

Digital Twins: The PLM Economy Perspective

2024 Market & Industry Forum—27 March 2024

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Digital Twins: The PLM Economy Perspective
PLM Market & Industry Forum
A CIMdata PLM Leadership Event

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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.

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

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Key Takeaways



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- Software and service providers have a (mostly) high opinion of their customers digital twin status and plans
- They have a lot to offer and are likely projecting that on their “typical customer”
- Overestimating adoption but often consistent with the industrial respondents on the future
- Customers are much more pragmatic around the digital thread
- Consistent views on key technologies and constraints but not on expected benefits

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Initiated CIMdata Research



Built on previous research and knowledge of the PLM Economy offerings




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- CIMdata opened two surveys on digital twins
- One for **industrial respondents**
 - The ideal respondent is knowledgeable about digital transformation, digital thread, and digital twin activities
- One for **software and service providers** enabling digital thread and digital twin capabilities

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The PLM Economy Survey


 Targeted to software and services companies

- Repurposed many of the questions and themes from the industrial survey, asked from perspective of the software and services companies in the PLM Economy
- Respondents asked to answer for their “typical” customer
 - Do they “know” this customer?
- Want to know what the PLM Economy respondents think
- How does it line up with our industrial respondents?
 - CIMdata, ISVs, and SI/Reseller/VARs have a “pro-innovation bias”
 - Shows in the survey responses

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Respondent Demographics

 Not quite 40-40-20 either, evenly split between ISVs and SI/Reseller/VAR

2024 CIMdata Digital Twins Surveys

| Region | Percentage |
|--------------|------------|
| The Americas | 51% |
| EMEA | 34% |
| Asia-Pacific | 15% |

| Respondent Type | Percentage |
|---------------------|------------|
| SI / Reseller / VAR | 49% |
| ISV | 51% |

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Responding Companies Included

Companies represent over 25% of CIMdata's PLM market estimate

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- Capgemini
- Dassault Systèmes
- DATADVANCE
- FASOTEC
- Fujitsu
- Hexagon
- Intercax
- Modelon
- PTC
- Razorleaf
- SAP
- Siemens
- Twinsight Consulting
- Vias3D

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Model-Based Practices Adoption

Interest and adoption of the "typical" customer

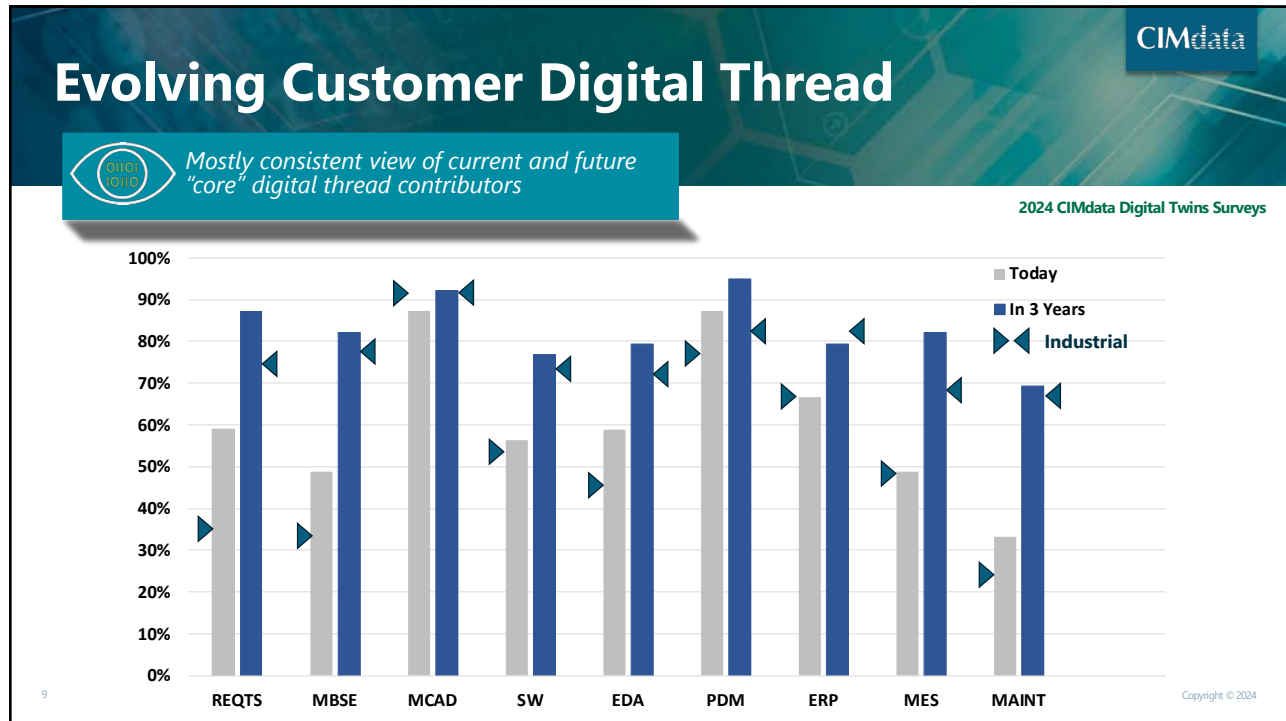
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| Practice | Not Using | Considering | Piloting | Implementing | In Production | Industrial |
|---------------------------------|-----------|-------------|----------|--------------|---------------|------------|
| Model-Based Definition | ~5% | ~10% | ~15% | ~40% | ~30% | ~40% |
| Model-Based Enterprise | ~5% | ~10% | ~25% | ~20% | ~15% | ~10% |
| Model-Based Systems Engineering | ~5% | ~10% | ~25% | ~20% | ~15% | ~15% |

