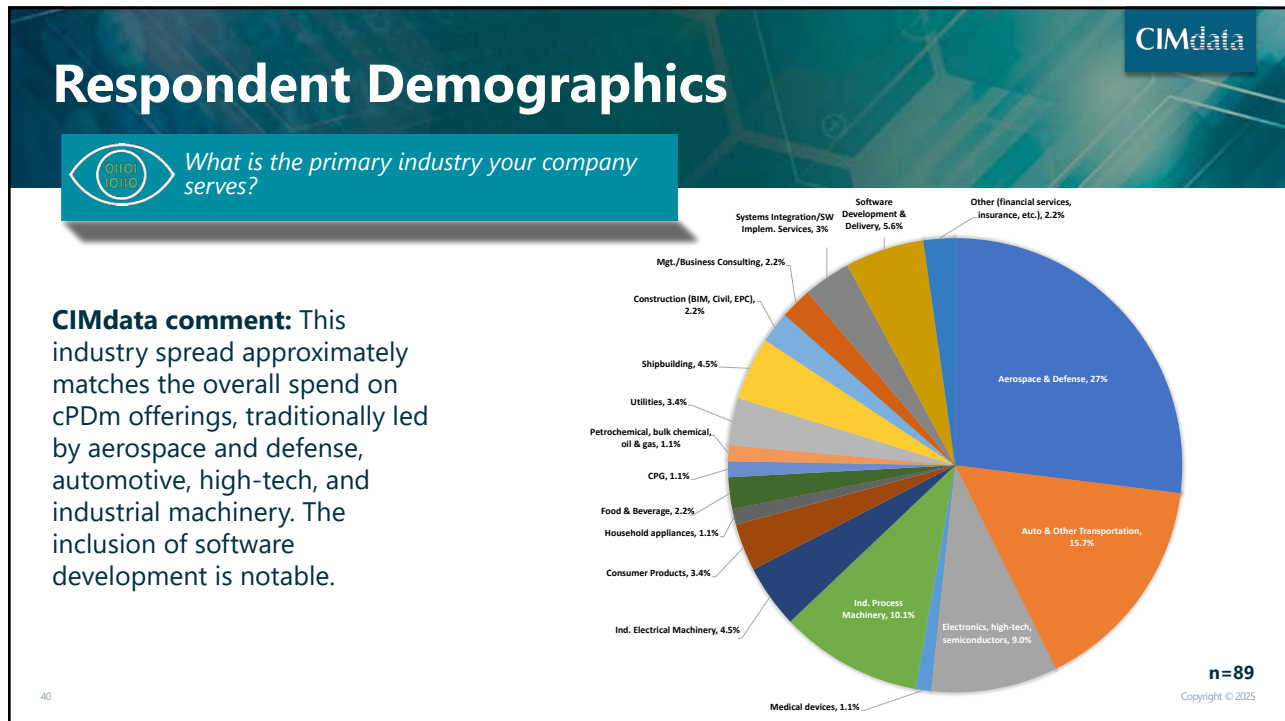
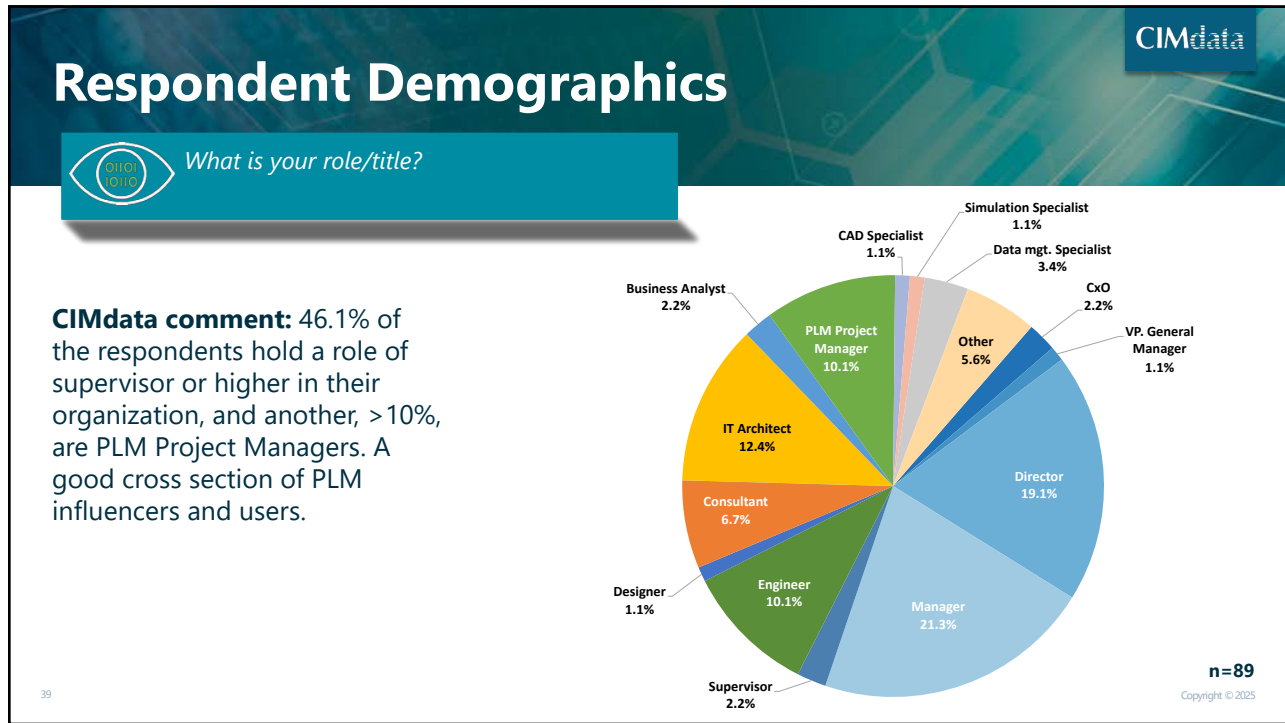
 Some key conclusions—8th year of CIMdata's PLM Status & Trends global survey

- This year's respondents represent a wide & diverse community
- Implementations continue to focus on "traditional" PDM capabilities
- For the most part, companies continue to find PLM worth investing in
- There continues to be an emphasis on getting faster, better, cheaper
- Standard compliance is gaining importance
- PLM, ERP, MES processes & functions overlap is a top challenge
- Management disconnect appears to be widespread
- PLM appears to have continued its positive momentum

