

# The State of PLM: An Update from the Field

## 2021 CIMdata PLM Market & Industry Forum—September 2021

### State of PLM: An Update from the Field

#### PLM Market & Industry Forum

A CIMdata PLM Leadership Event  
September 2021

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### CIMdata's Mission...

*Strategic management consulting for competitive advantage in global markets*

**CIMdata is the leading independent global strategic management consulting and research authority focused exclusively on PLM and the digital transformation it enables.**

**We are dedicated to maximizing our clients' ability to design, deliver, and support innovative products and services through the application of PLM.**

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### Key Takeaways

*State of PLM: An Update from the Field*

- The pandemic has had some very interesting impacts on manufacturing companies and their PLM needs
- There is an increasing urgency, leadership teams & corporate mgt. are demanding accelerated transformations to be ready for the next disruption
- Slow-moving organizations will not prosper—they will be blindsided by the next disruption
- Other forcing factors—beyond cost, quality, and time-to-market—will continue to evolve and exert pressure on industrial organizations
- A set of critical transformational elements, which have been born out of the recognition that transformations have been too difficult, are driving many companies to be disruptive

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### What We Were Told Regarding COVID-19's Impact

*A March 16, 2020 McKinsey article—two possible scenarios identified at that time*

**Economic impact.** Large-scale quarantines, travel restrictions, and social-distancing measures drive a sharp fall in consumer and business spending until the end of Q2, producing a recession. Although the outbreak comes under control in

most parts of the world by late in Q2, the self-reinforcing nature of the downturn kick in and prolong the slump until the end of Q3. Companies lose revenue and lay off workers, and unemployment rises. Investment contracts, and corporate bankruptcies slow down the banking and financial system.

**Economic impact.** Demand suffers as consumers cut spending throughout the year. In the most affected sectors, the number of corporate layoffs and bankruptcies rises throughout 2020, feeding a self-reinforcing downward spiral.

The financial system suffers significant distress, but a full-scale banking crisis is averted because of banks' strong capitalization and the macroprudential supervision now in place. Fiscal and monetary-policy responses prove insufficient to break the downward spiral.

The global economic impact is severe, approaching the global financial crisis of 2008–09. GDP contracts significantly in most major economies in 2020, and recovery begins only in Q2 2021.

<https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business>

*Both were wrong...*

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### What Has Been Going On...

*A lot has been written—are we at a new tipping point and what does this potentially mean for the PLM Economy?*

**The Washington Post**  
*Democracy Dies in Darkness*

**The hybrid office is here to stay. The shift could be more disruptive than the move to all-remote work.**

Citigroup, Ford, TIAA, Target: A growing number of bellwether companies are outlining their hybrid return-to-work plans

By **Jena McGregor**

March 30, 2021 at 6:00 a.m. EDT

**Raytheon to shrink office space in push for 'huge savings'**

**Salesforce says 'the 9-to-5 workday is dead' and will provide 3 new ways for employees to work — including the possibility of working from home forever**

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### Ripped from the Headlines

*A lot has been written—many haven't reached a balancing point (1 of 2)*

**The Washington Post**  
*Democracy Dies in Darkness*

**Ford gives 30,000 employees the option to work from home forever, another sign of workforce transformation**

Many workers will have a new 'hybrid option' to work both remotely and in-person, starting in July

By **Hannah Denham**

March 17, 2021 at 3:00 p.m. EDT

Technology

**Google Relaxes Work-From-Home Rules to Let More Staff Be Remote**

By **Mark Bergen**

May 5, 2021, 12:52 PM EDT

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### Ripped from the Headlines

*A lot has been written—many haven't reached a balancing point (2 of 2)*

## Google may cut pay of staff who work from home

🕒 11 August

<https://www.bbc.com/news/business-58171716>

## Facebook says employees at all levels can request permanent, full-time remote work

Published Wed, Jun 9 2021 4:49 PM EDT

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### The Future of Work After COVID-19

*The impact on industry varies widely*

# 70%

Time spent in computer-based office work could be spent remotely without losing effectiveness

**In the computer-based office work arena, 70 percent of time could be spent working remotely without losing effectiveness, compared to most other arenas, where as little as 5 to ten percent of work could be done remotely.**

*The future of work after COVID-19, McKinsey Global Institute, February 2021.*

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### Challenges Bring Opportunity

*Many have used the pandemic as an opportunity to evolve and tackle difficult issues*

Every challenge, every adversity, contains within it the seeds of opportunity and growth.