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- ## CIMdata
- ### Other Digital Thread Contributors
- Typical customers digital thread – really advanced customers (1 of 4)*
- 2024 CIMdata Digital Twins Surveys
- Application Lifecycle Management (ALM)
 - Software management
 - Supply chain (inbound and outbound, sourcing)
 - CAE
 - Reliability, Availability, Maintainability and Safety (RAMS)
 - Content management systems
 - Customer Relationship Management (CRM)
 - Cameo
 - AI/ML
 - Specific AI (model as a service) service models and algorithms
 - Supply chain collaboration
 - Work instruction (authoring)
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Other Digital Thread Contributors




Typical customers digital thread – really advanced customers (2 of 4)


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- Quality and Inspection planning tools
- CAE/Simulation/SPDM
 - Manufacturing simulations
 - Engineering simulations
- Integration platforms
- Analytics and Edge
- Virtual/digital twins
- AI-enabled MBSE updates
- Model-based acquisition
- Model governance
- Network scans
- Hypervisors for cyber designs
- Digital mission engineering
- IoT & C2 Operational Systems

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Other Digital Thread Contributors



Typical customers digital thread – really advanced customers (3 of 4)

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- Manufacturing process planning
- Digital shopfloor solutions
- Disposal information
- Engineering process integration platform
- Quality control data: metrology, NDT, etc.
- Project management
- IIoT and AR
- Service Lifecycle Management
 - Asset management
 - Spare parts and planning
- Quality management
- Regulatory compliance
- Certification
- Consumer sensory data

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Other Digital Thread Contributors



Typical customers digital thread – really advanced customers (4 of 4)

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- Time series of historical operational data
- GIS
- Reduced-order / real-time physics
- Real-time rendering
- Reality capture
- Security incident and event management
- Accounting
- HR
- Supply chain planning
- Production planning
- Financial planning
- Configuration management.
- Identity and access management

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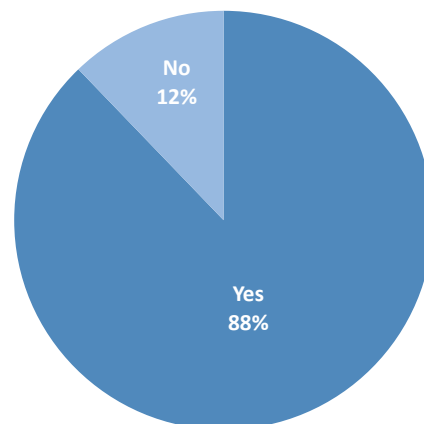
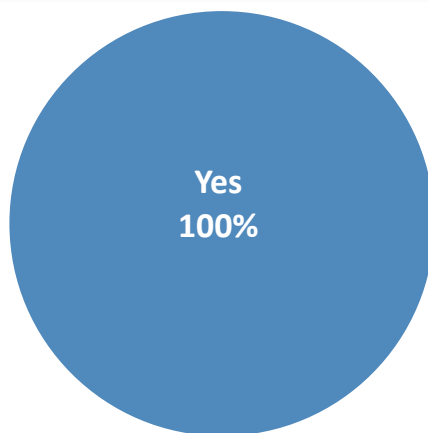
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Digital Transformation