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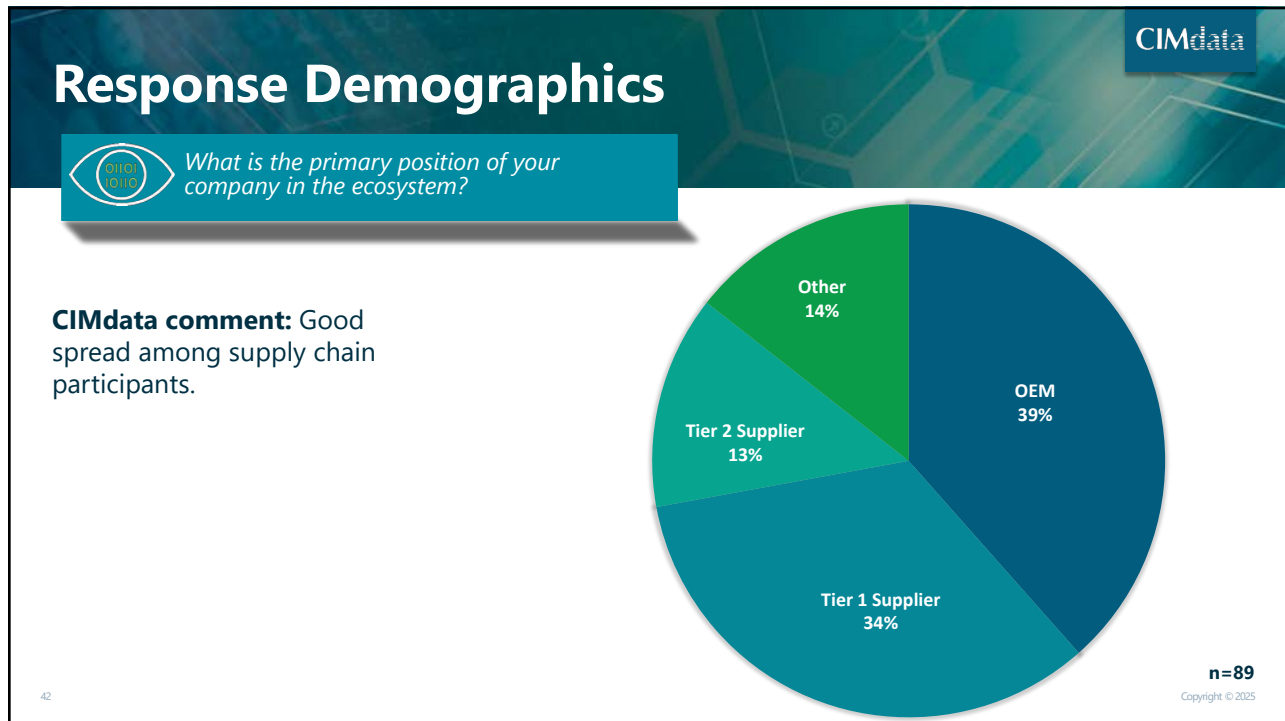
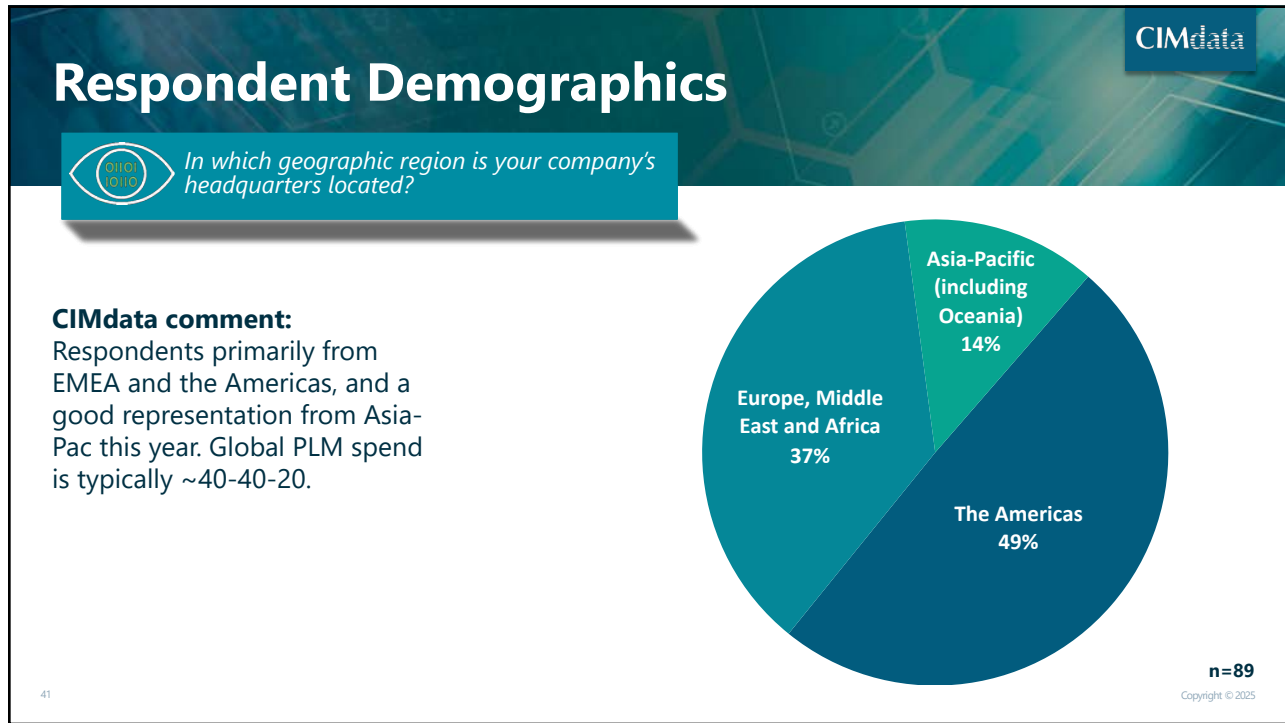
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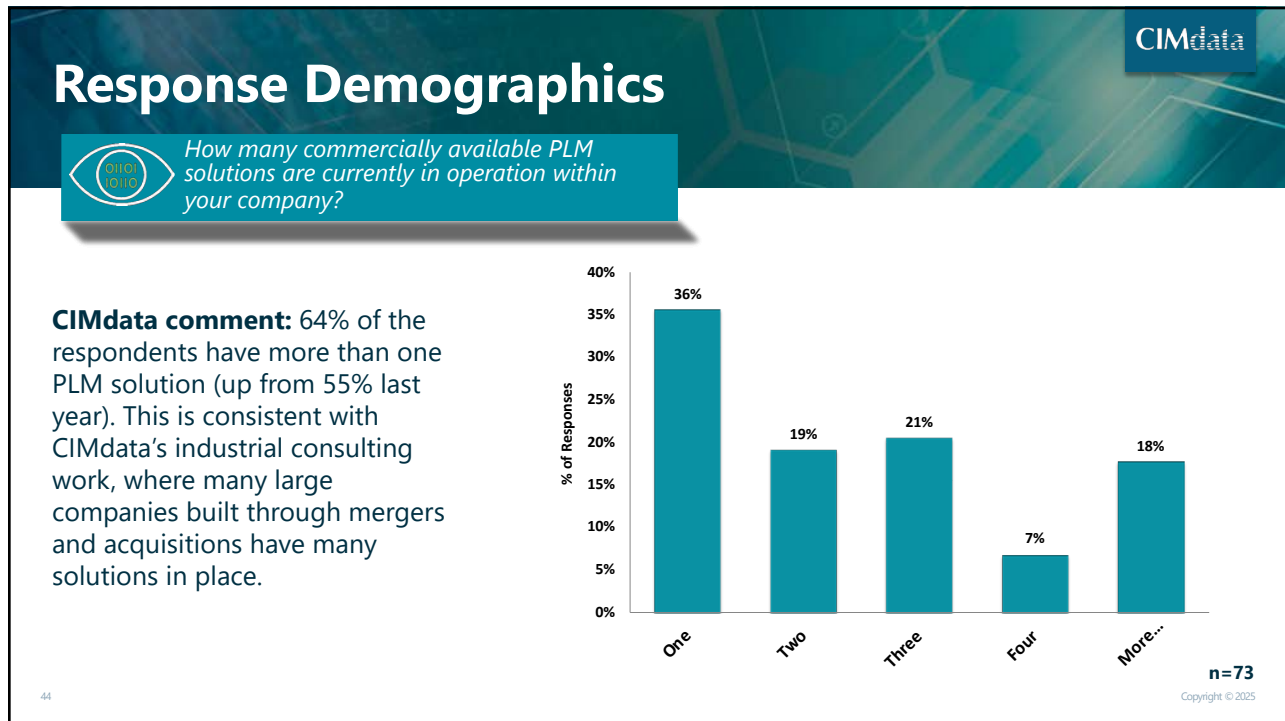
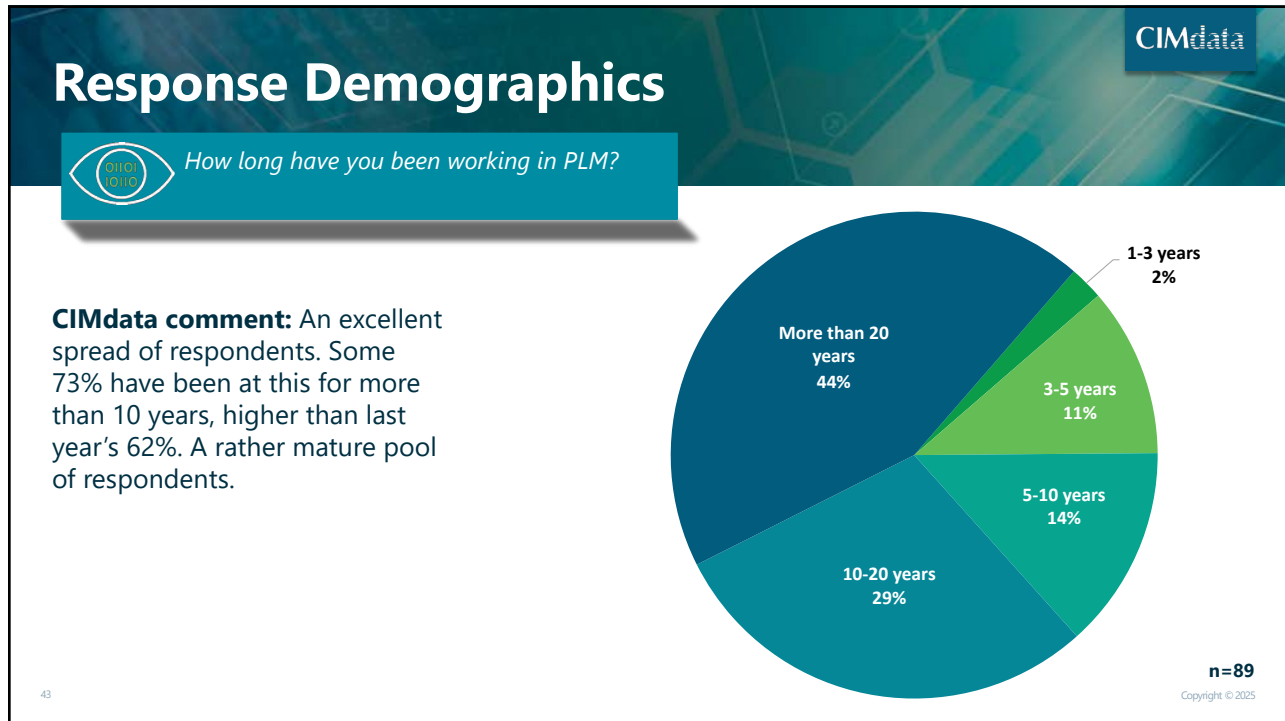
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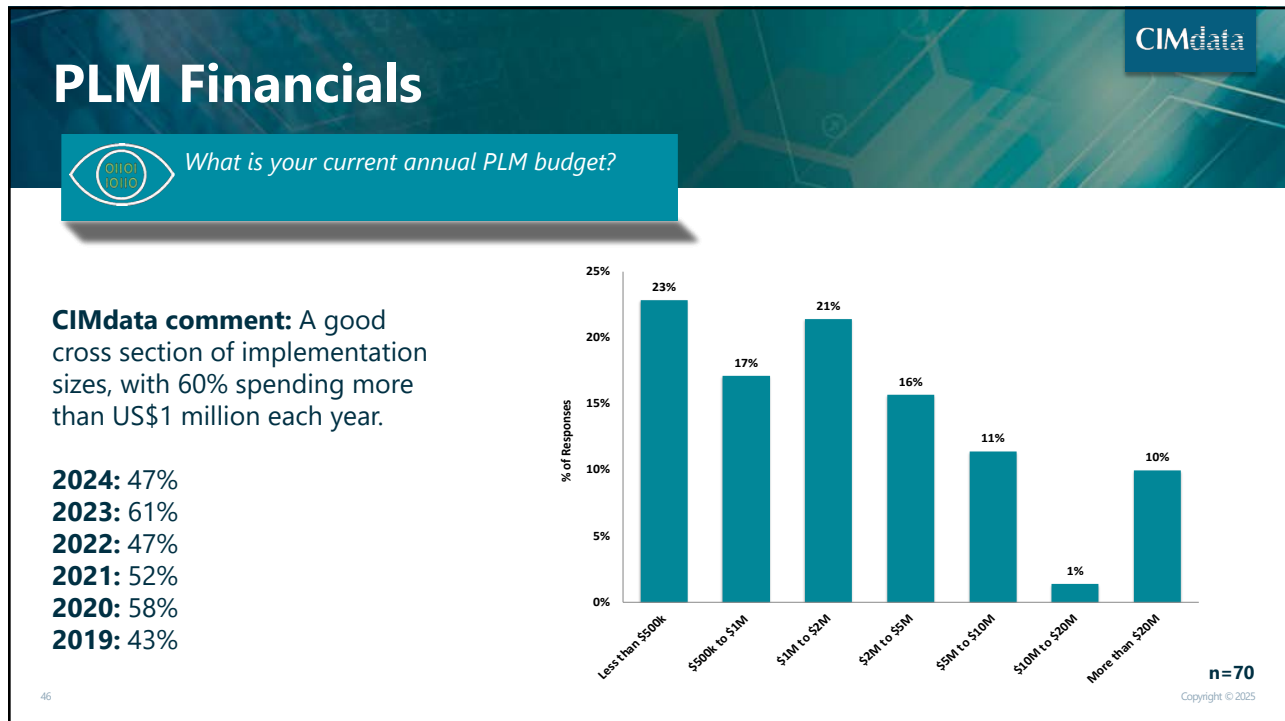