Roy Bennett - 1957-2018 - Politician

**The COVID-19 crisis has created an imperative for companies to reconfigure their operations—and an opportunity to transform them. To the extent that they do so, greater productivity will follow.**

*The next normal arrives: Trends that will define 2021—and beyond, by Kevin Sneader and Shubham Singhal, McKinsey & Company, January 2021.*

INSIGHT OF THE DAY



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### What's Next

*Digital transformation continues*



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IDEAS MADE TO MATTER | DIGITAL ECONOMY

## Digital transformation after the pandemic

by Beth Stackpole | Jul 27, 2021

*COVID-19 upended many outdated assumptions about digital transformation. Now companies should focus on these four initiatives.*

<https://mitsloan.mit.edu/ideas-made-to-matter/digital-transformation-after-pandemic>

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### Challenging Assumptions

*According to Westerman, a senior lecturer at MIT Sloan (1 of 2)*

- **Assumption: Customers value the human touch**
  - *Reality:* COVID-19 proved that a well-architected digital experience can offer an equivalent or even a more personalized transaction than an in-person engagement
- **Assumption: Regulation inhibits digital transformation**
  - *Reality:* During the pandemic, highly regulated industries...were open to addressing barriers like privacy concerns for much-needed services like telehealth visits
- **Assumption: It's prudent to be a "fast follower"**
  - *Reality:* Evaluating others' innovation efforts before taking action on your own wasn't an option during COVID-19, and isn't a good idea going forward

<https://mitsloan.mit.edu/ideas-made-to-matter/digital-transformation-after-pandemic>

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### Challenging Assumptions

*According to Westerman, a senior lecturer at MIT Sloan (2 of 2)*

- **Assumption: IT can't keep pace with digital transformation efforts**
  - *Reality:* Tech organizations across every industry stepped up to keep operations going and revenue coming through the door
- **Assumption: People won't pay full price for digital-only**
  - *Reality:* Consumers paid for digital products and services — and will continue to do so post-COVID

<https://mitsloan.mit.edu/ideas-made-to-matter/digital-transformation-after-pandemic>

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### Areas Where Companies Should Focus

*Next-generation digital initiatives*

- **Customer experience**
  - Companies are leveraging data to provide better customer experiences, whether it's an online clothing site or a brick-and-mortar retailer using a mobile apps
- **Employee experience**
  - Automation and ML can bring efficiencies to routine tasks, while other technologies like augmented reality can assist workers in ways not possible before
- **Operations**
  - Fueled by the IoT & I4.0, innovations like digital twins and ML help companies better leverage real-time data to improve operational performance & introduce new services
- **Business model transformation**
  - Organizations can seek out smaller opportunities for digital enhancement and information-based extensions

<https://mitsloan.mit.edu/ideas-made-to-matter/digital-transformation-after-pandemic>

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### Many Companies are Looking for a Balance

*Most responses will be dependent on need & company culture*



<https://www.forbes.com/sites/dedehenley/2021/06/20/working-from-home-is-here-to-stay-for-the-better/?sh=4c1923b06d5b>

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### Working from Home is Here to Stay

*Dede Henley, Forbes*

- **Design Your Organization Around Your People**

- In a Harvard Business Review article, “*How to do Hybrid Right*,” Lynda Gratton notes:
  - “Moving to an anywhere, anytime hybrid model will succeed only if it is designed with human concerns in mind, not just institutional ones.”
  - Robert Glazer writes in his book “*How to Thrive in the Virtual Workplace*”:
    - “If flexibility is becoming an increasingly desirable workplace trait, flexible and remote work is the best way to meet that need in a sustainable way.”

- **Experiment & Try New Things**

- Unlimited time off for an experimental year

- **Don't Punish People for Wanting to WFH**

- “We are moving leagues beyond the industrial revolution now. As leaders, we have the privilege of restoring dignity to our team members.”

<https://www.forbes.com/sites/dedehenley/2021/06/20/working-from-home-is-here-to-stay-for-the-better/?sh=4c1923b06d5b>

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### CIMdata Field Observations

*Some specific industrial observations (1 of 2)*

- As industrial organizations dig themselves out of the rubble of the latest disruption, long-accepted views of product development & other lifecycle phases are increasingly recognized as inadequately defined & supported
- Complexities, risks, and opportunities that have been downplayed or ignored are now being tackled on the factory floor, in the field, in the executive suite, and everywhere in between
- A massive upheaval sweeping through many organizations—one that impacts how the organization operates, prospers, and views itself, its competencies as well as its products & services

***There is increasing urgency, leadership teams and corporate management are demanding accelerated transformations to be ready for the next disruption.***

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### CIMdata Field Observations