All vs. 88% - other research suggests that most have initiatives

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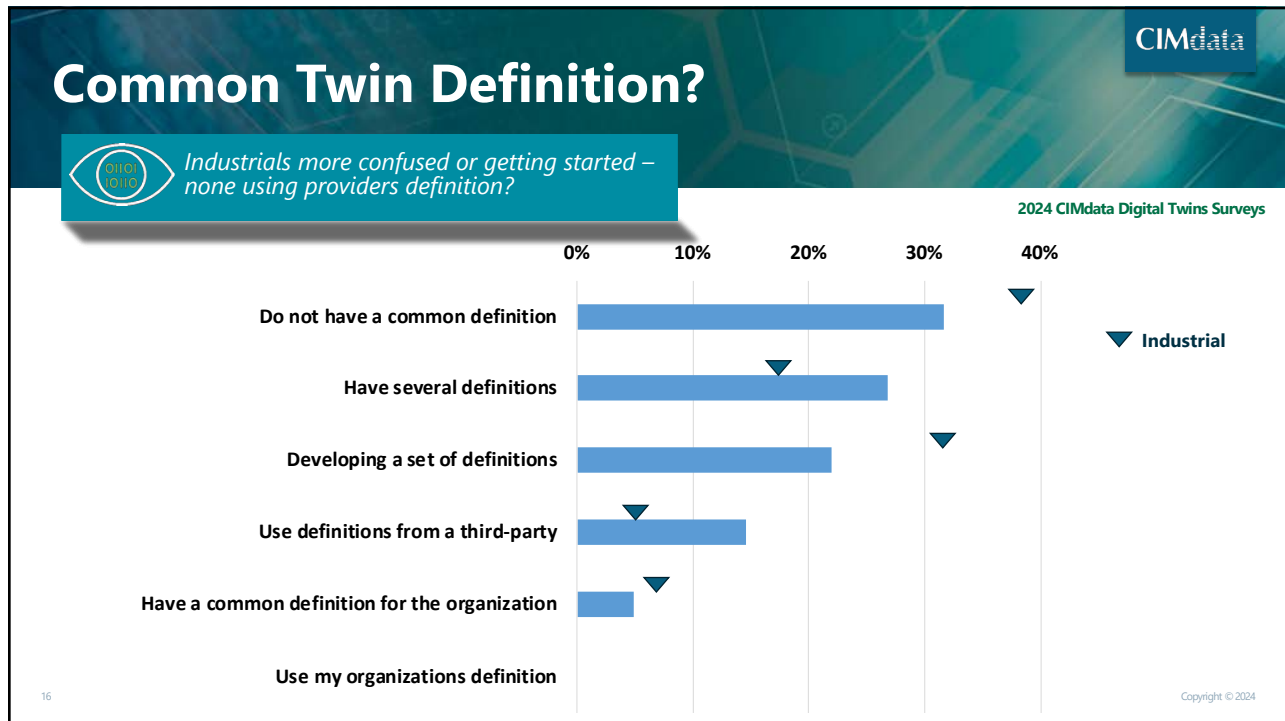
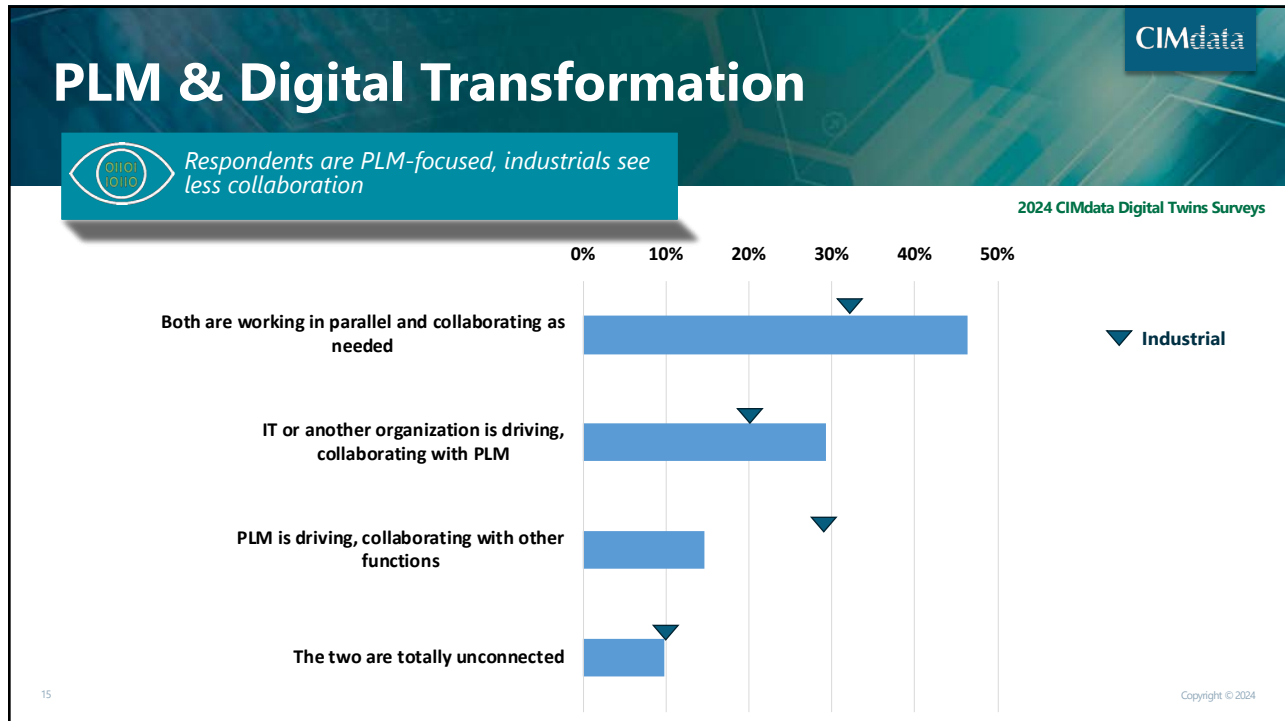


