

# State of PLM: Today's Market & Leading Trends

2023 Market & Industry Forum—4 April 2023

**CIMdata**

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

**4 April 2023—Frankfurt, GERMANY**

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**#plm4um**  
**www.CIMdata.com**  
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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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# State of PLM: Today's Market & Leading Trends

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## Key Takeaways

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State of PLM: Today's Market & Leading Trends

- 2023 – CIMdata's 40<sup>th</sup> year of defining, tracking & working in the global PLM market
- The global PLM economy is growing and continues to add value
- Multiple disconnects still exist, e.g., prioritization of digital initiatives, and managements narrow understanding of lifecycle management
- To be successful, companies need to transform people, processes and technologies—there are at least 12 critical elements
- The digital thread is really a digital web—key to true E2E traceability
- Data governance and sustainability are lifecycle issues

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## Agenda

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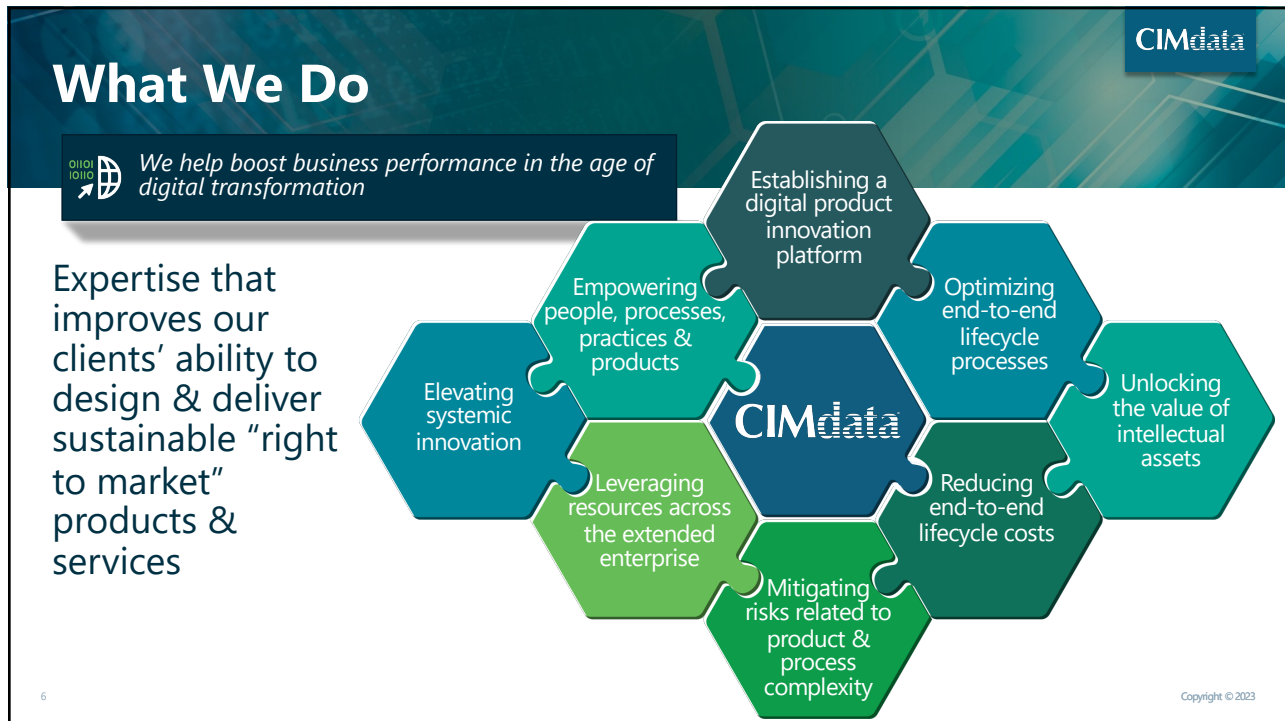
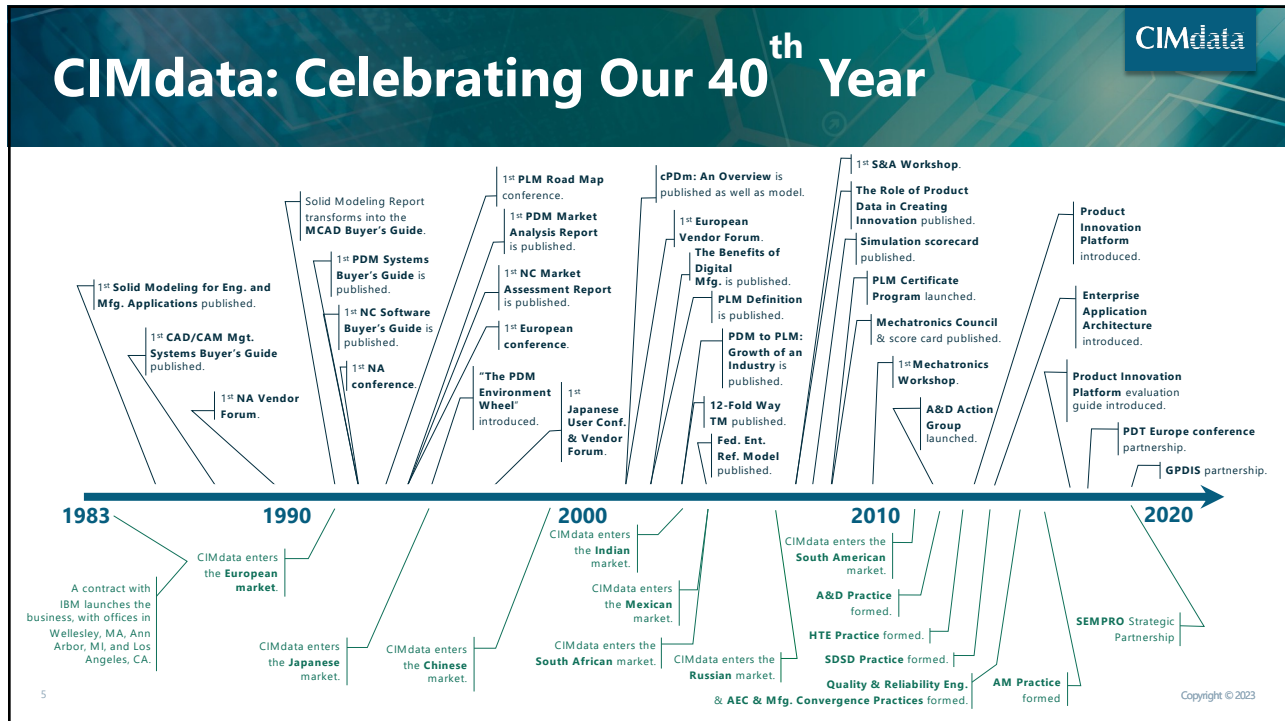
- What's New from CIMdata
- 2022: The Year in Review
- 2023: Today's Trends & Challenges
- Looking Towards the Future
- The Digital Thread: Powering Business Transformation
- Concluding Remarks

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### Our Approach

 Digitally transforming product lifecycles with unbiased research & actionable insight

- Deliver independent strategic advice & counsel
- Support the end-to-end product lifecycle
- Apply a methodology that is solution-independent, modular & adaptable
- Provide expert & actionable insight informed by extensive market & technology research



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### Our 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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## Global Knowledge & Relationships

 Diverse, deep experience across industry verticals...delivered on six continents!


Clients & offices in the Americas, EMEA, and Asia-Pacific




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## Our 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



**Solution Providers**  
Executive Mgmt.  
Program Mgmt.  
Sales/Mktg.

**CIMdata Experts**

**Industrial Clients**  
Executive Mgmt.  
Program Mgmt.  
Users

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

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**Our 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 solution providers to support their drive toward market success*

Driving growth & competitive advantage in a complex, dynamic market

**Channel Services**

**Strategic Support**

**Product & Program Management**

**Product & Program Development**

**Sales & Marketing**

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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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## Select Financial Industry Clients

Logos of various financial industry clients including Berenberg, GTCR, CVC, Bain & Company, GI Partners, J.P. Morgan, Hg, FIP, Symphony Industrial AI, Matrix Capital Management, Longview Partners, Bank of America, Redburn, Thomabravo, Silverlake, Banneker Partners, TA Associates, McKinsey & Company, Generation, WCM, Goldman Sachs, Golden Gate Capital, and Vector Capital.

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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

The diagram illustrates a circular methodology with seven stages: Monitoring & Continuous Improvement, Strategy Development, Solution Definition, Solution Evaluation & Selection, Implementation Planning, Implementation Support, and Monitoring & Continuous Improvement.

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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	Other

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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
- Simulation-Driven Systems Development
- Sustainability & Green Energy



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### Expansion of CIMdata's Simulation Practice

 Sandeepak Natu joins CIMdata's Simulation-Driven Systems Development team

Monday, January 16, 2023

#### CIMdata Announces Expansion of Simulation Practice Team

*Developing hybrid digital twins with strategic insights and implementation consulting.*



Ann Arbor, Michigan, USA 16 January 2023—CIMdata, Inc., the leading global PLM strategic management consulting and research firm, announces the expansion of its Simulation-driven Systems Development (SDSD) practice team, with the addition of Sandeepak Natu as an Executive Consultant.