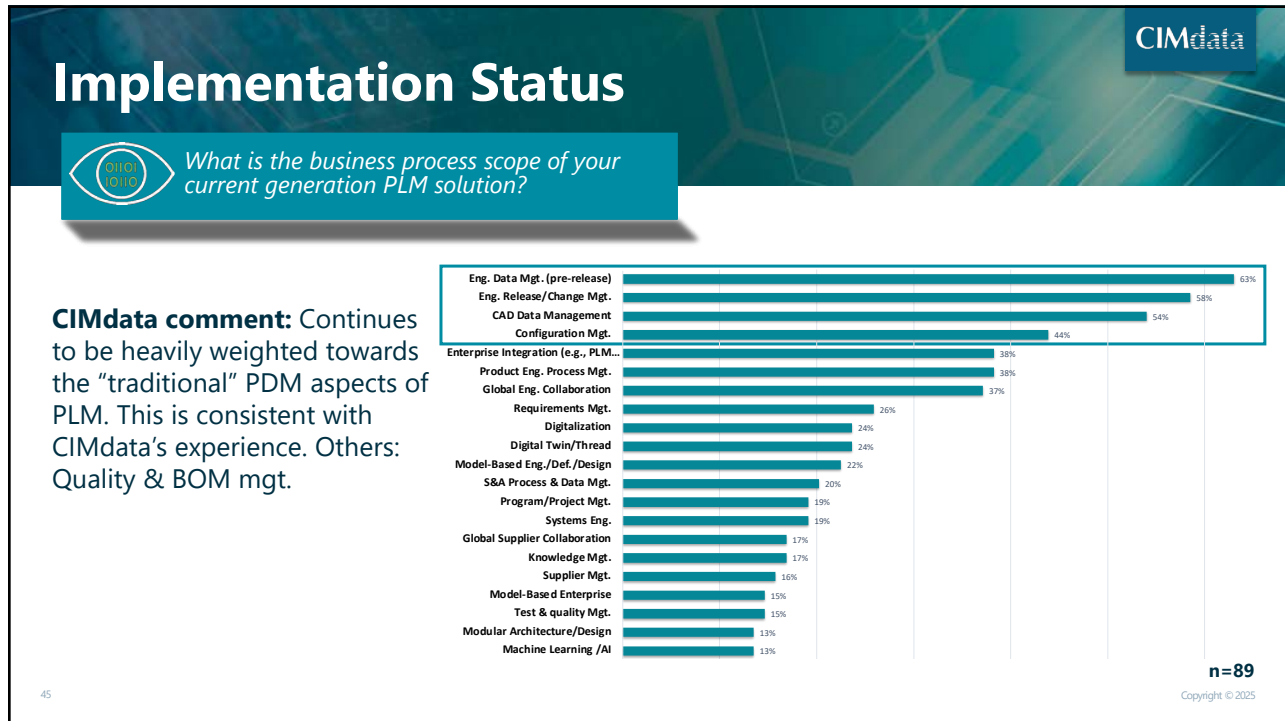
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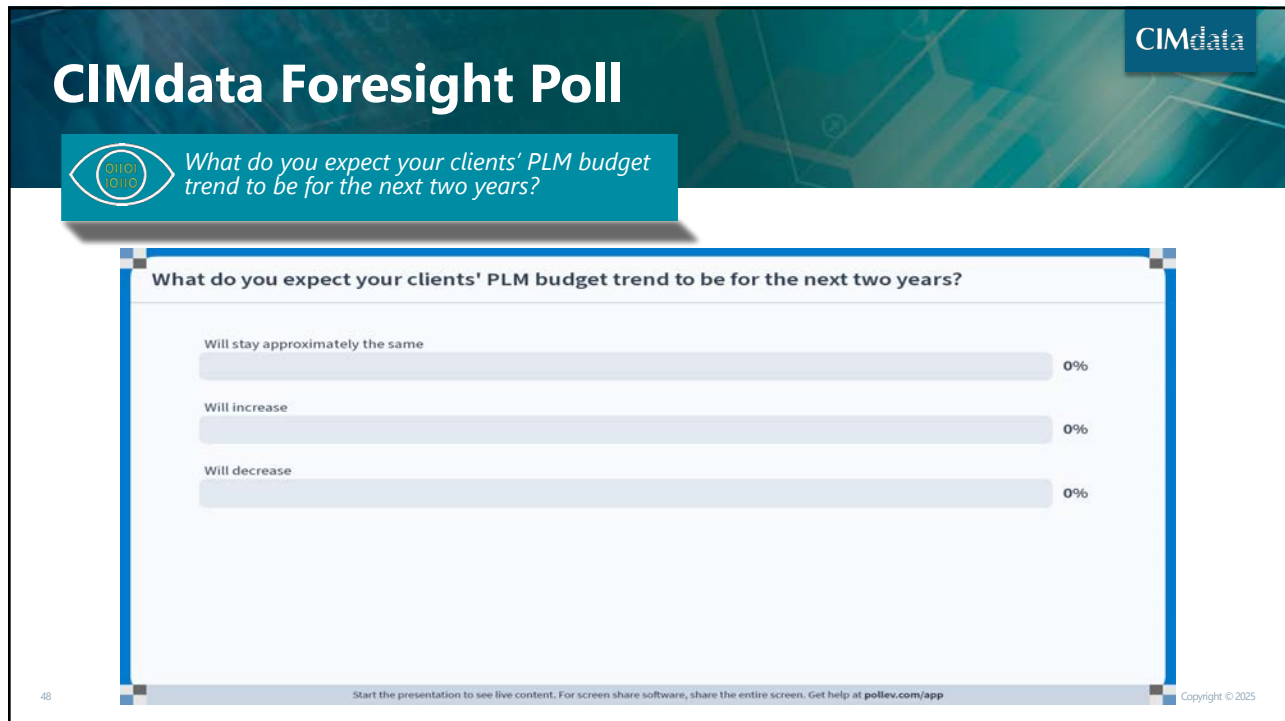
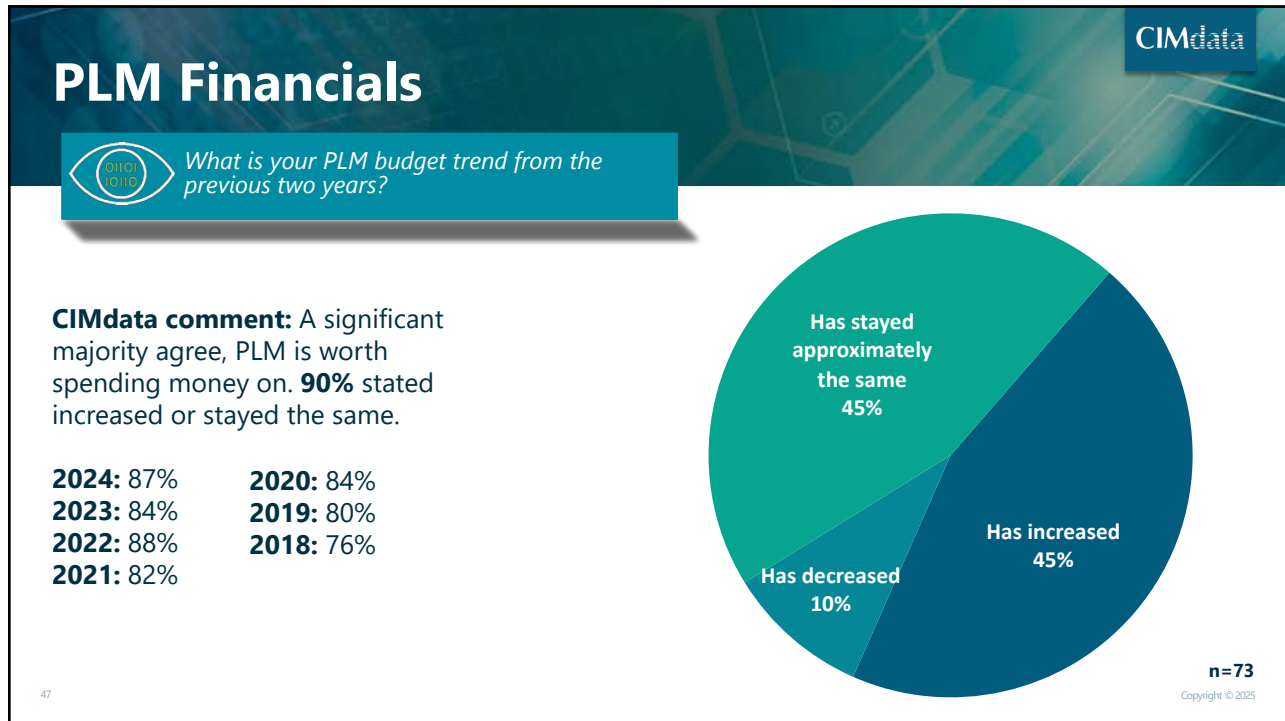
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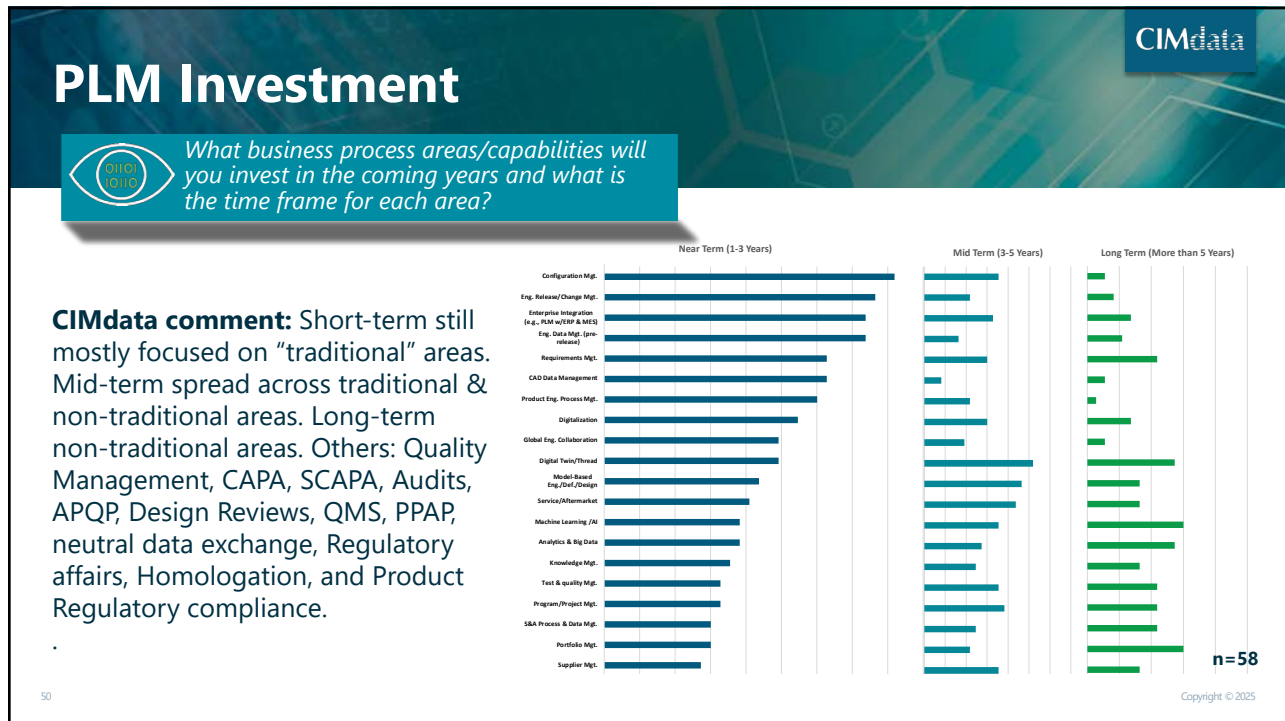
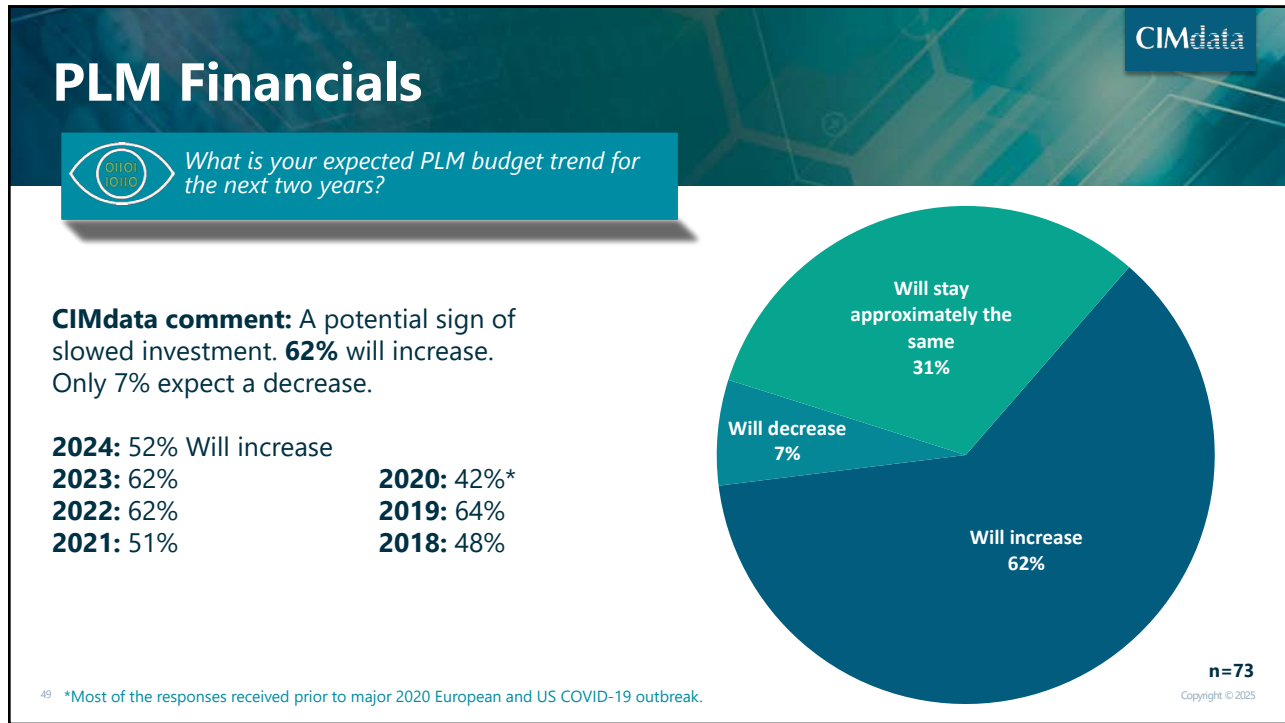