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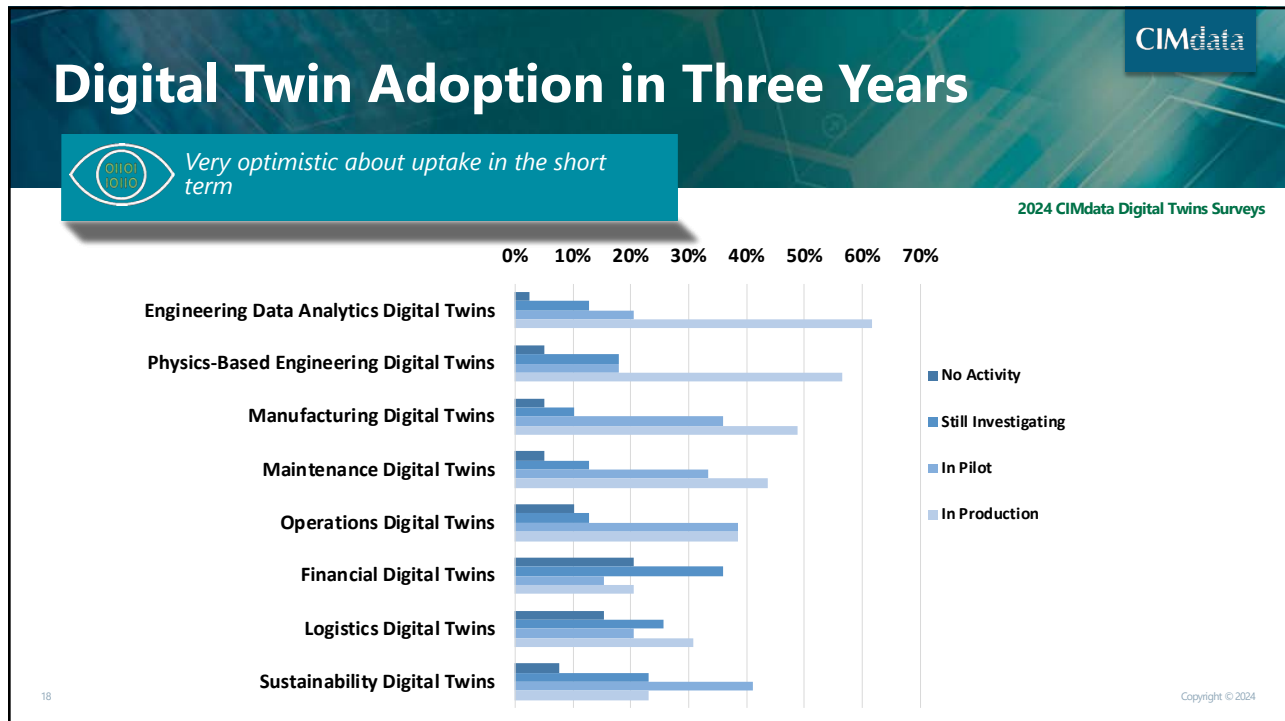
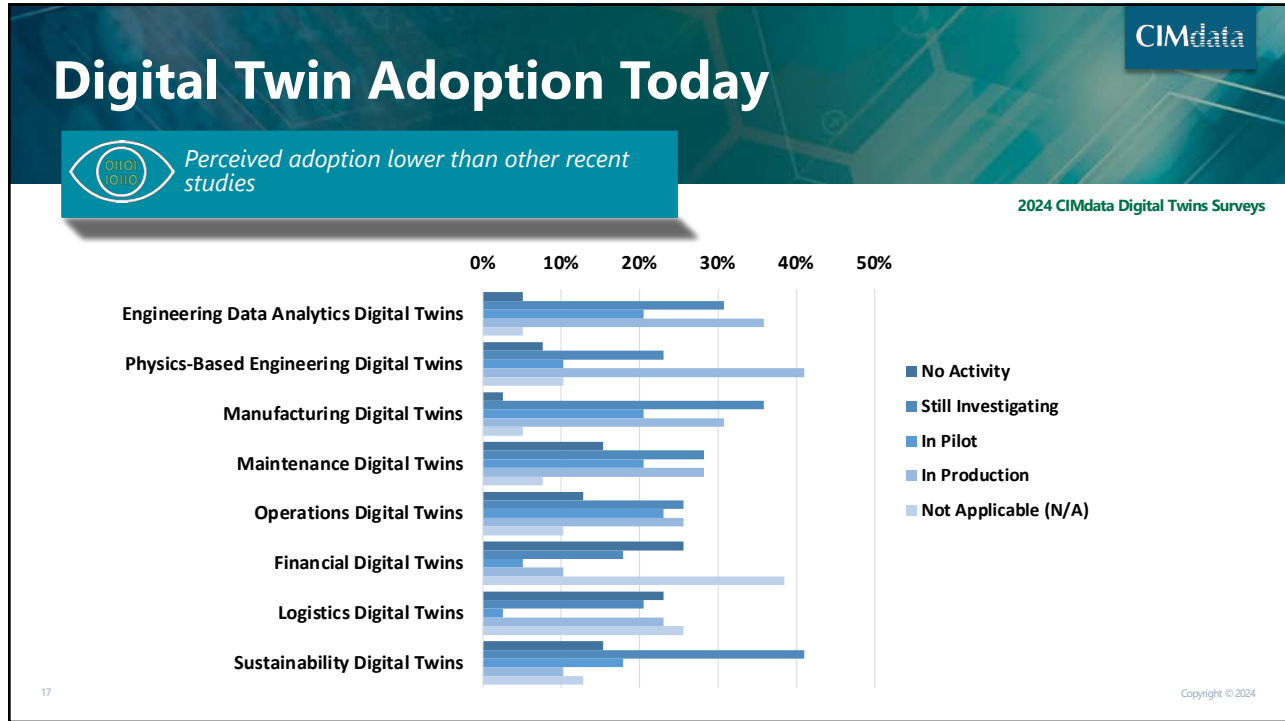
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Other Digital Twins?