With industry experience of more than 25 years, Sandeepak has a strong background in multi-physics-based modeling and simulation technologies, including the development and application of hybrid digital twins. Sandeepak started his career with Fluent India (now part of ANSYS Inc.) and has been associated with several engineering consultancy and simulation software organizations. He has worked with various industrial organizations helping them adopt simulation technologies and has deep application expertise in the automotive, aerospace, chemicals, pharmaceuticals, food, consumer products, and healthcare sectors. More recently, he has been involved in multiple technology and management consulting roles encompassing digitalization, simulation, sustainability, and business management, including a key role in helping a global vaccine manufacturer scale up its production facilities at the peak of the COVID-19 pandemic.

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**Sustainability & Green Energy Practice**


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**Mark Reisig joins CIMdata's as an Executive Consultant & Practice Director**

Monday, July 18, 2022

### PLM Industry Executive Mark Reisig joins CIMdata as Executive Consultant and Practice Manager

The primary focus will be on developing and delivering new services to meet the expanding needs of CIMdata's industrial clients.



Ann Arbor, Michigan, USA, 18 July 2022—CIMdata, Inc., the leading global Product Lifecycle Management (PLM) strategic management consulting and research firm, has hired Mark Reisig as an Executive Consultant and Practice Manager. Mark will focus on Green Energy enablement.

Peter Bilello, President & CEO of CIMdata, commented, "We're excited to have Mark join CIMdata. He has a deep understanding of PLM both from a solution provider and industrial user perspective. His experience has given him a comprehensive understanding of how industrial clients' needs continue to evolve. Mark's extensive experience will help CIMdata support its clients in meeting existing and new market challenges."

Mark joins CIMdata after an extensive career in PLM with GE, Federation, Oracle, Auto-trol Technology, Kraft-Heinz, Catalytic, Day & Zimmermann, and most recently, Aras, where he was the Vice President of Product Marketing.

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**CIMdata Foresight**

**CIMdata**

**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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### Membership Services

 A rich set of community services and research areas

Broad, deep portfolio of services and research topics

Industry  
Action Groups

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Community**

Solution  
Providers

- Innovation Engagement & Governance
- Design Creation & Collaboration
- Simulation-Driven Systems Development
- Manufacturing Systems Engineering
- Enterprise Value & Integration
- Sustainability & Green Energy
- Other Research Topics...

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### Aerospace & Defense PLM Action Group

**Group  
Overview**



Jim Roche  
A&D Practice Director



**AEROSPACE & DEFENSE PLM ACTION GROUP**

**AIRBUS**













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# Collaborative Research Program



Study Digital Thread current state & future trends—more on this later

### Sponsors










### Objective

The A&D PLM Action Group members and the PLM solution provider sponsors share a common objective for this research – To gain understanding of needs and opportunities within industry that will inform Digital Thread solution strategy and roadmap

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# CIMdata Leadership



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

- Speakers at international conferences
  - PDT North America 2023 – May, Washington D.C. area
  - PDT EMEA 2023 – November, Paris, France
- PLM Market & Industry Forums for solution providers
  - North America 2023 – March 30 (in-person)
  - EMEA 2023 – April 4 (in-person)
  - India 2023 – April 10 & 11 (virtual live)
  - China 2023 – April 13 & 14 (virtual live)
  - Japan 2023 – April 17 & 18 (virtual live)



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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™ 2023 Series
  - PLM Road Map™ NA 2023—3-4 May, Washington D.C. area
  - PLM Road Map™ EMEA 2023—15-16 November, Paris, France

***PLM Road Map, in its 30<sup>th</sup> year, continues to be a premier international PLM industry event in the rapidly transforming digital world***

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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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### Over 1,100 PLM Professionals Certified

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### CIMdata Foresight Poll

**How can CIMdata better support the global PLM market & its evolution?**

Response	Percentage
Expand research reports offering	64%
Expand education offering	14%
Stand up additional Action Groups	7%
Expand solution areas covered	14%
Other	

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### Agenda

- What's New from CIMdata
- 2022: The Year in Review
- 2023: Today's Trends & Challenges
- Looking Towards the Future
- The Digital Thread: Powering Business Transformation
- 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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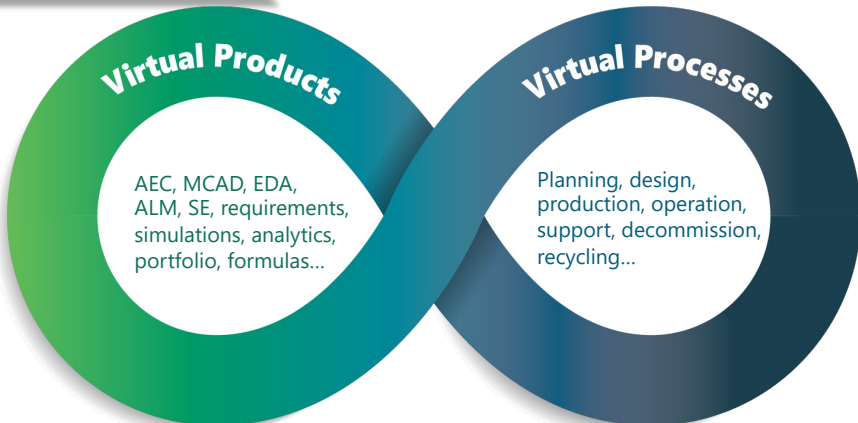
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## PLM's Critical Role

 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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## 2023 CIMdata PLM Status & Trends Survey

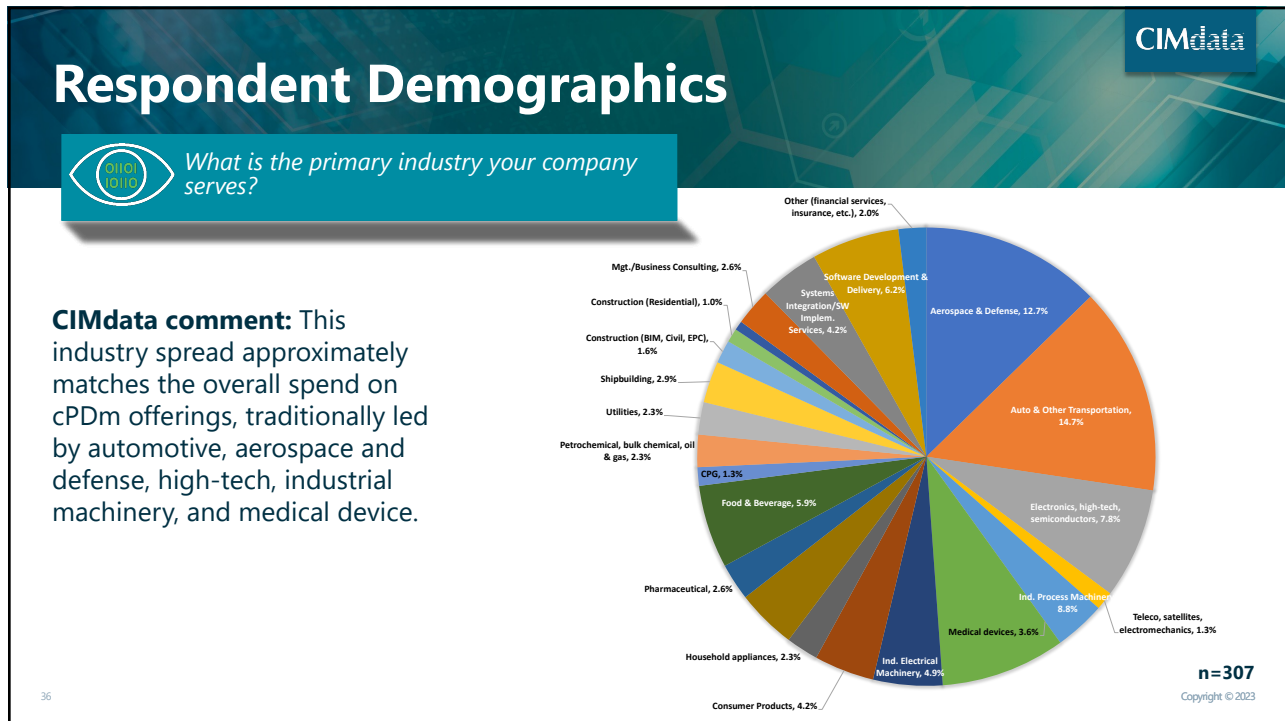
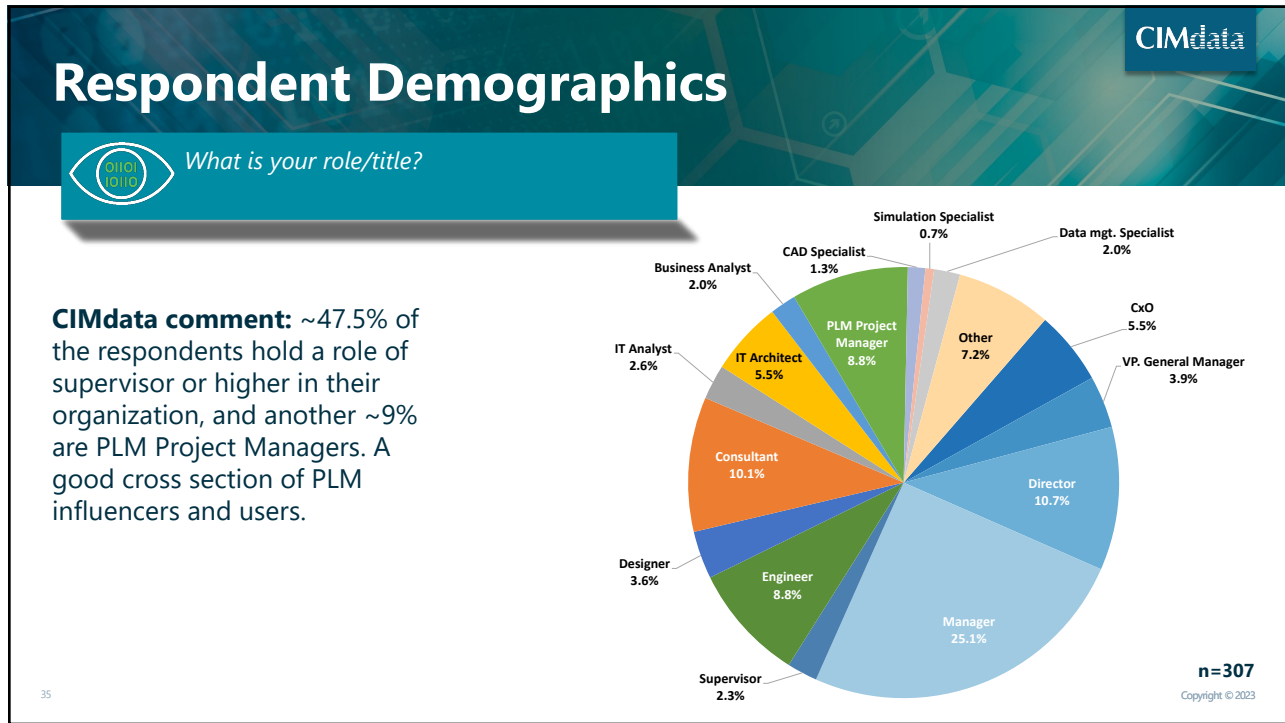
 Some key conclusions