*Some specific industrial observations (2 of 2)*

- Part of this upheaval is the rapid acceleration of the extraction of information that is trapped in paper documents or tangled in data formats that often mimic paper
  - Data access and quality issues burden almost all product development, production, and support teams
    - Liberating this data requires transforming an unfathomable amount, and variety, of data into the model-based enterprise (MBE) and its many model-based structures
- Disruptions of supply chains, component shortages, workforce skill mismatches, and the after-effects of the ever-evolving COVID-19 pandemic are turning digital transformation's long journey into a race

***Slow-moving organizations aren't likely to prosper; they will be blindsided by changes that are multiplying in every marketplace.***

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### Today's Major Forcing Factors

*Just wait a while, there will be more*

- Large and growing electronics content & software in physical products
- New manufacturing techniques & support processes
- The introduction of new materials that are lighter, stronger & more sustainable
- Mass customization, with all the latest technological features in each new offering
- Shorter product lifecycles & nonstop product & process innovation
- The Internet of Things (IoT) with its enablement of continuous marketplace feedback

***And of course, cost, quality, and time-to-market.***

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### To Be Successful

*The need to focus on the appropriate people, processes, and technological transformational elements*

- Today's complex and continually changing marketplace requirements demand up-front, cross-domain connectivity
  - With the appropriate and easily accessible model-based data constructs
  - Organizations run on data—all products & services are just a result of data
- This complexity can only be tackled with cross-functional efforts to root out the unknowns and then nail down wise solutions that are optimized from a complete systems of systems perspective

*CIMdata's "critical dozen" have been born out of the recognition that transformations have been too difficult primarily because so many don't concentrate their productive efforts on the right transformational elements.*

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### Hot Topics: The Critical Dozen

*12 key enabling elements of a digital transformation that you can't and/or shouldn't live without*

1. End-to-End Connectivity
2. Data & Process Management
3. Ensure All Data is Under Configuration Management Control
4. Bill Of Information
5. Model-Based Structures
6. Digital Thread
7. Digital Twin
8. IoT & Product Lifecycle Management
9. A Changed View of "Product"
10. Big Data & Analytics
11. Data Governance
12. Digital Skills Transformation

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### Model-Based Enterprise Maturity Model

*Seven levels of MBE as defined by the Next-Generation Model-Based Enterprise Maturity Index*

Drawing-Centric	Model-Centric	Validated Model-Centric	Formalized Model-Based Definition	Trusted Model-Based Definition	Integrated Model-Based Enterprise	Extended Model-Based Enterprise
Level 0	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
<ul style="list-style-type: none"> <li>2D Static Drawings Only</li> <li>Models ad-hoc</li> <li>Models not managed</li> <li>Disconnected manufacturing / disconnect enterprise</li> </ul>	<ul style="list-style-type: none"> <li>3D models create 2D drawings</li> <li>STEP AP203 derivative</li> <li>CAX STEP &amp; 2D drawings</li> <li>Models may be managed</li> </ul>	<ul style="list-style-type: none"> <li>3D models create drawings &amp; derivatives</li> <li>Model checked and derivative compared &amp; managed</li> <li>Certificate of model quality</li> <li>CAX derivatives w/2D drawings</li> <li>Model images</li> </ul>	<ul style="list-style-type: none"> <li>Model-based definition (3D PMI, metadata)</li> <li>3d interactive viewable</li> <li>3D technical data packages</li> <li>Lightweight viewing</li> <li>MB animation</li> <li>MBD, derivative &amp; CAX managed</li> </ul>	<ul style="list-style-type: none"> <li>Model-based definition</li> <li>Digital manufacturing certificate</li> <li>LOTAR</li> <li>3DIV, 3D TDP, TDP deployed from PLM</li> <li>TDPs used</li> <li>Integrated mfg.</li> </ul>	<ul style="list-style-type: none"> <li>Model-based Enterprise</li> <li>Model-based definition w/product characteristics</li> <li>Auto MBD/TDP deployment to internal operation</li> <li>LOTAR+</li> <li>Integrated mfg.</li> </ul>	<ul style="list-style-type: none"> <li>Model-based Enterprise</li> <li>Model-based definition w/product requirements</li> <li>Authenticated digital exchange</li> <li>Auto MBD/TDP deployment to external operation</li> <li>Integrated mfg.</li> </ul>
<b>File-Sharing</b>	<b>Doc-Centric PDM</b>	<b>Doc-Centric PDM</b>	<b>Part-Centric PLM</b>	<b>Part-Centric PLM</b>	<b>Digitally "1" PLM</b>	<b>Extended PLM</b>
<i>2D Drawings Authorized</i>	<i>2D Drawings Authorized</i>	<i>2D Drawings Authorized</i>	<i>2D Drawings Authorized</i>	<i>3D Model Authorized</i>	<i>3D Model Authorized</i>	<i>3D Model Authorized</i>
<i>Design Activities</i>						
<i>Product Data Management Activities</i>						
<i>Manufacturing Activities</i>						
<i>Quality Activities</i>						
<i>Enterprise Enabling Activities</i>						

From the Proceedings of the 11<sup>th</sup> Model-Based Enterprise Summit (MBE 2020); April 2020.