Asked “important to your company AND customers” – got sales pitches


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- Virtual twin (a la DS)
- Process digital twins
- Human digital twins
- Consumer sensory profiles
- Marketing & sales digital twins
- Supply chain twin
- Systems twin
- Enterprise architecture
- Supply chain planning
- Product architecture digital twins

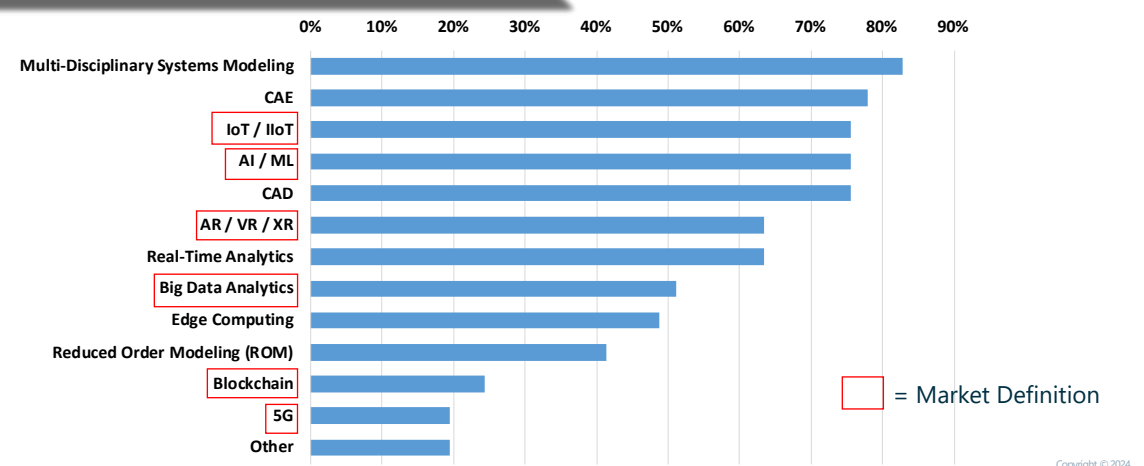
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Digital Twin-Associated Technologies