- CIMdata's PLM Status & Trends survey executed again (6<sup>th</sup> year)
- This year's respondents represent a wide & diverse community
- Most implementations still focus on "traditional" PDM aspects of PLM
- For the most part, companies continue to find PLM worth investing in
- There continues to be an emphasis on getting faster, better, cheaper
- Enterprise digital priorities & systems confusion still exists
- Management disconnect is believed to be widespread
- PLM appears to have continued its positive momentum

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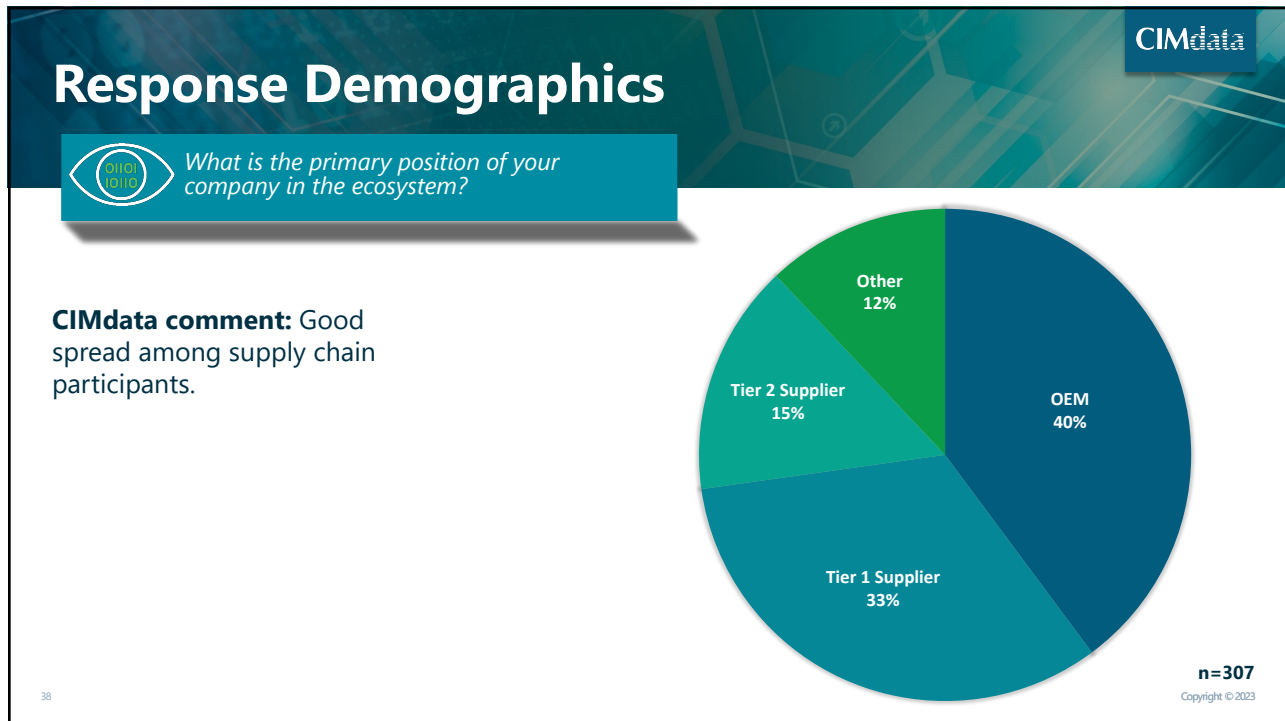
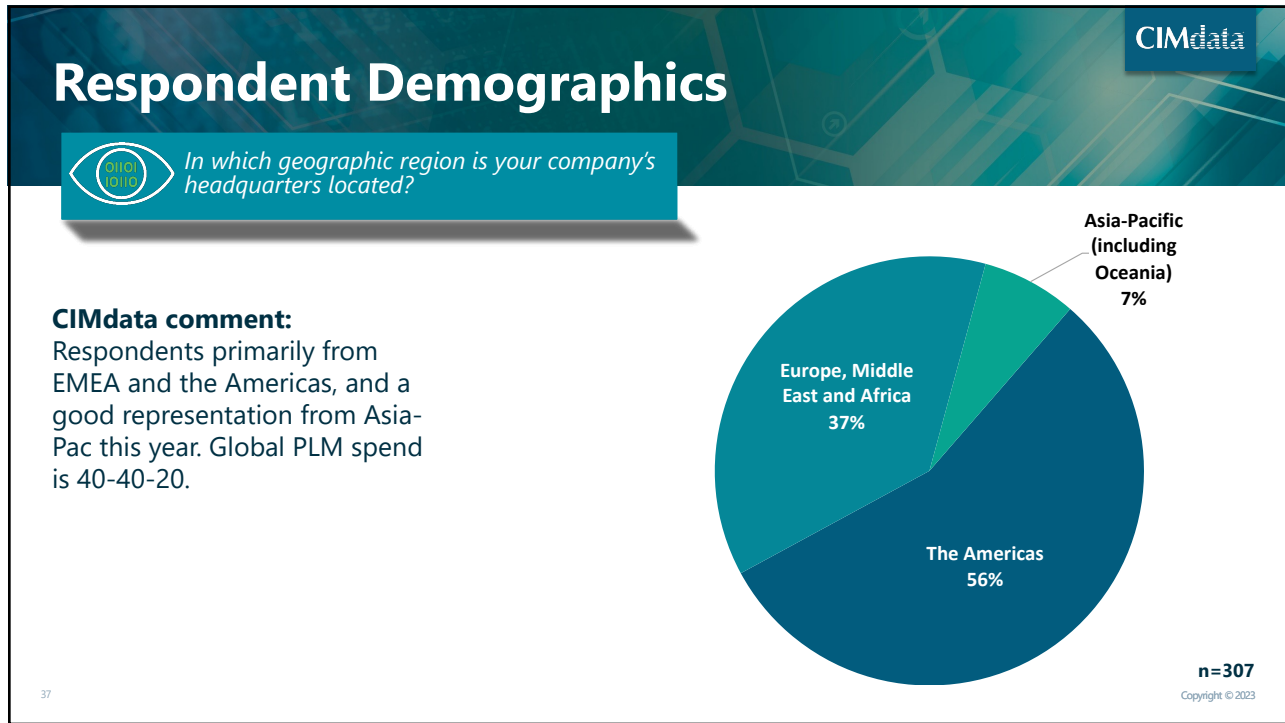