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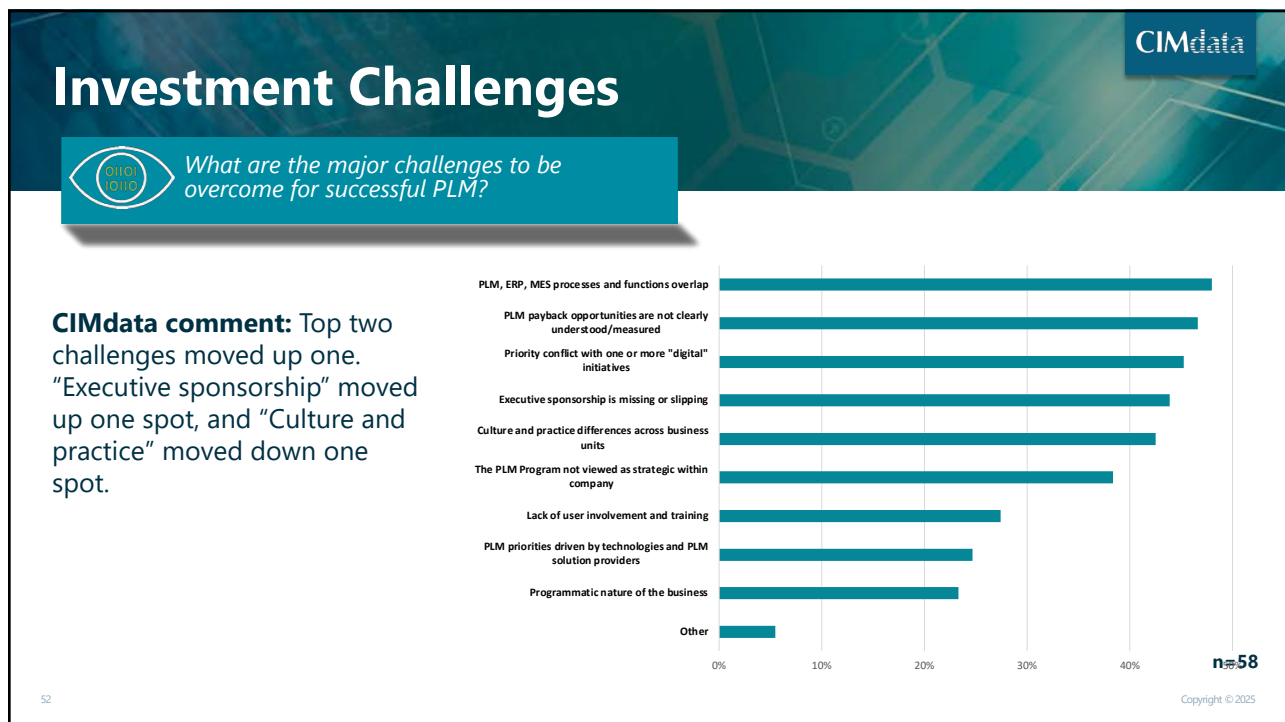
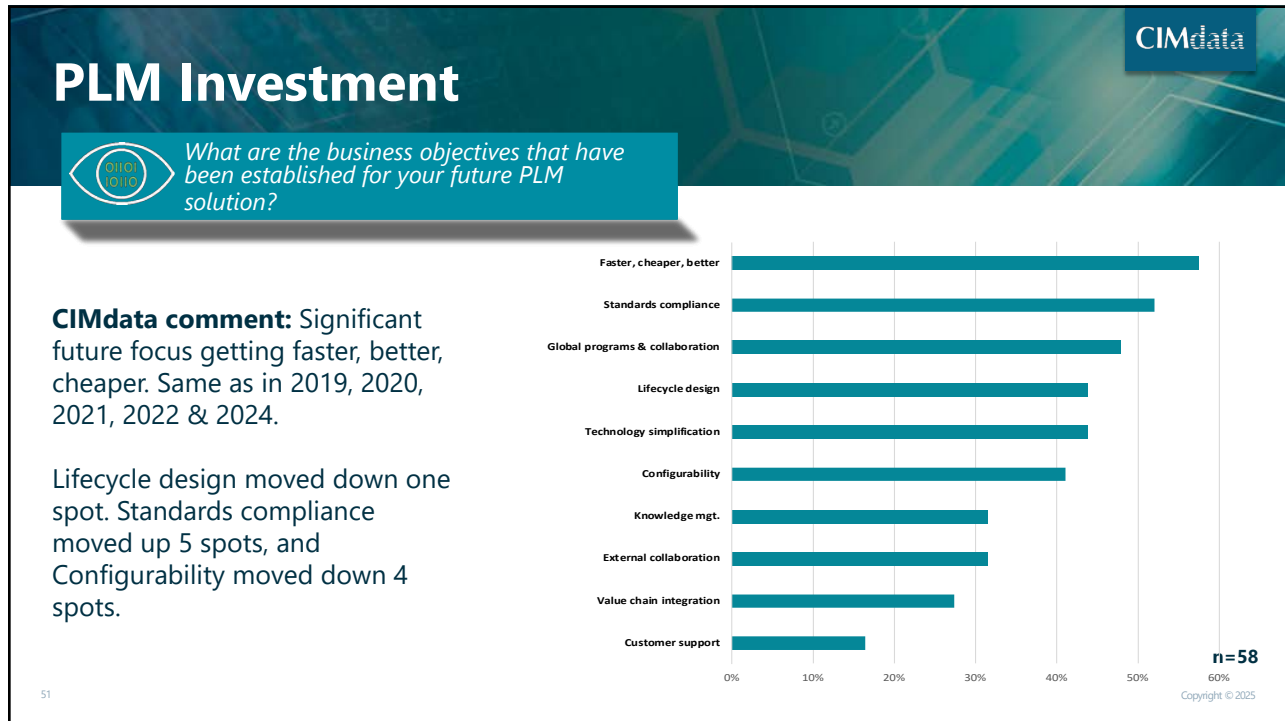
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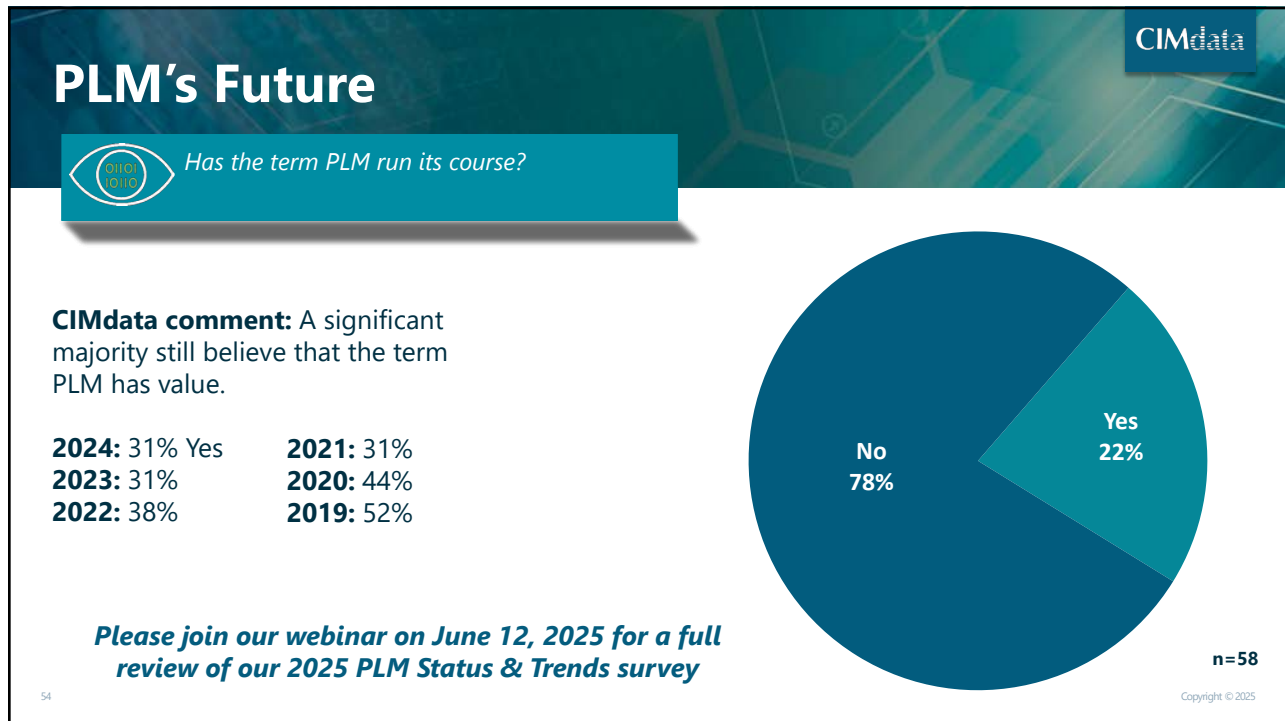
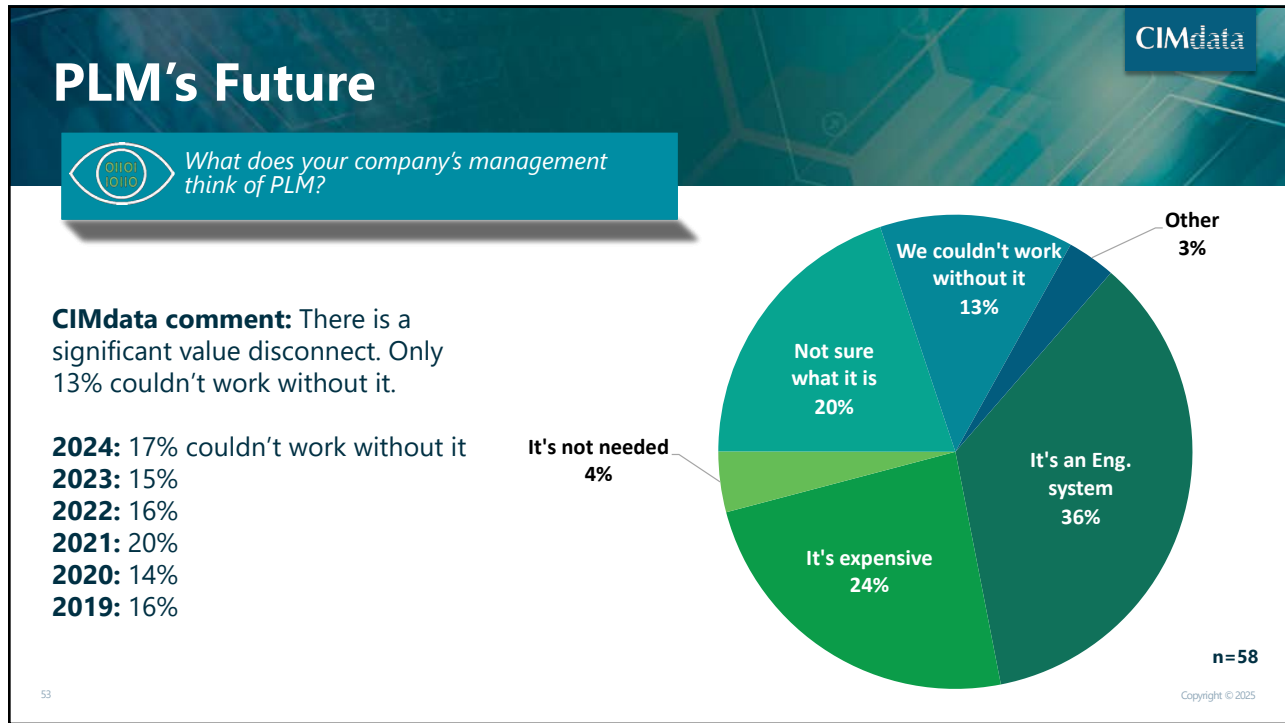
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What CIMdata Has Been Saying