Somewhat different responses from industrial

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| Technology | Percentage |
|-------------------------------------|------------|
| Multi-Disciplinary Systems Modeling | ~85% |
| CAE | ~80% |
| IoT / IIoT | ~75% |
| AI / ML | ~75% |
| CAD | ~75% |
| AR / VR / XR | ~65% |
| Real-Time Analytics | ~65% |
| Big Data Analytics | ~55% |
| Edge Computing | ~50% |
| Reduced Order Modeling (ROM) | ~45% |
| Blockchain | ~25% |
| 5G | ~20% |
| Other | ~20% |

= Market Definition


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Differing Views on the Same Technologies




Top seven the same, just shifted – overestimated MSBE adoption earlier

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| Industrial Response | PLM Economy Response |
|--|--|
| IoT / IIoT | Multi-Disciplinary Systems Modeling |
| CAD | CAE |
| CAE | IoT / IIoT |
| AR / VR / XR | AI / ML |
| Multi-Disciplinary Systems Modeling | CAD |
| AI / ML | AR / VR / XR |
| Real-Time Analytics | Real-Time Analytics |

Bold = included in both responses

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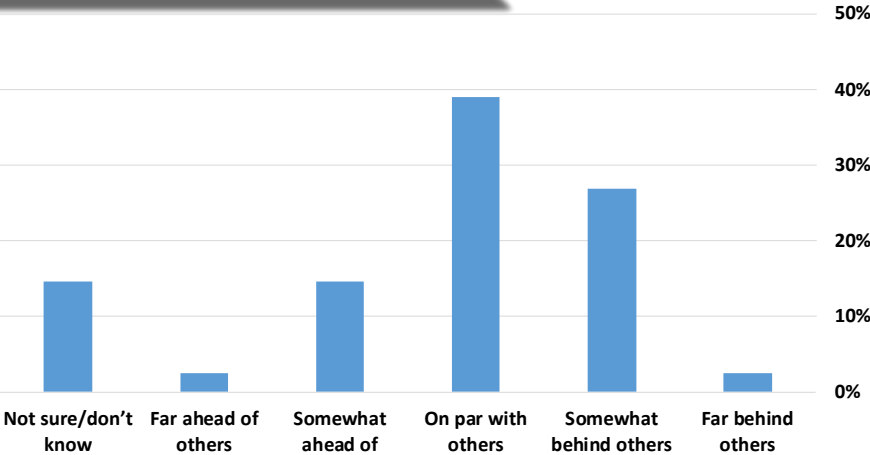


Adoption at Customers



Comparing yours to theirs – mostly a bell curve – more realistic than other responses