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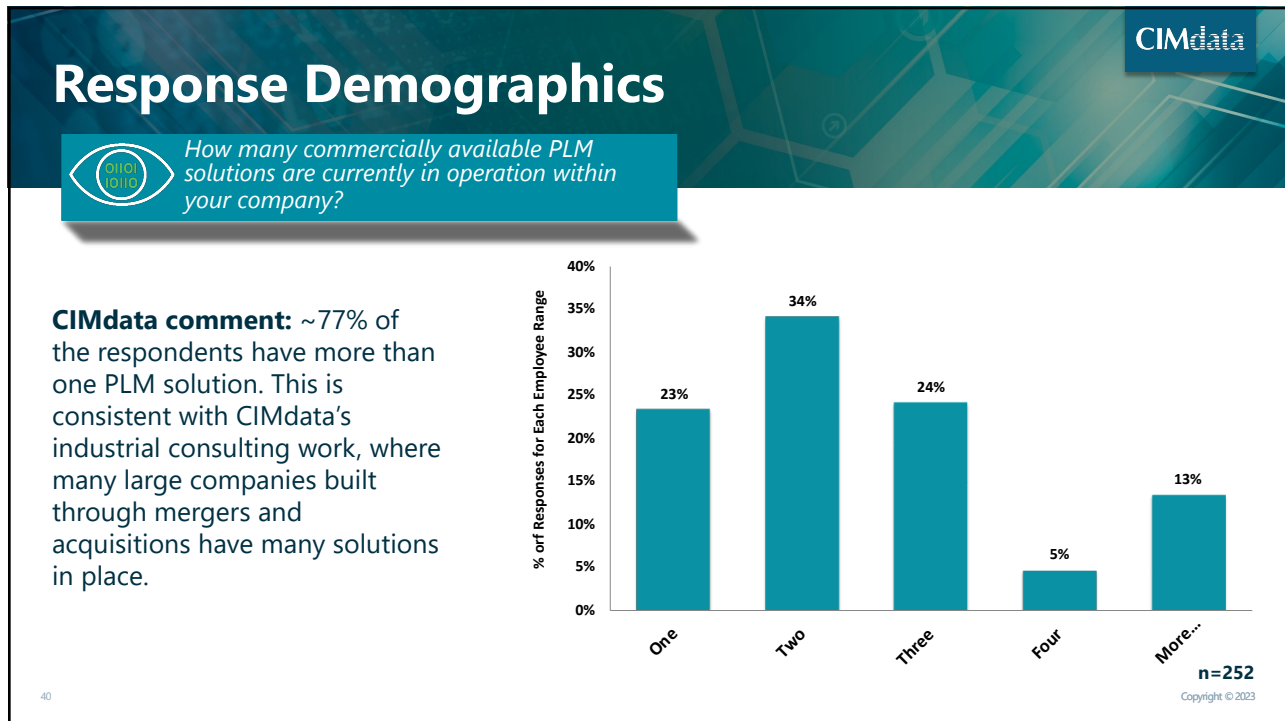
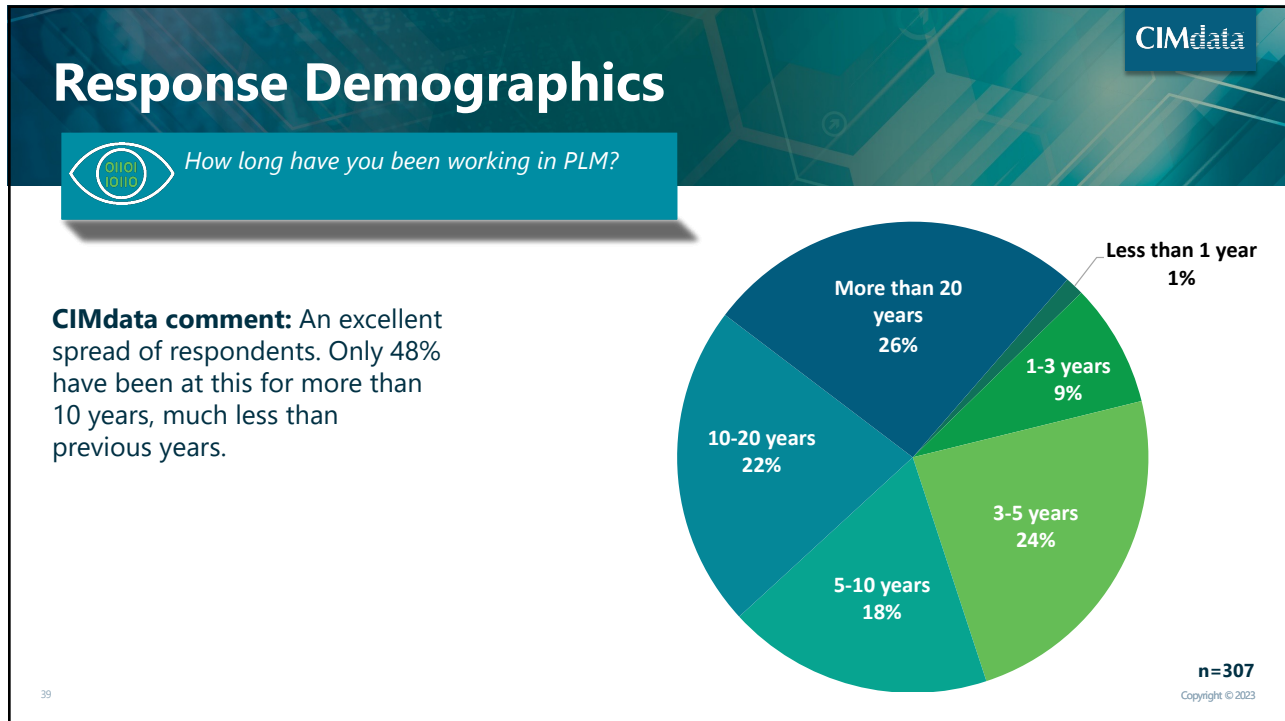
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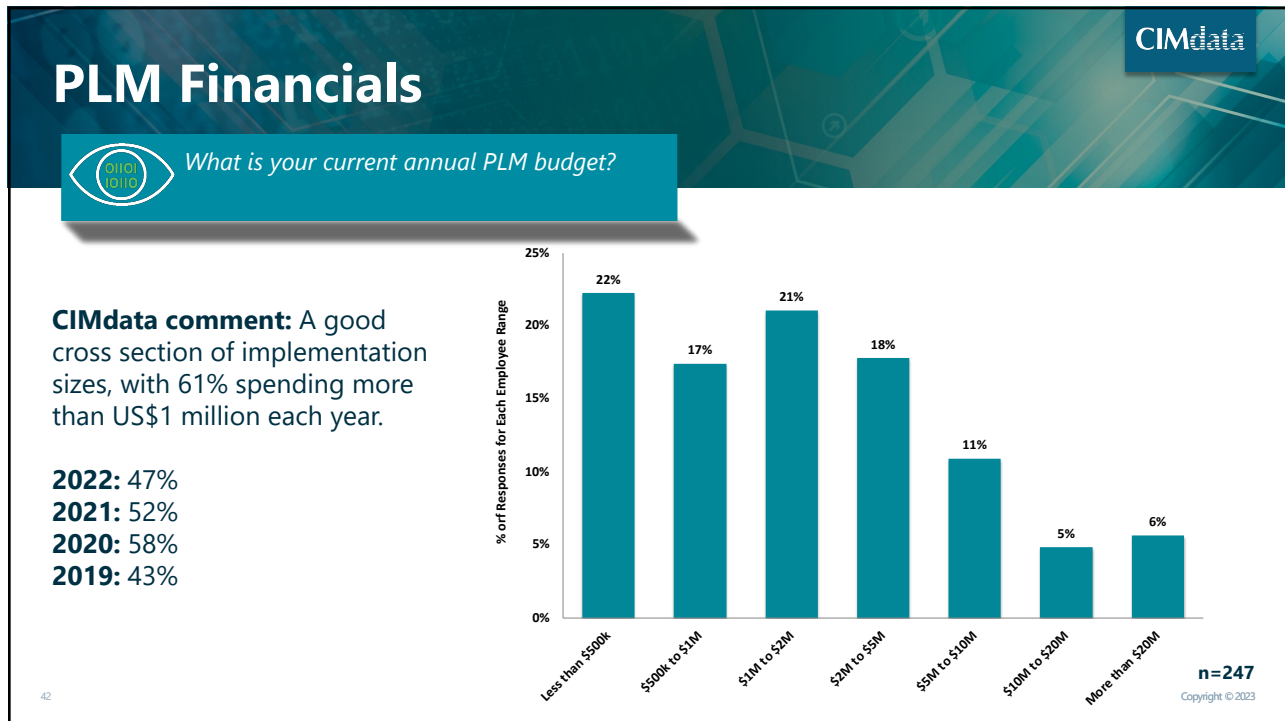
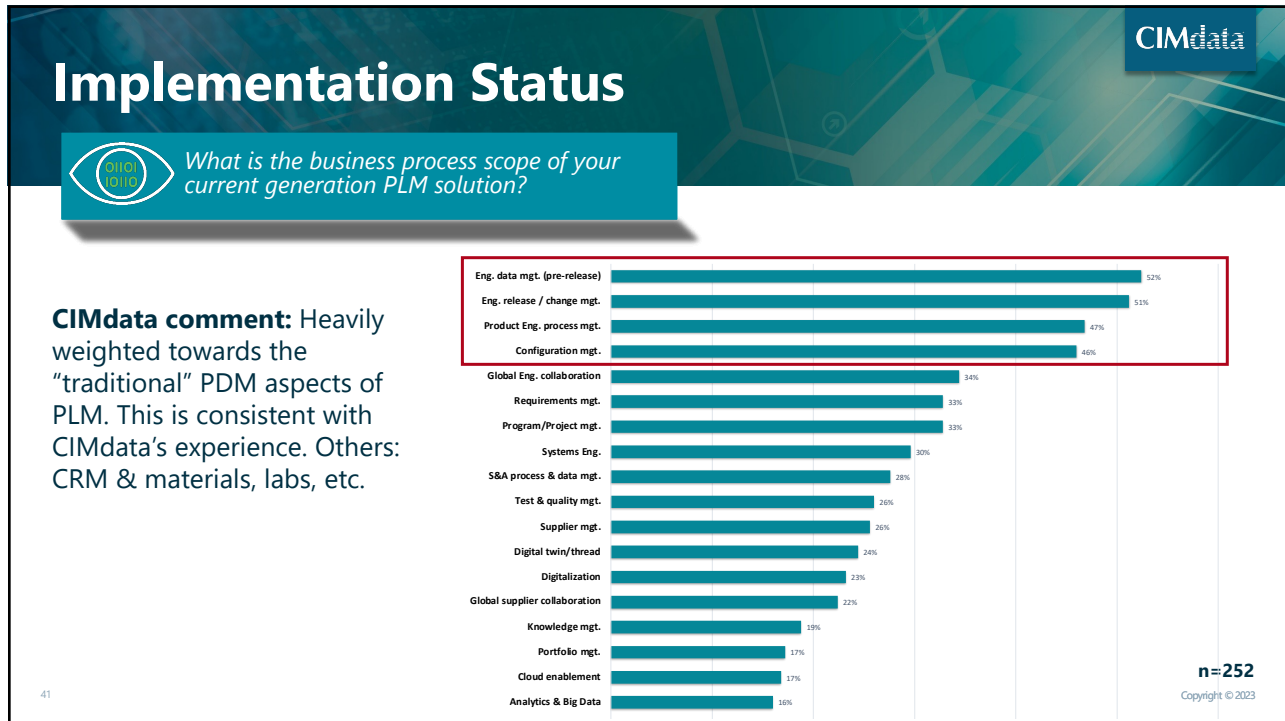
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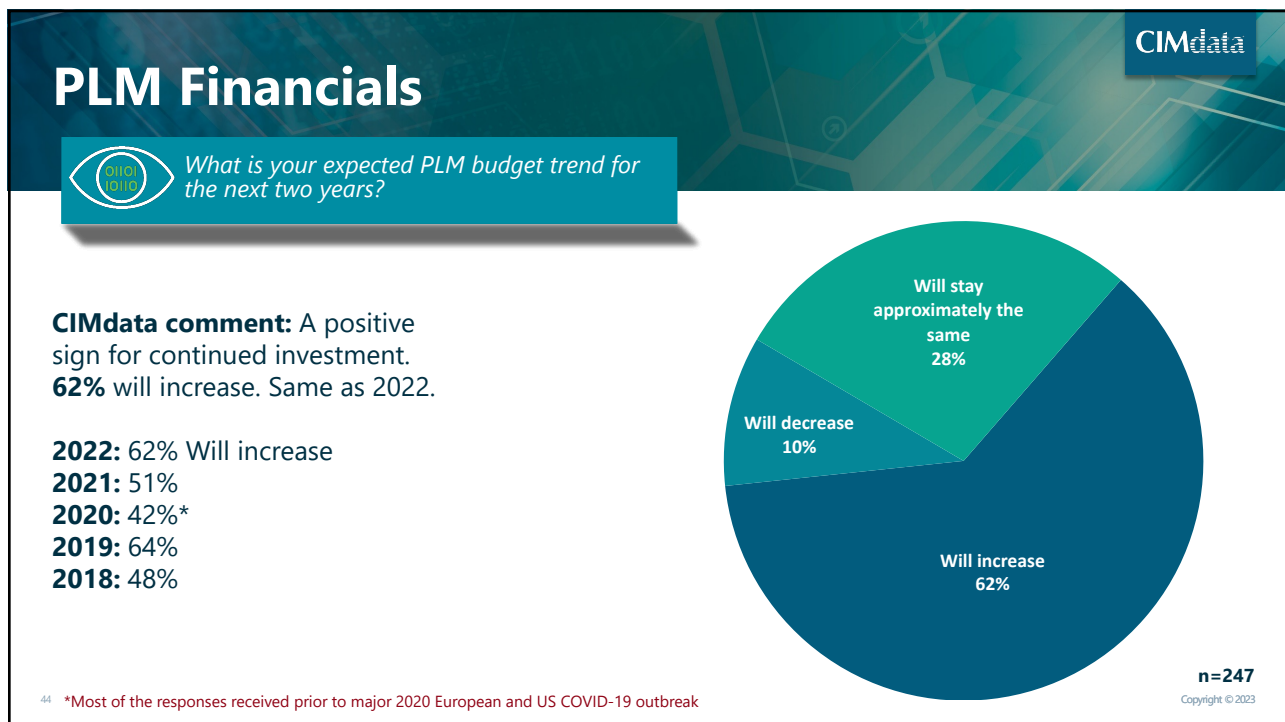
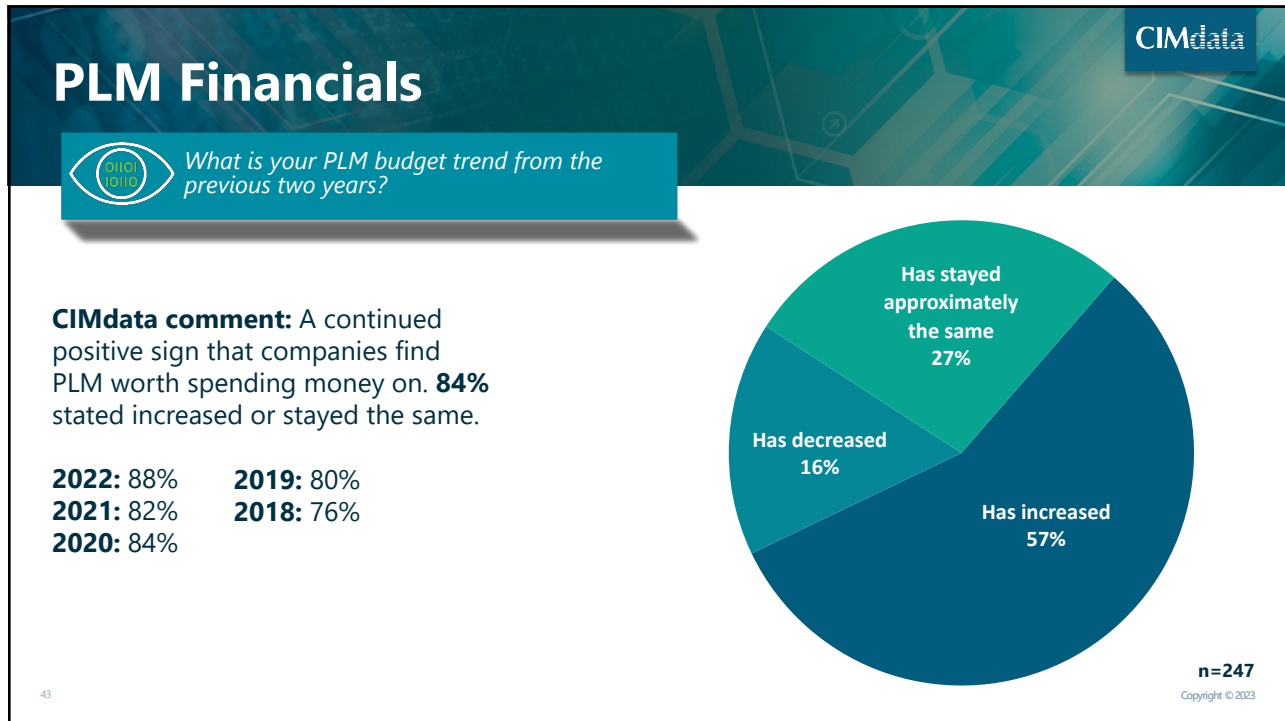