Some examples—have you seen what we have been publishing since the last Forum

A unified la
defense an
ben

Enriching the digital thread with
variation simulation

The creati
underway,
recognized

PL

In late Jan
Common L
webinar he

The dig

Aerospace and Defense Digital Transformation

Bridging the Gap: How PMI Streamlines Product Development with the Power of Digital Twins

PLM/ERP

Advanced Manufacturing Digital Transformation Machining Simulation

Information

Updated Jun 24, 2024

PLM/ERP

Bothenburg


emonstrated by the CIMdata
g away were prior years'

nd solution providers.


FEB 21, 2025

MAR 4, 2025

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2024 PLM Market – Overall State


PLM market—overall growth of 9.6%

- Overall, the PLM market was up **9.6%** to **US\$79.5 billion** (vs. 8.6% forecast)
 - cPDm sector @ US\$25.5B (9.0%); solid software and services growth
 - Tools sector @ \$US52.8B (9.8%); led by significant EDA & S&A growth
 - Digital Manufacturing sector @ US\$1.04B (8.5%) – first time over \$1B mark
- Multiple bright spots exist
 - Transition to subscription licenses & SaaS is well underway, resulting in higher returns
 - Numerous acquisitions continue to build out broad & deep solution portfolios
- Current economic uncertainty may slow PLM investments, but not its value
 - Tariffs and the threat of tariffs have made consumers & industries nervous
 - Hostilities in eastern Europe & middle east have forced some companies to reconsider their investment priorities

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CIMdata's Critical Dozen

01 End-to-end connectivity

02 Data & process management

03 Configuration management

04 Bills of information

05 Model-based structures

06 Digital thread/twin

CIMdata's Critical Dozen
The Top 12 Trends and Enablers of Digital Transformation


12 familiar, evolving trends & key enablers of digital transformation that you cannot, or should not, live without.