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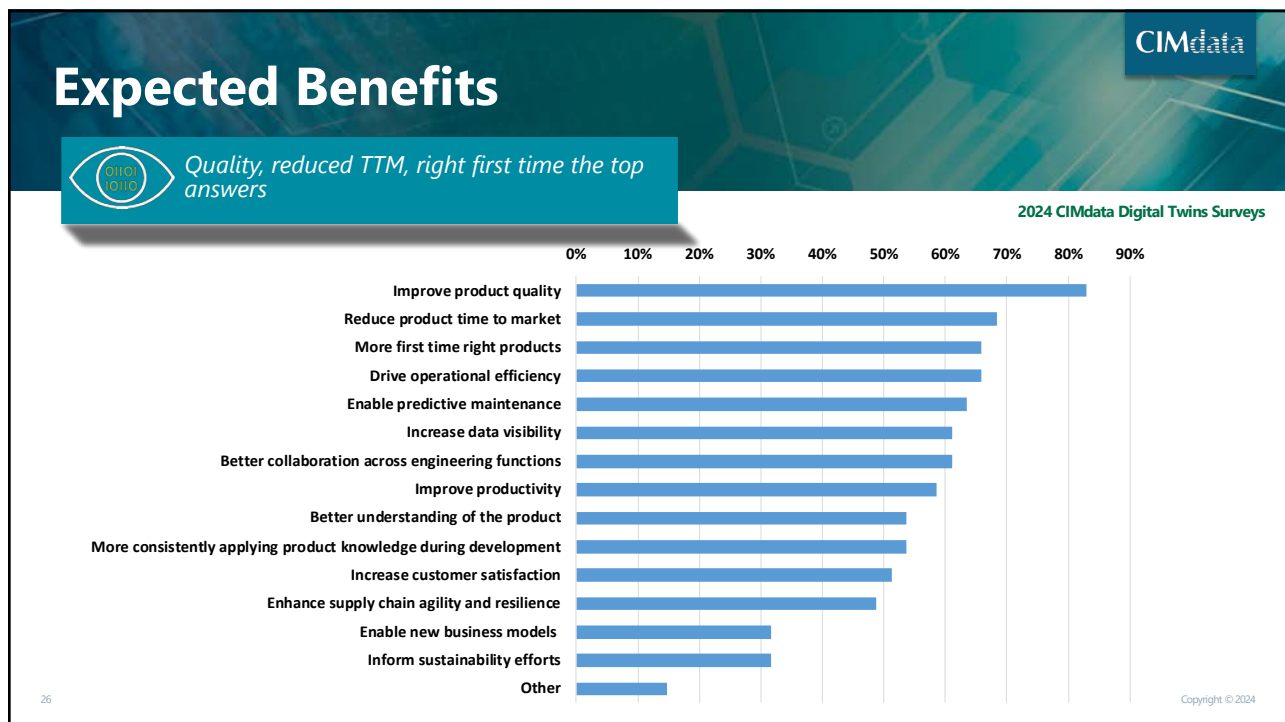
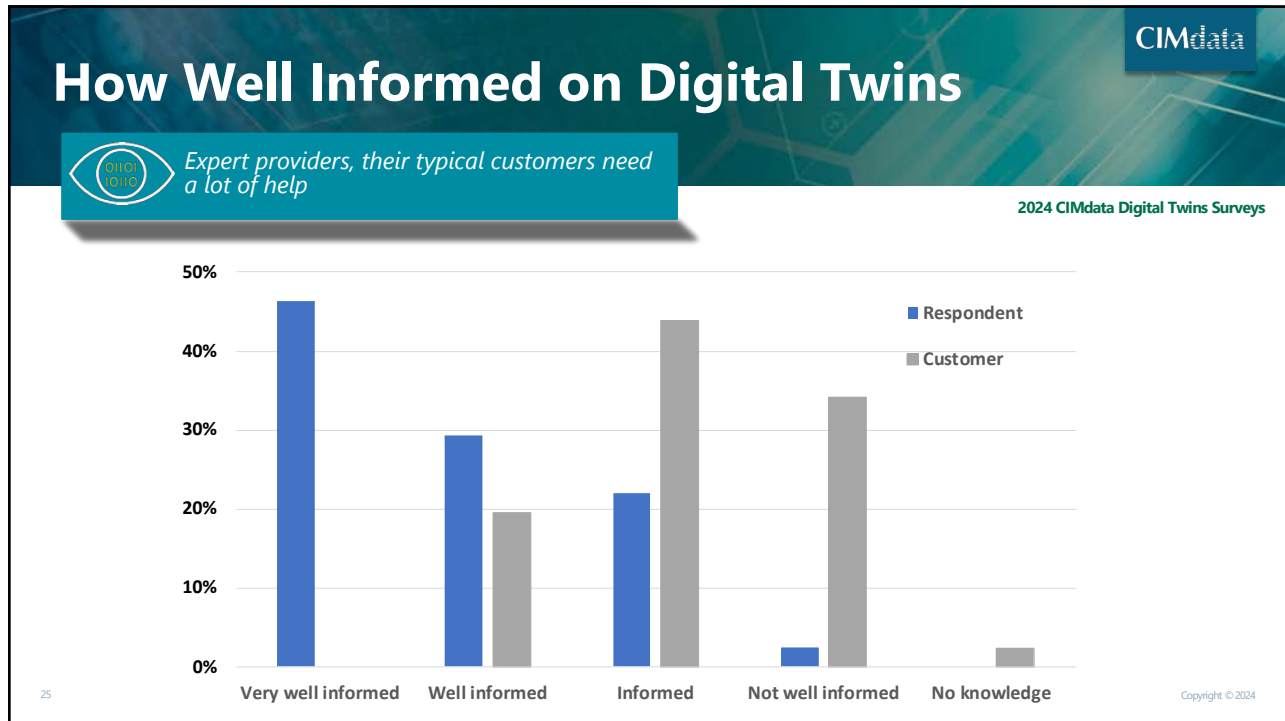


| Adoption Status | Percentage |
|--------------------------|------------|
| Not sure/don't know | 15% |
| Far ahead of others | 5% |
| Somewhat ahead of others | 18% |
| On par with others | 42% |
| Somewhat behind others | 30% |
| Far behind others | 5% |