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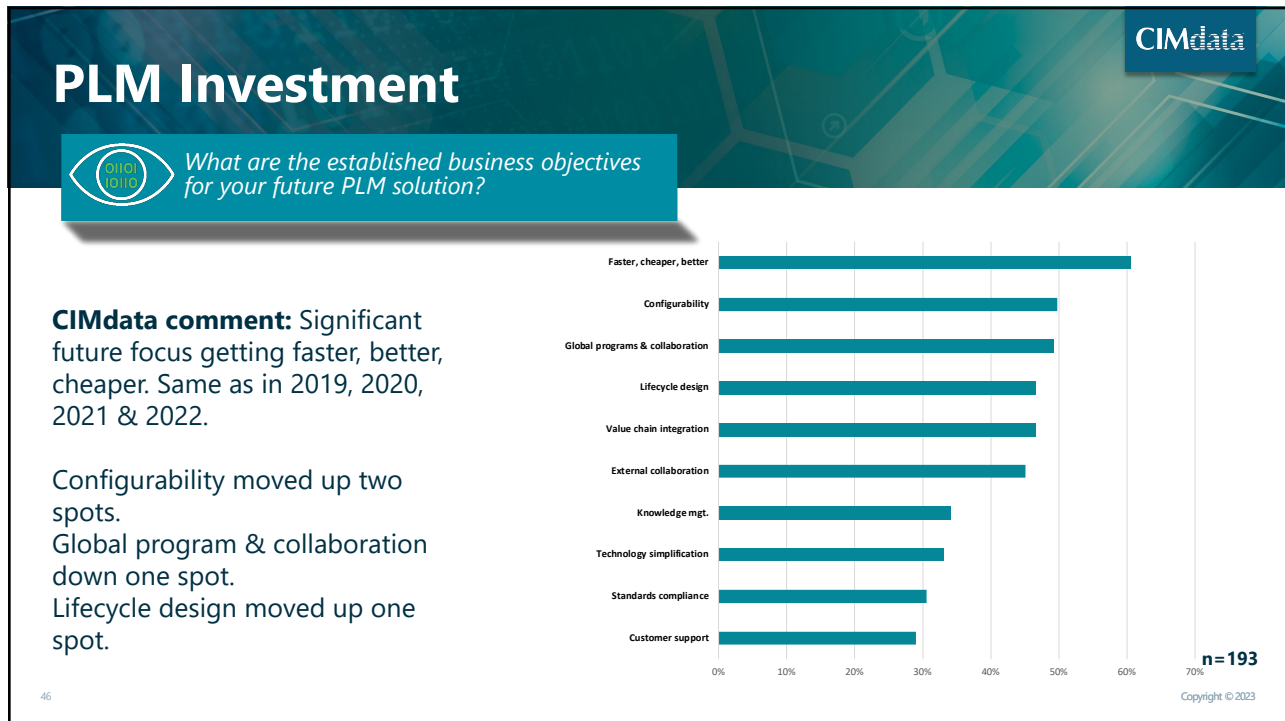
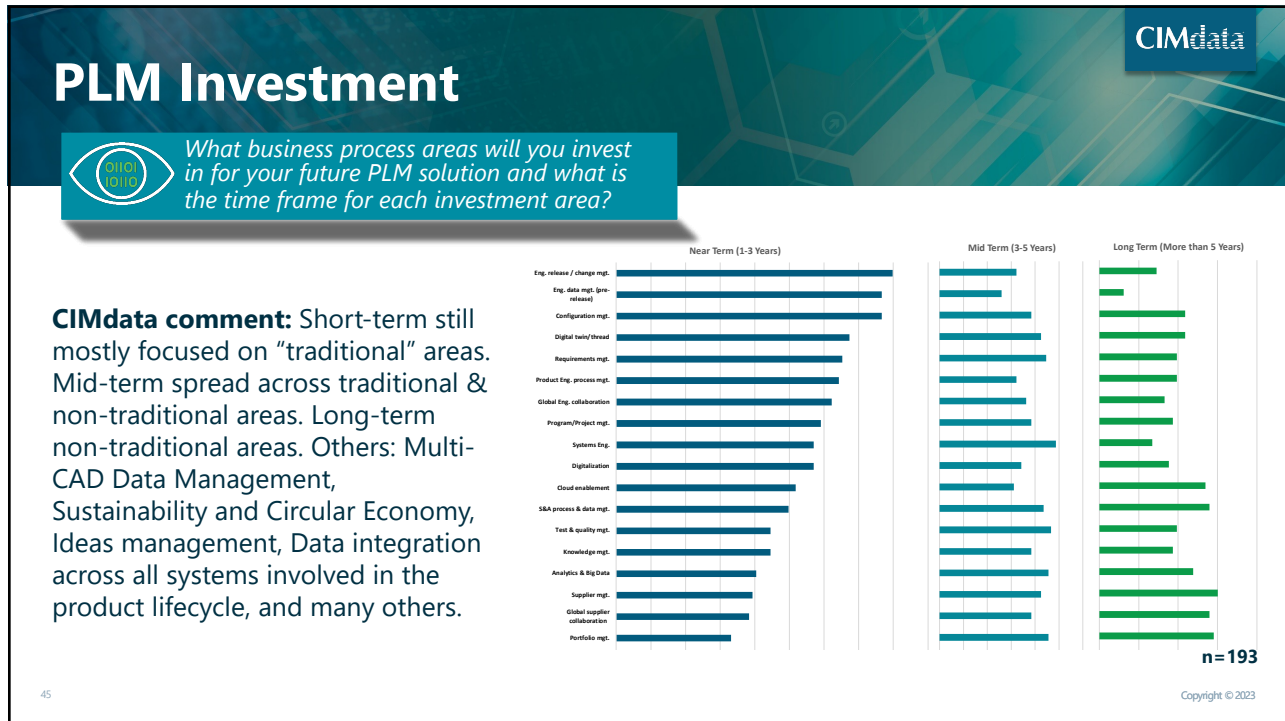
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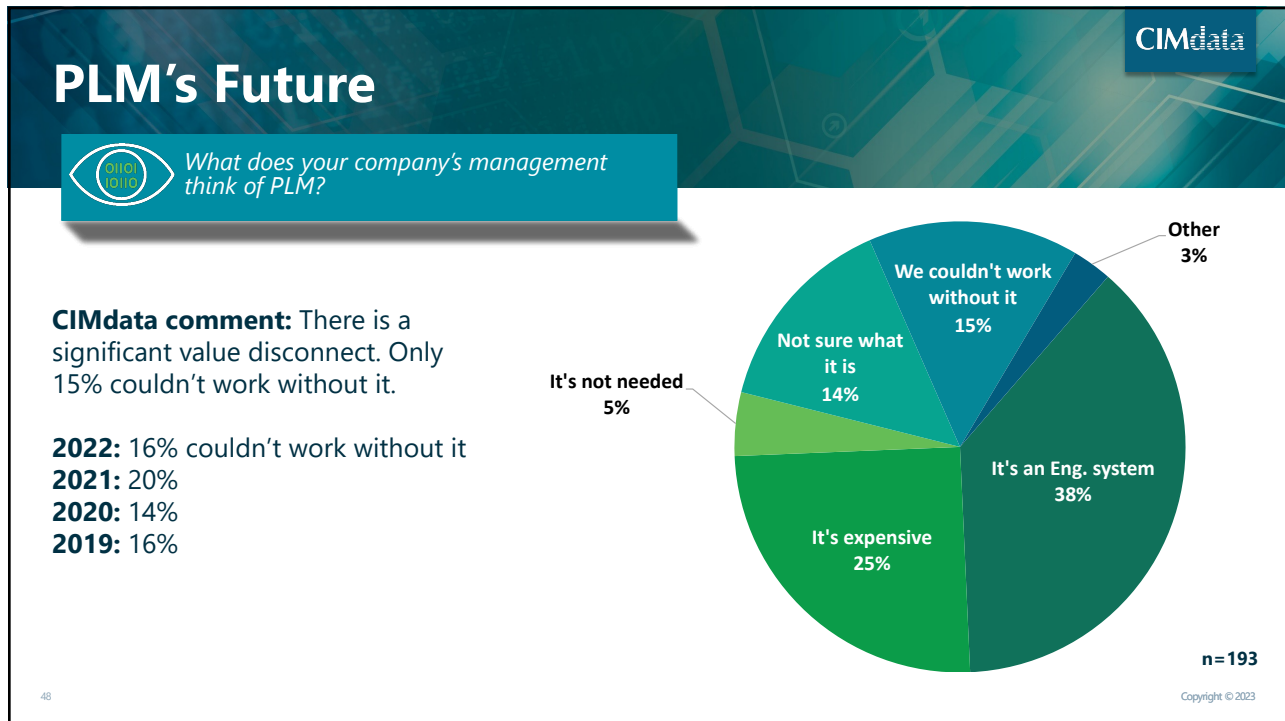
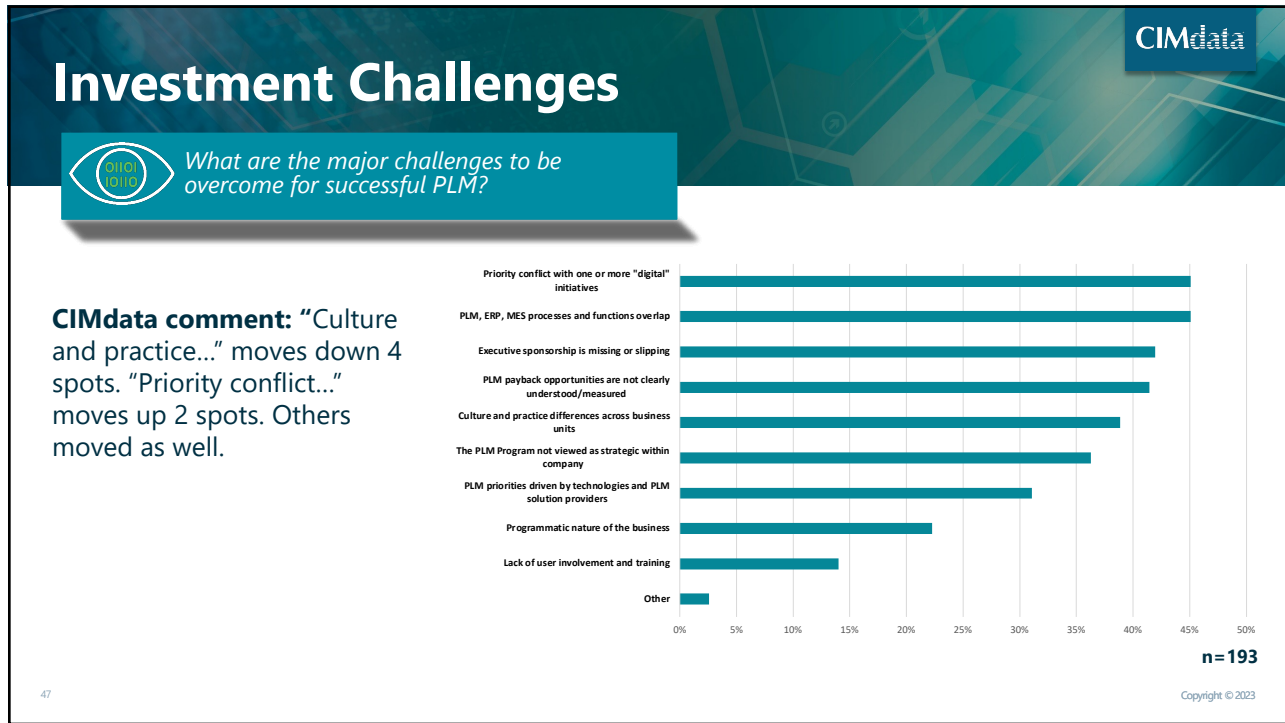
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### PLM's Future