Digital thread/digital twin convergence—some from of a digital thread is required if you wish to have an up-to-date digital twin


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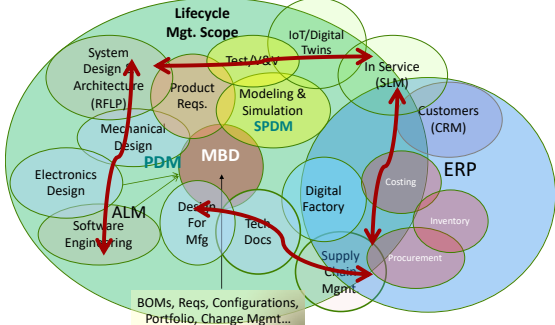
Digital Thread


CIMdata's preferred definition

06
Digital thread/twin


- A **communication framework** that allows a connected data flow & integrated view of an asset's data (i.e., its Digital Twin) throughout its lifecycle across traditionally siloed functional perspectives

Digital thread is enabled and supported by a robust end-to-end and connected systems model and MBSE processes




59 Extracted from: https://www.dodmantech.com/ManTechPrograms/Files/AirForce/Cleared_DT_for_Website.pdf
60 Also see: <http://www.manufacturing-operations-management.com/manufacturing/2016/04/what-is-the-digital-thread-and-digital-twin-definition.html>

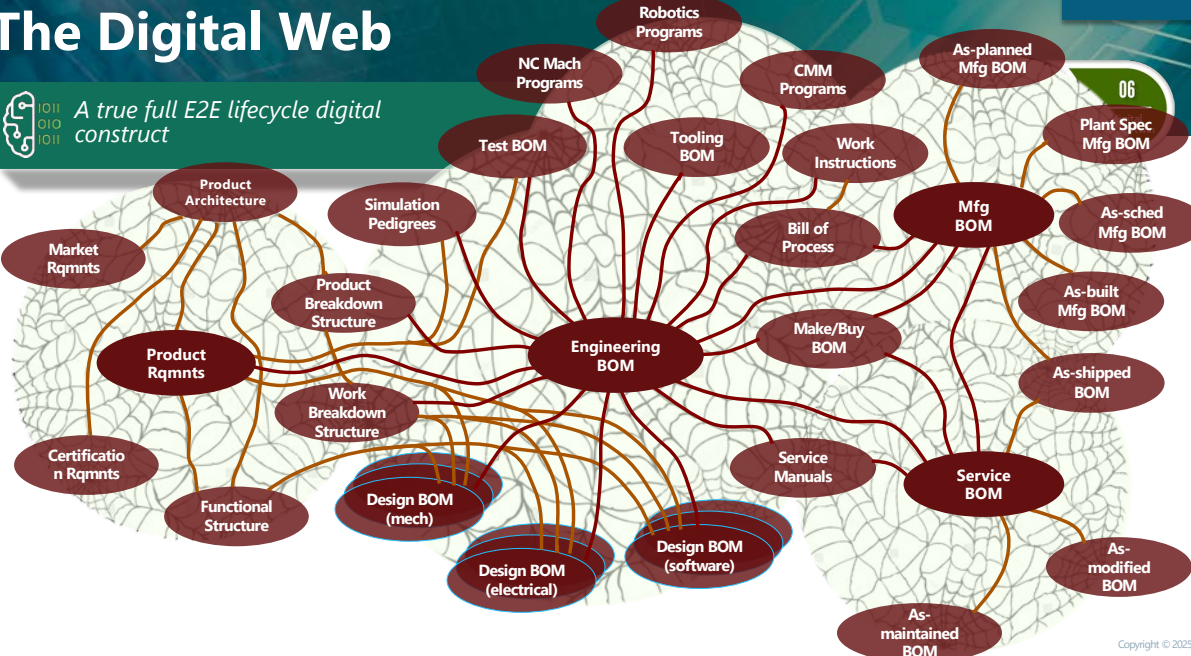
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The Digital Web


A true full E2E lifecycle digital construct

06

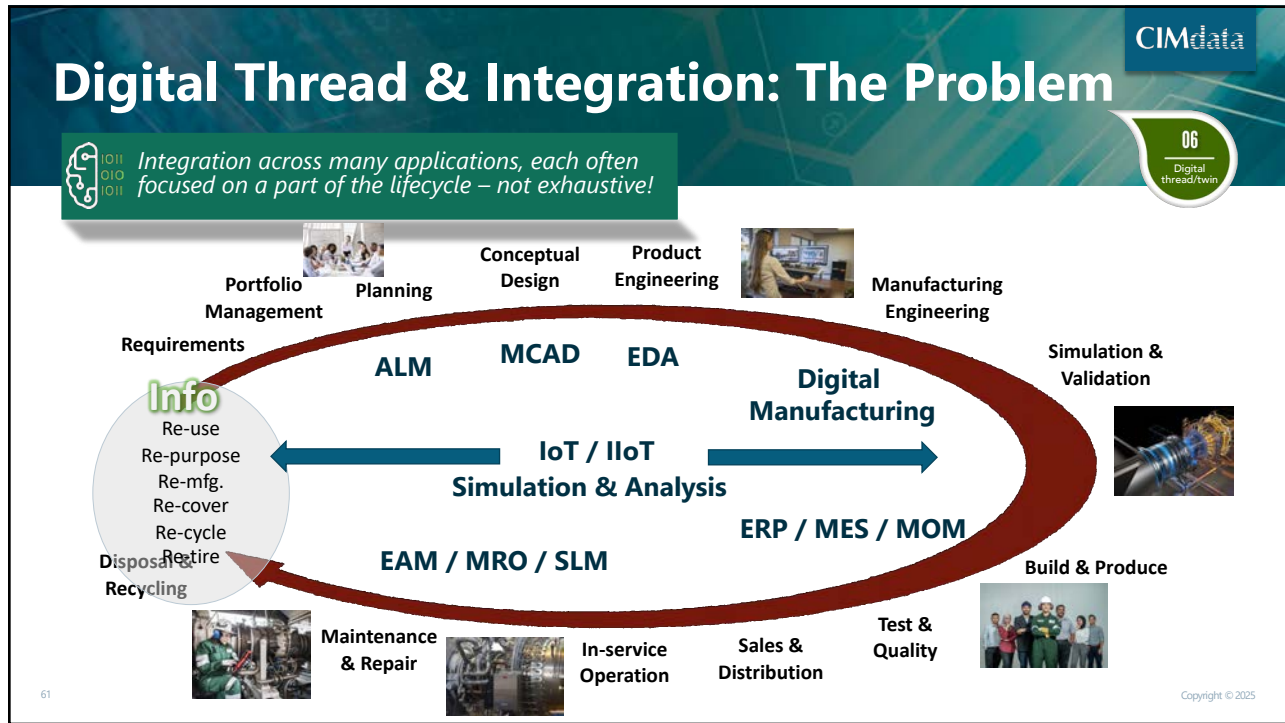


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Digital Twin

A digital representation of products and/or services at any point throughout the lifecycle

06 Digital thread/twin

- A **virtual representation** (i.e., digital surrogate) of a physical asset or collection of physical assets (i.e., physical twin) that exploits data flow to/from the associated physical asset(s).

Digital Twin of the Product

Digital Twin of Production

Digital Twin of Service


Digital Twin of Organization

Digital twin is enabled and supported by a robust end-to-end and connected systems model and MBSE processes


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The Ultimate Vision




Many credit Vickers as the first person to use the phrase—"digital twin"

06

Digital thread/twin


"The ultimate vision for the digital twin is to create, test and build our equipment in a virtual environment. Only when we get it to where it performs to our requirements do we physically manufacture it.

We then want that physical build to tie back to its digital twin through sensors so that the digital twin contains all the information that we could have by inspecting the physical build."



John Vickers, Manager,
NASA's National Center for
Advanced Manufacturing

63 <https://www.forbes.com/sites/bernardmarr/2017/03/06/what-is-digital-twin-technology-and-why-is-it-so-important/?sh=783735a22e2a>
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CIMdata's Critical Dozen

01

End-to-end connectivity

02

Data & process management

03


Configuration management

04

Bills of information

05

Model-based structures



CIMdata's Critical Dozen
The Top 12 Trends and Enablers of Digital Transformation

12 familiar, evolving trends & key enablers of digital transformation that you cannot, or should not, live without.

10

Augmented intelligence

09

Big data & analytics

08

Changing views of "product"

06

Digital thread/twin

07

IoT & PLM


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Augmented Intelligence

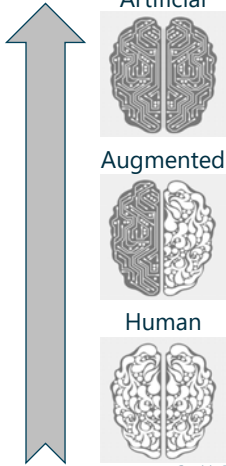
 This is where we are at—extensively covered in our 2018 PLM Market & Industry Forum

- **Augmented Intelligence** or intelligence augmentation (IA) is not about replacing human intelligence but rather about amplifying or augmenting it by enabling humans to make use of the large volume of data we're generating by combining human and machine intelligence

"Over the next decade, AI won't replace managers, but managers who use AI will replace those who don't."
Erik Brynjolfsson and Andrew McAfee, HBR (2017)

10
Augmented intelligence

Artificial
Augmented
Human




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AI Governance

 AI governance is essential for ensuring that AI is developed & used responsibly

CIMdata Webinar
15 May 2025

- AI governance encompasses a set of principles, rules & practices that guide the development, deployment & use of AI enabled systems
- Here are some of the key reasons why it is important:
 - **Safety**—helps to ensure that AI systems are safe and do not pose a risk to people or the environment
 - **Ethics**—can help to ensure that AI systems are used ethically & fairly
 - **Transparency**—can help to ensure that AI systems are transparent
 - **Accountability**—can help to ensure that there is someone accountable for the development & use of AI systems
 - **Trust**—can help to build trust in AI systems

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CIMdata's Critical Dozen

The Top 12 Trends and Enablers of Digital Transformation

12 familiar, evolving trends & key enablers of digital transformation that you cannot, or should not, live without.

- 01 End-to-end connectivity
- 02 Data & process management
- 03 Configuration management
- 04 Bills of information
- 05 Model-based structures
- 06 Digital thread/twin
- 07 IoT & PLM
- 08 Changing views of "product"
- 09 Big data & analytics
- 10 Augmented intelligence
- 11 Data governance

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Data Governance

CIMdata's definition

The definition, implementation, and management of policies, procedures, structures, roles, and responsibilities that outline and enforce rules of engagement, decision rights & accountabilities for the effective management of information assets.