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Differing Views on Benefits




Priorities different in each group


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| Industrial Response | PLM Economy Response |
|---|--|
| Better collaboration across engineering functions | Improve product quality |
| Better understanding of the product | Reduce product time to market |
| More consistently applying product knowledge during development | More first-time right products |
| Reduce product time to market | Drive operational efficiency |
| Improve product quality | Enable predictive maintenance |
| Increase customer satisfaction | Increase data visibility |
| Increase data visibility | Better collaboration across engineering functions |

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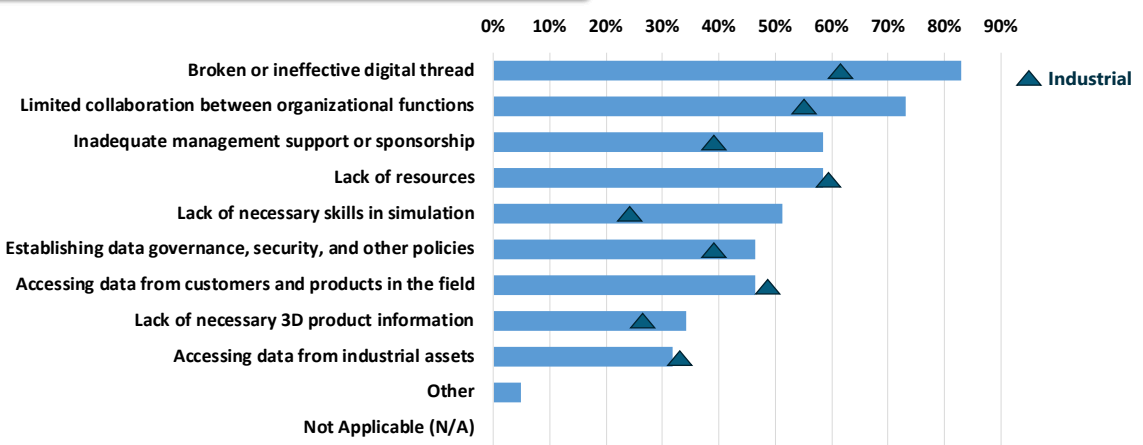


What is Holding Your Customer Back?



Digital thread, collaboration, sponsorship and resources top the list

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| Factor | Percentage | Industrial |
|--|------------|------------|
| Broken or ineffective digital thread | ~85% | ~60% |
| Limited collaboration between organizational functions | ~75% | ~55% |
| Inadequate management support or sponsorship | ~60% | ~40% |
| Lack of resources | ~55% | ~50% |
| Lack of necessary skills in simulation | ~50% | ~25% |
| Establishing data governance, security, and other policies | ~45% | ~40% |
| Accessing data from customers and products in the field | ~45% | ~55% |
| Lack of necessary 3D product information | ~35% | ~30% |
| Accessing data from industrial assets | ~35% | ~40% |
| Other | ~5% | - |
| Not Applicable (N/A) | 0% | - |

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Similar Views on Constraints



Pretty consistent understanding across the two respondent groups

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| Industrial Response | PLM Economy Response |
|---|---|
| Broken or ineffective digital thread | Broken or ineffective digital thread |
| Lack of resources | Limited collaboration between organizational functions |
| Limited collaboration between organizational functions | Inadequate management support or sponsorship |
| Accessing data from customers and products in the field | Lack of resources |
| Inadequate management support or sponsorship | Lack of necessary skills in simulation |
| Establishing data governance, security, and other policies | Establishing data governance, security, and other policies |
| Accessing data from industrial assets | Accessing data from customers and products in the field |

Bold = included in both responses

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What is the Business Opportunity?



Confirmed a lot of confusion in the market, need education and support (1 of 2)

- Both sides agree on the importance of digital twins, have lofty expectations, will need help to get there
- The PLM Economy respondents clearly see lots of digital thread opportunity, well beyond industrial responses; broken or ineffective thread a major inhibitor
- Getting better agreement on benefits could result in quality, TTM efforts at customers
- A lot of confusion and inconsistent level of knowledge in both groups

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What is the Business Opportunity?



Confirmed a lot of confusion in the market,
need education and support (2 of 2)

- No consistent definition of digital twins
- Knowledge level of managers vs. practitioners (users)
- Knowledge level of the PLM Economy vs. their customers
- Not a big surprise given the different positioning and messaging across the industry
- CIMdata is already working on several fronts to address these issues
 - Let's talk about how we can help

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Concluding Remarks



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- Software and service providers have a (mostly) high opinion of their customers digital twin status and plans
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Questions & Answers

 What's on your mind?



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To Learn More...

 Please contact me with any questions or comments

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