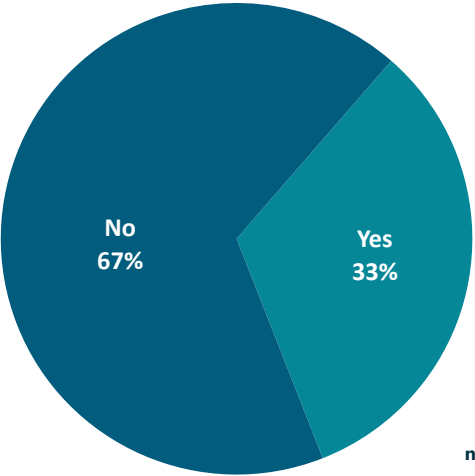


Has the term PLM run its course?

**CIMdata comment:** A significant majority still believe that the term PLM has value.


**2022:** 38% Yes  
**2021:** 31%  
**2020:** 44%  
**2019:** 52%

*Please join our webinar on May 11, 2023 for a full review of our 2023 PLM Status & Trends survey.*




n=193

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### What CIMdata Has Been Saying



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

**ARTICLE**

The Future of PLM: CIMdata Spotlights Leading CEO's



31 January 2023  
by Tom Gill

**ARTICLE**

#### How to Meet Industrial Digital Transformation Challenges With Virtual Prototyping Technologies

A CIMdata commentary on ESI's predictive, real-time, & immersive virtual testing and how it supports the democratization

31 January 2023  
by Tom Gill


**ARTICLE**

As Data Becomes Digital Threads

Feb 9, 2023  
by Mark Reising

**ARTICLE**


Digital Transformation: New Techniques and Technologies Disrupt Accumulated Expertise



**ARTICLE**

Accelerating the Transition to Green Energy with Product Lifecycle Management


Sustainability



**ALSO IN THIS ISSUE**

February 9, 2023


Nuclear | Feb 9, 2023




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## 2022 PLM Market – Overall State

 PLM market—overall growth of 8.6%

- The global PLM market fell short of CIMdata's forecast
  - Overall, the PLM market was up 8.6% to \$65.8 billion (vs. forecast of 10.1%)\*
  - cPDM sector @ \$20.7B (8.1%); solid software and services growth
  - Tools sector @ \$44.2B (8.9%); led by significant EDA growth
  - Digital Manufacturing sector @ \$893M (2.1%)
- Continued movement towards subscription
  - E.g., Autodesk & PTC finished; others, Siemens, ramping up
- Digital Transformation driving PLM investments
  - Led by major service providers, e.g., Accenture & Atos, expanding their reach
  - Major PLM players are differentiating & expanding their reach

51 \*Significant impact from exchange rate fluctuations Copyright © 2023



## Agenda

- What's New from CIMdata
- 2022: The Year in Review
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## Today's Major Trends & Potential Disruptors

A convergence of ideas, technologies, strategies, and associated complexities

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## Digital Thread

CIMdata's preferred definition

- Digital Thread refers to the communication framework that allows a connected data flow and 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**

Extracted from: [https://www.dodmantech.com/ManTechPrograms/Files/AirForce/Cleared\\_DT\\_for\\_Website.pdf](https://www.dodmantech.com/ManTechPrograms/Files/AirForce/Cleared_DT_for_Website.pdf)  
 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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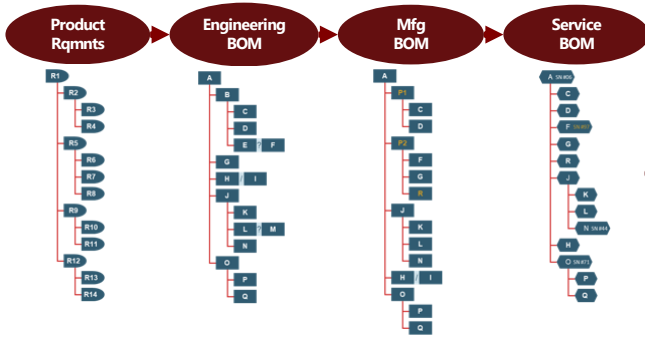
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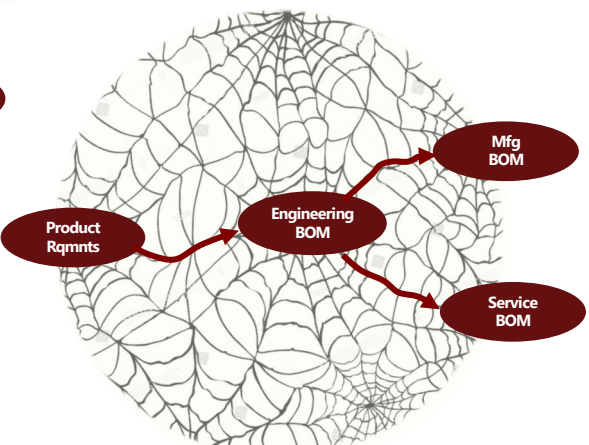
## E2E: Lifecycle Product Structures


Connections between the four principal structure configurations – Thread vs. Web


### Product Lifecycle Timeline Sequence (Thread)




### Derivative Dependencies (Web)

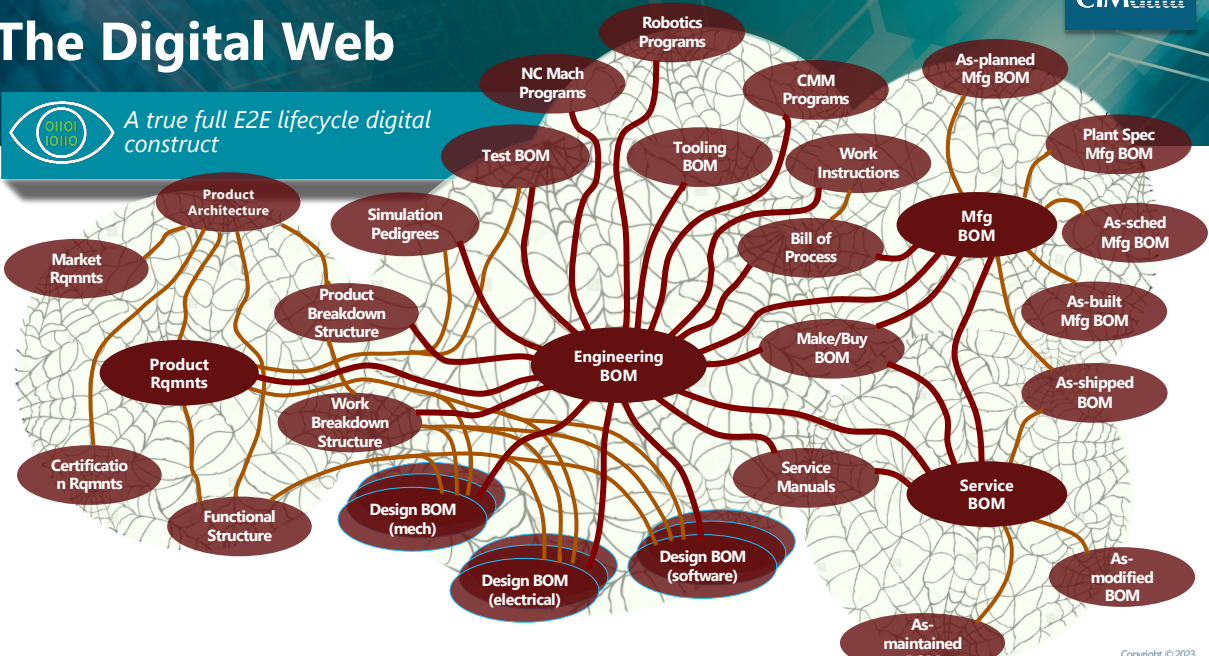


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## The Digital Web


A true full E2E lifecycle digital construct




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### Digital Twin

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


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

57 \*Adapted from input from ASSESS (see [www.assessinitiative.com](http://www.assessinitiative.com)) Copyright © 2023