11 Data governance

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Data Governance – Goals & Principles


Key data governance goals & principles to understand & follow


11
Data governance

- Goals:
 - Sustainability and data/information & processes and change management
 - Embedded governance helps guide software development, data use in analytics & master data mgt.
 - Provides for measurement of improvements from baselines
- Principles:
 - Leadership & data strategy implementation
 - Responsiveness to business drivers
 - Shared responsibility for data management
 - Multi-layered approach to address data complexity
 - Built on an agreed governance framework
 - Adhering to clearly stated principles



Environmental Factors

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CIMdata's Critical Dozen


01
End-to-end connectivity

02
Data & process management

03
Configuration management

04
Bills of information

05
Model-based structures



12
Digital skills transformation

06
Digital thread/twin

11
Data governance

10
Augmented intelligence

09
Big data & analytics

08
Changing views of "product"

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IoT & PLM

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Changing views of "product"

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Digital Skills Transformation

Assessing, defining & enabling the workforce of the future—you can't transform without it (1 of 2)

12 Digital skills transformation

- A well-defined Digital Skills Transformation program is **multi-faceted**, and should include organizational, process, technology, content & delivery considerations
- An education & training framework, and related implementation & support structures cover **different organizational processes & supporting platforms**
- Different experience and skill levels need to be incorporated into **one repeatable standard**, applicable throughout an enterprise, no matter its size or complexity

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Digital Skills Transformation

Assessing, defining & enabling the workforce of the future—you can't transform without it (2 of 2)

12 Digital skills transformation


- With the appropriate structure in place, an enterprise is **in a better position** to proactively handle growth, reduce employee turnover, and successfully deal with the technological and process changes encountered




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Digital Skills Transformation: Guiding Principles




For your consideration



- The program should be **strategy-driven**
- Criteria that define success should be **defined & consistently refined**
- The program should be **supported by key strategies, systems, structures, policies & practices**
- The program should be **driven through many channels**
- **Learning by doing & establishing shared accountability** should be practiced

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Agenda

- What's New from CIMdata
- 2024: The Year in Review
- 2025: Today's Trends & Challenges
- Looking Towards the Future
- MBSE: Optimizing Systems of Systems
- Concluding Remarks

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Top Strategic Tech Trends




Gartner's Top Strategic Technology Trends

Direct connection
Indirect/secondary connection

2023	2024	2025
<ol style="list-style-type: none"> 1. Digital Immune System 2. Applied Observability 3. AI Trust, Risk and Security Management (AI TRISM) 4. Industry Cloud Platforms 5. Platform Engineering 6. Wireless-Value Realization 7. Superapps 8. Adaptive AI 9. Metaverse 10. Sustainable Technology <p style="font-size: 8px; margin-top: 5px;"> https://www.gartner.com/en/articles/gartner-top-10-strategic-technology-trends-for-2023 <small>75</small> https://www.gartner.com/en/articles/gartner-top-10-strategic-technology-trends-for-2024 </p>	<ol style="list-style-type: none"> 1. AI Trust, Risk and Security Management (AI TRISM) 2. Continuous Threat Exposure Management (CTEM) 3. Sustainable Technology 4. Platform Engineering 5. AI-Augmented Development 6. Industry Cloud Platforms 7. Intelligent Applications 8. Democratized Generative AI 9. Augmented Connected Workforce 10. Machine Customers 	<ol style="list-style-type: none"> 1. Agentic AI 2. AI governance platforms 3. Disinformation security 4. Post-quantum cryptography 5. Ambient invisible intelligence 6. Energy-efficient computing 7. Hybrid computing 8. Spatial computing 9. Polyfunctional robots 10. Neurological enhancement <p style="font-size: 8px; margin-top: 5px;"> https://www.gartner.com/en/articles/top-technology-trends-2025 </p>




The Age of Ontologies



The use of ontologies is increasing throughout the information technology domain

- **Semantic Web**—making web data more meaningful to computers
- **Artificial Intelligence**—enabling machines to reason & understand knowledge
- **Knowledge Management**—organizing & sharing information within organizations
- **Data Integration**—combining/integrating data from different sources



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Interoperability in the Age of Ontologies



The apparent arrival of ontology-based integrations

- Ontology-based & standards-based approaches aim to facilitate interoperability, but they do so with distinct philosophies & methodologies
 - **Standards-based** integrations rely on predefined, agreed-upon formats, protocols, and rules for data exchange
 - They emphasize syntactic & structural consistency, ensuring that systems can "talk" to each other by adhering to common formats
 - **Ontology-based** integrations emphasize the semantic meaning of data, using ontologies to define concepts, relationships & rules
 - They aim to achieve semantic interoperability, where systems "understand" the meaning of the data they exchange

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The State of AI: The Future is Upon Us



"The state of AI: How organizations are rewiring to capture value" (1 of 5)

Organizations are beginning to create the structures and processes that lead to meaningful value from gen AI. While still in early days, companies are redesigning workflows, elevating governance, and mitigating more risks.

Organizations are starting to make organizational changes designed to generate future value from gen AI, and large companies are leading the way. The latest McKinsey Global Survey on AI finds that organizations are beginning to take steps that drive bottom-line impact—for example, redesigning workflows as they deploy gen AI and putting senior leaders in critical roles, such as overseeing AI governance.


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"The state of AI: How organizations are rewiring to capture value," <https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai>, March 2025


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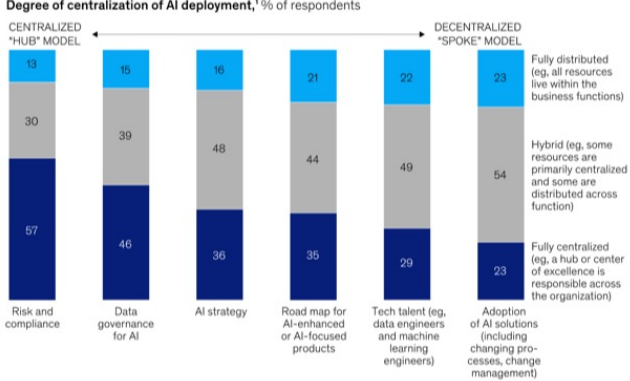
The State of AI: The Future is Upon Us



"The state of AI: How organizations are rewiring to capture value" (2 of 5)

Risk & data governance are two of the most centralized elements of deploying AI solutions, whereas tech talent is often hybrid.


Degree of centralization of AI deployment,¹ % of respondents




Category	Centralized 'Hub' Model (%)	Hybrid (%)	Decentralized 'Spoke' Model (%)
Risk and compliance	57	30	13
Data governance for AI	46	39	15
AI strategy	36	48	16
Road map for AI-enhanced or AI-focused products	35	44	21
Tech talent (eg, data engineers and machine learning engineers)	29	49	22
Adoption of AI solutions (including changing processes, change management)	23	54	23

¹Question was asked only of respondents whose organizations use AI in at least 1 function, n = 1,229. Figures were calculated after removing the share who said "don't know/not applicable."
Source: McKinsey Global Survey on the state of AI, 1,491 participants at all levels of the organization, July 16–31, 2024

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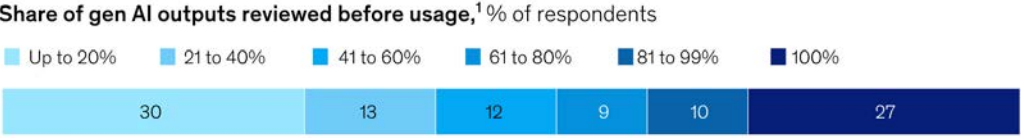
The State of AI: The Future is Upon Us



"The state of AI: How organizations are rewiring to capture value" (3 of 5)

Respondents are about equally likely to say their organizations review all gen AI outputs as they are to say few are reviewed.

