

2020 Market Analysis Results

CIMdata PLM Market & Industry Forum

2020 Market Analysis Results

PLM Market & Industry Forum

A CIMdata PLM Leadership Event

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Our 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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2

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Purpose of this Presentation

A CIMdata disclaimer

- Deliver an overview of CIMdata's analysis of the PLM market for calendar year 2019
- Present our estimates of direct provider revenues by various categories
- Provide insight into investment changes, trends and market leaders
- Obtain provider input as to the PLM analytics they would like CIMdata to develop
- A detailed analysis of this research will be provided in CIMdata's 2020 PLM Market Analysis Report series
- All information represent CIMdata's estimates of revenues and investments

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Important Notes

How CIMdata prepares the global MAR data

- CIMdata's estimates are for calendar year 2020 and may differ from a provider's fiscal year reported financials
- The relative strength of different currencies can impact growth estimates – all estimates are based on the yearly average for conversion of a currency to US dollars
- All estimates are net of royalties to eliminate any double counting of revenues
 - The royalty paid by a reseller is deducted from their revenue estimate and included within the direct revenues of the appropriate provider's estimate
- There are many acquisitions in some segments that could affect some numbers in 2019
 - We will note those during the presentation

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Research Methodology Overview

How CIMdata gathers PLM market data each year

- Gather data through multiple means
 - Nearly 550 companies get survey workbooks via email
 - Repeated reminders increase response rate
 - Approximately 30 of the world's largest PLM companies interviewed each year
 - Often multiple times to get more insights
 - Separate research conducted in China and Japan
 - Public reporting and other market research used for data collection and cross-check, e.g., Electronic System Design Alliance (formerly EDA Consortium)
 - CIMdata global contacts used as "sanity checks" on anomalous inputs
- Total of approximately 700 companies "touched" by CIMdata process



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Currency Fluctuations Important

More balanced than recent years

Currency	2018	2019	YoY Change
Euro To US Dollar	1.18063	1.1198	-5.43%
Pound To US Dollar	1.333	1.287	-3.57%
Japanese Yen To US Dollar	0.0090549	0.00891	-1.63%
Swiss Franc To US Dollar	1.0225	1.015	-0.74%
Chinese Yuan To US Dollar	0.15673	0.148	-5.90%
Korean Won To US Dollar	0.0008929	0.000884	-1.01%
Swedish Krona To US Dollar	0.115	0.10575	-8.75%
Brazilian Real To US Dollar	0.227739	0.25354	10.18%
Indian Rupee To US Dollar	0.014669	0.0142	-3.30%
Australian Dollar To US Dollar	0.72046	0.6949	-3.68%
Norwegian Krone To US Dollar	0.12118	0.11364	-6.63%



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Acquisitions in 2019

Some big, many tuck-ins but still at a high rate (1 of 5)

- Autodesk acquired BuildingConnected, digital construction network now at core of the Autodesk Construction Cloud
- CONTACT adds ISKO engineers AG (V&V)
- Dassault Systèmes adds elecworks (ECAD) and Medidata
- PTC acquired Onshape
- SAP acquired Qualtrics (XM)
- Siemens Digital Industries Software (4) adds Saab Medav Technologies GmbH (NVH), Atlas 3D (DMLS), MultiMechanics (FEM), ESTEQ (Safr VAR)

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Acquisitions in 2019

Some big, many tuck-ins but still at a high rate (2 of 5)

- Lectra adds Retviews (fashion benchmarking)
- OpenText acquires Carbonite (cloud data mgmt)
- PROSTEP bought out Bartscher & Hasenäcker Consulting GmbH (PLM in EDA/ALM)
- Cadence acquired AWR Corporation (hi-freq RF)
- Synopsys added Qtronic GmbH (auto sim/test), eSilicon IP, DINI (FPGA boards)
- Zuken bought Vitech Corporation (MBSE)