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### Digital Twins


 Key characteristics

- There are multiple Digital Twins for different purposes, each have specific characteristics
  - For example, Data Analytics Digital Twins, MRO Digital Twins, Financial Digital Twins, Engineering Digital Twins, and Engineering Simulation Digital Twins
- Each Digital Twin must have a physical twin (i.e., a physical asset)
  - A virtual representation can and should exist prior to its physical twin
  - The physical asset can be a plant, a ship, infrastructure, a car, etc.
- Each Digital Twin must communication with its Physical Twin
  - It does not have to be real time or electronic


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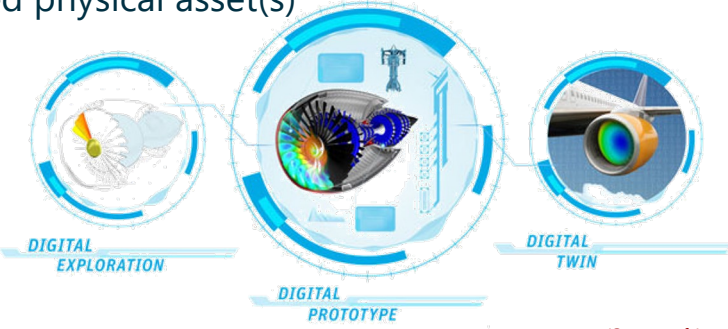
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### Engineering Simulation Digital Twin



CIMdata's preferred definition

- A **physics-based virtual representation** of a physical asset or collection of physical assets (physical twin) that allows simulations of the associated physical asset(s)




DIGITAL EXPLORATION
DIGITAL PROTOTYPE
DIGITAL TWIN

(Courtesy of Ansys) Copyright © 2023




### Creating & Maintaining the Digital Twins


Digital Twin vision cannot be achieved without a full product/process model


**Digital Twin – From Design to Operation**


**Physical Asset**



CAD Courtesy of Volvo Cars  
<http://www.ansys-blog.com/digital-twin-pump/>


**Virtual Prototype**





<https://www.digitals.dtu.dk/software/2016/04/digital-twins-structural-engineering>

**Physics-based analytics**



<https://community.plm.automation.siemens.com/t5/Tecnomatix-News/Digital-Twin-Blurring-the-lines-between-reality-and-simulation/ba-p/333483>

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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

07 Digital twin

08 IoT & PLM

09 Changing views of "product"

10 Big data & analytics

11 Data governance

12 Digital skills transformation

**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.

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### Agenda

- What's New from CIMdata
- 2022: The Year in Review
- 2023: Today's Trends & Challenges
- Looking Towards the Future
- The Digital Thread: Powering Business Transformation
- Concluding Remarks


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# State of PLM: Today's Market & Leading Trends

## 2023 Market & Industry Forum—4 April 2023



### Top Strategic Tech Trends



Gartner's Top Strategic Technology Trends

2021	2022	2023
1. <b>Internet of Behavior</b>	1. <b>Data Fabric</b>	1. <u>Digital Immune System</u>
2. <u>Total Experience</u>	2. <u>Cybersecurity Mesh</u>	2. <u>Applied Observability</u>
3. <u>Privacy-Enhancing Computation</u>	3. <u>Privacy-Enhancing Computation</u>	3. <u>AI Trust, Risk and Security Management (AI TRISM)</u>
4. <b>Distributed Cloud</b>	4. <b>Cloud-Native Platforms</b>	4. <b>Industry Cloud Platforms</b>
5. <b>Anywhere Operations</b>	5. <b>Composable Applications</b>	5. <b>Platform Engineering</b>
6. <u>Cybersecurity Mesh</u>	6. <b>Decision Intelligence</b>	6. <u>Wireless-Value Realization</u>
7. <u>Intelligent Composable Business</u>	7. <b>Hyperautomation</b>	7. <u>Superapps</u>
8. <b>AI Engineering</b>	8. <b>AI Engineering</b>	8. <u>Adaptive AI</u>
9. <b>Hyperautomation</b>	9. <u>Distributed Enterprises</u>	9. <b>Metaverse</b>
	10. <u>Total Experience</u>	10. <b>Sustainable Technology</b>
	11. <b>Autonomic Systems</b>	
	12. <b>Generative AI</b>	


<https://www.gartner.com/smarterwithgartner/gartner-top-strategic-technology-trends-for-2021/>

**Direct connection**  
Indirect/secondary connection

<https://www.gartner.com/en/information-technology/insights/top-technology-trends>

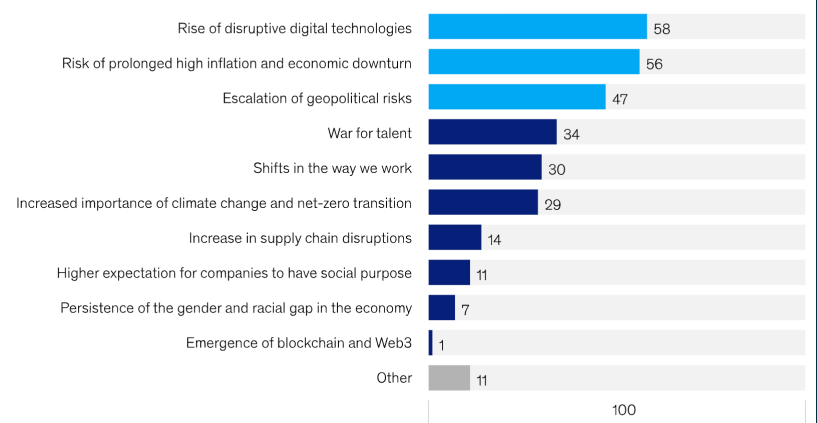
<https://www.gartner.com/en/articles/gartner-top-10-strategic-technology-trends-for-2023>

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### What CEO's Are Saying

**Trends that have the biggest impact on how CEOs are leading their organizations in 2023,<sup>1</sup>**  
% of respondents (n = 73)



Trend	% of respondents
Rise of disruptive digital technologies	58
Risk of prolonged high inflation and economic downturn	56
Escalation of geopolitical risks	47
War for talent	34
Shifts in the way we work	30
Increased importance of climate change and net-zero transition	29
Increase in supply chain disruptions	14
Higher expectation for companies to have social purpose	11
Persistence of the gender and racial gap in the economy	7
Emergence of blockchain and Web3	1
Other	11
<b>Total</b>	<b>100</b>

<sup>1</sup>Question: From your perspective as a current or former CEO, which of the following trends will have the biggest impact on how you lead/would lead your organization in 2023 and beyond, compared with past years? Respondents selected their three most important trends.  
Source: McKinsey CEO Excellence Survey

<sup>64</sup> <https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/actions-the-best-ceos-are-taking-in-2023>

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### Other Areas of Activities



*Just a few words on a few other areas of accelerated PLM-related investment*

- Enterprise platform implementations for digital thread/twin enablement
  - e.g., Aras, CONTACT, Cassini, Dassault Systèmes, PTC, and Siemens\*
- Movement to full cloud-enablement and SaaS delivery
  - e.g., Aras, Dassault Systèmes, Oracle, PTC, SAP, and Siemens\*
- Continued acquisitions (much more on this later)\*
  - ISVs continue to buy their VARs
  - Accenture slowed down from their M&A peak last year
- AI is presenting new possibilities in terms of how to do work

65 \*not an all-inclusive list.

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## This Year's Market & Industry Forum Theme



*The Digital Thread: Powering Business Transformation*

- When PLM was defined in the late 1990s, CIMdata was already promoting the notion of the bill of information (BOI)
  - An info network that fully captures the virtual product & associated processes
- Today, the phrase is “the digital thread” and it has been adopted broadly by industry, governments, and the PLM Economy
  - Unfortunately, many of actors mean quite different things by the same set of words, an all-too-common occurrence
- In this Forum, CIMdata will highlight the overall issue, and then focus on how the global PLM Economy is responding and how well their industrial clients are achieving their digital thread objectives

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## Today's Agenda



*2023 PLM Market & Industry Forum (1 of 2)*

- **The Digital Thread: Powering Business Transformation**
  - **The Promise of the Digital Thread**  
James Roche, Director, A&D Practice
  - **The Digital Thread: The Industrial Perspective**  
James Roche, Director, A&D Practice
  - **The Digital Thread: The PLM Economy Perspective**  
Stan Przybylinski, Vice President
- **Break**

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# State of PLM: Today's Market & Leading Trends

## 2023 Market & Industry Forum—4 April 2023



### Today's Agenda

 2023 PLM Market & Industry Forum (2 of 2)

- **Updates on Key Topics**
  - **The Green Energy Transition**  
Mark Reisig, Director, Sustainability & Green Energy
  - **Data Governance in the Era of Digital Transformation**  
Janie Gurley, Director, Data Governance
- **Closing Comments**

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## Concluding Remarks



State of PLM: Today's Market & Leading Trends

- 2023 – CIMdata's 40<sup>th</sup> year of defining, tracking & working in the global PLM market...we are happy to be your growth partner
- The global PLM economy is growing and continues to add value
- Multiple disconnects still exist, e.g., prioritization of digital initiatives, and managements narrow understanding of lifecycle management
- To be successful, companies need to transform people, processes and technologies—partial solutions don't get the job done
- The digital thread is really a digital web—key to true E2E traceability
- Data governance and sustainability are lifecycle issues

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## Questions & Answers



What's on your mind?



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**CIMdata** Defining What Comes Next in Digital Transformation



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