Share of gen AI outputs reviewed before usage,¹ % of respondents



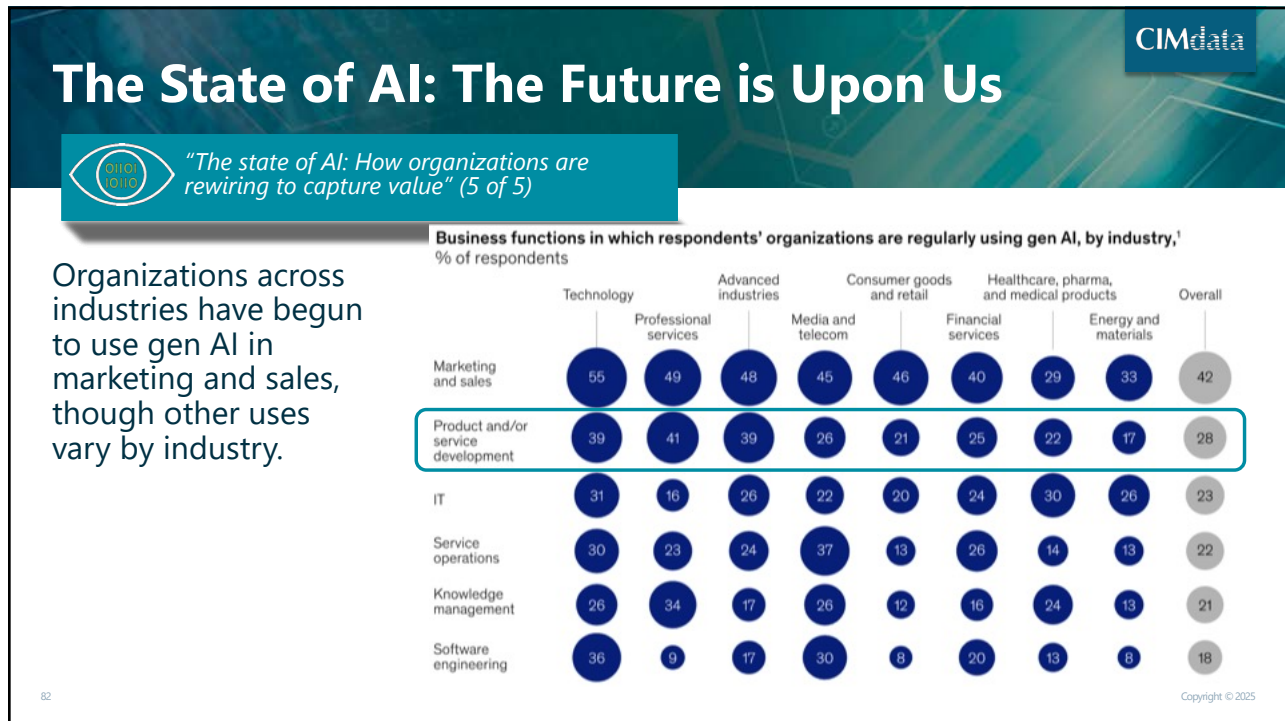
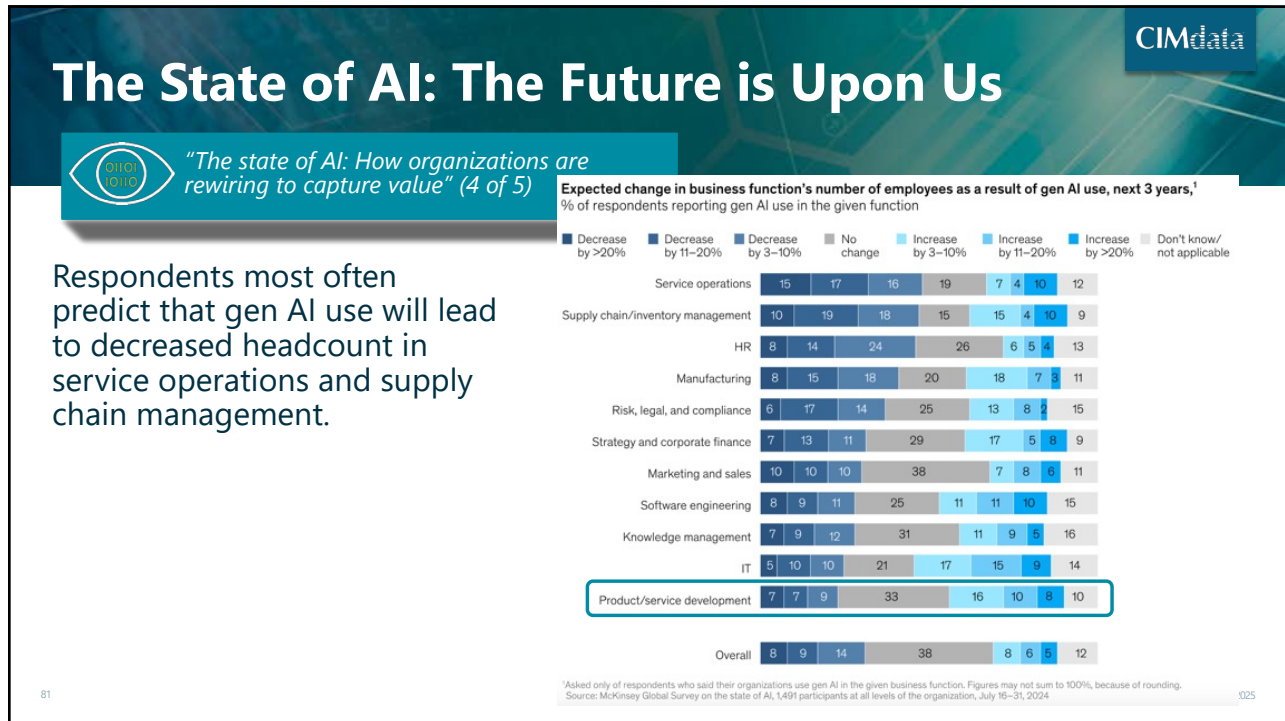
Review Category	Percentage (%)
Up to 20%	30
21 to 40%	13
41 to 60%	12
61 to 80%	9
81 to 99%	10
100%	27

¹Only asked of respondents whose organizations regularly use gen AI in at least 1 function. Figures were calculated after removing the share who said "don't know"; n = 830.
Source: McKinsey Global Survey on the state of AI, 1,491 participants at all levels of the organization, July 16–31, 2024

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AI Considerations



We appear to be at the tipping point

- The integration of artificial intelligence (AI) into the product lifecycle is poised to dramatically reshape engineering & design practices
- AI is expected to augment, not replace, human ingenuity in engineering & design
- Humans need to assume the role of “curator” of AI generated content
- Professionals who embrace AI & adapt to the changing landscape will be well-positioned to thrive in the years to come
- Key areas of change include Automation & Optimization, Collaboration & Efficiency, Skills, and Personalization & Customization

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Automation & Optimization



Automation & optimization will be enhanced with the proper application of AI

- **Generative Design**—enable engineers to explore a much wider range of design possibilities
- **Simulation & Analysis**—accelerate & enhance simulation processes, allowing for more accurate & efficient analysis of complex systems, and even systems of systems
- **Predictive Maintenance**—monitor the performance of assets in real-time, predicting potential failures & enabling proactive maintenance

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Collaboration & Efficiency


 *Collaboration & Efficiency will be increased with the proper application of AI*

- **AI-Powered Design Assistants**—act as intelligent design assistants, providing real-time feedback, suggesting design improvements & automating repetitive tasks
- **Improved Collaboration**—facilitate seamless collaboration among design teams, enabling them to share & analyze data more effectively
- **Streamlined Workflows**—automate various aspects of the design process, from concept development to manufacturing, leading to increased efficiency & reduced time to market

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Skills

 *Skills sets will need to change to enable the proper application of AI*

- **Emphasis on High-Level Thinking**—engineers & designers will increasingly focus on high-level problem-solving, strategic thinking, and creative innovation, while AI handles more routine tasks
- **Curation**—professionals will need to learn & support this critical role
- **AI Literacy**—professionals will need to develop a strong understanding of AI principles & tools to effectively leverage them in their work
- **Data Analysis & Interpretation**—ability to analyze & interpret data generated by AI systems will become increasingly important

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Personalization & Customization


*Personalization & Customization will be easier to deliver with the proper application of AI*

- **Tailored Designs**—enable the creation of highly personalized & customized products & solutions, catering to individual user needs and preferences
- **Adaptive Systems**—will be able to adapt & learn from user behavior and environmental conditions, providing a more personalized and responsive experience

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A Few Words on Ontologies & RAG

*How ontologies enhance Retrieval Augmented Generation (RAG)*

- In essence, ontologies provide the structure & meaning that RAG enabled systems need to effectively access & utilize knowledge
 - This combination enables more accurate, relevant, and reliable data retrieval & generation, leading to improved performance
- Value is provided in multiple areas, including:
 - Improved information retrieval
 - Contextual understanding
 - Reduced hallucination
 - Knowledge representation
 - Query understanding

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A Few Words on AI Agents & PLM



The intersection of AI agents & PLM is a dynamic and rapidly evolving area

- AI agents within PLM environments will act as intelligent assistants, augmenting human capabilities & driving efficiency, innovation, and better decision-making throughout the product's entire journey
 - Enhanced data analysis & insights
 - Automation of routine tasks
 - Predictive analytics & optimization
 - Improved collaboration & communication
 - Design & development
 - Supply chain management
 - Quality & compliance



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Agenda

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- MBSE: Optimizing Systems of Systems
- Concluding Remarks

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This Year's Market & Industry Forum Theme



*Model-Based Systems Engineering:
Optimizing Systems of Systems*

- Smart connected products are everywhere today
 - As a result, industrial firms need to optimize the interaction between the mechanical, electronic/electronic & software components of their products
- MBSE is being adopted more broadly across many industries
 - Creating opportunities, while highlighting the needs for new skills, tools & standards to best support this evolving practice
- In this Forum, CIMdata will
 - Highlight the overall issue
 - Discuss how the global PLM Economy is responding
 - Discuss how well industrial companies appear to be achieving MBSE

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Today's Agenda



2025 PLM Market & Industry Forum (1 of 2)

- **MBSE: Optimizing Systems of Systems**
 - **Model-Based Systems Engineering**
Peter Bilello, for Don Tolle, Co-Director, SDS Consulting Practice
 - **MBSE Industry Research: Value Positioning & Readiness for Success**
Sandeepak Natu, Co-Director, SDS Consulting Practice
 - **MBSE Industry Research: Future Investment, Technology Considerations & Summary Observations**
Sandeepak Natu, Co-Director, SDS Consulting Practice
- **Break**

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Today's Agenda

2025 PLM Market & Industry Forum (2 of 2)

- **Updates on Key Topics**
 - **Sustainability Trends within PLM**
Christine Longwell, Director of Research
 - **News from the Field**
Peter Bilello, President & CEO
- **Closing Comments**

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True "Systems of Systems"

The complexity can be overwhelming without the appropriate MBSE approach


- To get right-to-market, a company's MBSE approach must ultimately go beyond the product as a system of systems
- A "system of systems" (SoS) is a collection of independent & operational systems that collaborate to achieve a common goal
- In the case of a product organization, their product can be a system of systems, product development is a system of systems, manufacturing is a system of systems, logistics is, and so on—this is the true SoS



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Concluding Remarks



State of PLM: Today's Market & Leading Trends (1 of 2)

- CIMdata continues to expand & adjust to major PLM market trends—adding people & services to stay at the forefront
- CIMdata's global A&D PLM Action Group has entered its 11th year in partnership with market leaders—major research is underway & you can participate
- Multiple disconnects still exist, e.g., prioritization of IT systems initiatives, and management's narrow understanding of lifecycle management—executive education still required
- The global PLM economy is growing and continues to add value

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Concluding Remarks

 *State of PLM: Today's Market & Leading Trends (2 of 2)*


- The global PLM economy continues to increase as it approaches another milestone—**US\$79.5 billion—a 9.6% increase**
- To be successful, companies need to transform people, processes and technologies—there are at least 12 evolving critical elements—the convergence of digital thread/digital twin & the continued and widespread adoption of MBSE & AI is underway
- The AI revolution is finally upon us...what will the future bring?
- SaaS is here, but is your ecosystem ready for it?


What's next?

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Questions & Answers

 *What's on your mind?*



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