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### The Future of Work After COVID-19

*The post-pandemic economy—what will it look like*

Trends accelerated by COVID-19

- Remote work**  
20–25% of workers in advanced economies could work remotely 3+ days a week on a long-term basis
- Digitization**  
2–5x growth in e-commerce, as a surge in digital platforms is underway
- Automation**  
Uptick in use of robotics, robotic process automation, and AI

Work arenas with high physical proximity were most disrupted short term during COVID-19, and some will see enduring effects.

- Remote work
- Digitalization
- Automation
- All three are friends of PLM

**COVID-19 has accelerated digitization, e-commerce, and automation**

The future of work after COVID-19, McKinsey Global Institute, February 2021.

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### Manufacturers Seek to be Disruption-Proof

*This is what companies are striving to do (1 of 4)*



- Getting it right can be the difference in making or losing money
- Supply chain is brittle; disruptions are everywhere, and it isn't just because of the pandemic
- Can't afford to miss a delivery because you don't have the right stock in house

Navigating disruption

**Solving forecasting challenges could be critical in navigating the disruption**

"Manufacturers seek to be disruption-proof," 2021 Manufacturing Industry Outlook, Deloitte, 2021.

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### Manufacturers Seek to be Disruption-Proof

*This is what companies are striving to do (2 of 4)*



- Digital twins of:
  - Products
  - Processes
  - Production environments
- These allow companies prepare and adjust quickly to future unknown events like the pandemic

Digital investment

**Digital twins could support new levels of resilience and flexibility**

"Manufacturers seek to be disruption-proof," 2021 Manufacturing Industry Outlook, Deloitte, 2021.

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### Manufacturers Seek to be Disruption-Proof

*This is what companies are striving to do (3 of 4)*



Supply chain resilience

**Manufacturers may expand their options to reduce exposure to trade and other disruptions**

"Manufacturers seek to be disruption-proof," 2021 Manufacturing Industry Outlook, Deloitte, 2021.

- Companies must build agility into their supply chains
- A single source approach can be dangerous
- Must be strategic and look not just at cost & quality, but also at availability

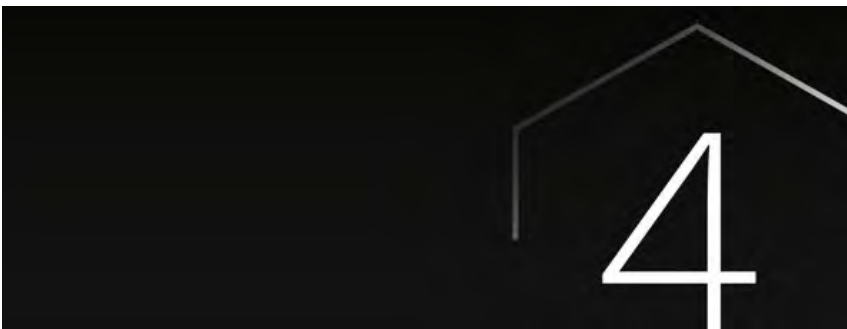
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### Manufacturers Seek to be Disruption-Proof

*This is what companies are striving to do (4 of 4)*



Adapting to the new workplace

**Disruption increases the need for greater workforce agility**

"Manufacturers seek to be disruption-proof," 2021 Manufacturing Industry Outlook, Deloitte, 2021.

- Need to develop a talent ecosystem—a dynamic network of external partners that can help bolster the talent pipeline

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### Concluding Remarks

*State of PLM: An Update from the Field*

- The pandemic has had some very interesting impacts on manufacturing companies and their PLM needs—PLM is more critical than ever
- We can't deny the increasing urgency, leadership teams & corporate mgt. are demanding their transformations to be ready for the next disruption—need to be disruption-proof
- Slow-moving organizations will not prosper—they will be blindsided by changes that are multiplying in every marketplace
- Other forcing factors, beyond cost, quality, and time-to-market will continue to evolve and exert pressure on industrial organizations
- The “critical dozen” transformational elements are driving many companies to be disruptive

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### Q&A

*Let's hear what's on your mind?*



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