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Acquisitions in 2019

Some big, many tuck-ins but still at a high rate (3 of 5)

- Accenture still very active (15), emphasis on IoT, analytics/AI (Analytics8, Clarity Insights, Knowledgegent, Pragsis Bidoop), regional focused SIs, bolstering Industry X.0 (Enterprise System Partners, Zielpuls)
- Atos with Idnomic (digital ID), X-PERION AG (energy IT)
- Capgemini added Altran (eng svcs) and KONEXUS Consulting (German energy)
- Cognizant adds Zenith Technologies (IE life sci)
- DXC Technology added Luxoft (dig strat/eng svcs), Bluleader (CX), and Virtual Clarity (IT Cloud)
- HCL added selected IBM products (inc. Notes), new HCL Software division

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Acquisitions in 2019

Some big, many tuck-ins but still at a high rate (4 of 5)

- HPE with MapR (AI/analytics)
- TechMahindra bought stake in Vitaran Electronics and Infotek Software and Systems (RFID)
- Wipro acquired International TechneGroup Incorporated

- Altair with SEAM (high-freq NV) and DEM Solutions (bulk matl)
- Ansys (5) with Helic (emag), Granta Design, DfR Solutions (reliability), LSTC (LS-Dyna), Dynardo (PIDO)

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Acquisitions in 2019

Some big, many tuck-ins but still at a high rate (5 of 5)

- AspenTech with Mnubo (AI/analytics)
- Bentley Systems added SignCAD Systems and Keynetix (UK cloud geo viz)
- Hexagon (5) with Etalon (mfg quality data), AMendate (AM sim), Melown Technologies (landscape viz), Volume Graphics (ind CT), Thermopylae (geosp)
- Rockwell Automation adds Emulate3D (Ind auto sim)
- Schneider Electric adds AutoGrid (AI/ML)
- Trimble added Cityworks (dig asset mgmt), Cansel Survey Equipment and iBase networks (VRS networks – hi accuracy GPS)

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Changes in Market Sample

Looking to cover more and more of the overall PLM market

- None of the acquisitions will affect the overall market results
 - Of course, acquisitions will affect the results of individual companies
 - E.g., Dassault Systèmes acquisition of Medidata added US\$133 million that was not previously part of our PLM definition
 - Compensate for acquisitions by adjusting un-allocated revenues
- Will follow up in next year's process to see if any of the acquisitions are contributing to their PLM business
- Beyond acquisitions, in any given year we may add a number of companies
- For 2019, there were no major additions that affect the reported results

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- PLM Market Analysis
- Overall cPDM Market Analysis
- PLM Provider Analysis
- Provider Sector Analysis
- Concluding Remarks

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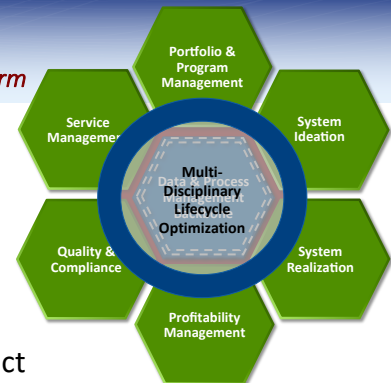
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PLM – CIMdata's Definition

Digital transformation of the lifecycle—enabled by a product innovation platform

- Strategic business approach
 - **NOT** just technologies
 - Consistent set of business solutions
- Collaborative creation, use, management & dissemination of product related *intellectual assets*
 - All product/plant definition information – the virtual product
 - AEC, MCAD, EDA, ALM, SE, requirements, simulations, analytics, portfolio, formulas...
 - All product/plant process definitions – the virtual processes
 - Processes that plan, design, produce, operate, support, decommission, recycle...
- An innovation platform that supports the extended enterprise
- Spans the full lifecycle, from idea/concept through life



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PLM Market Categories

Three major segments comprise the PLM Market

- collaborative Product Definition management
 - Applications and solutions to capture, manage, disseminate, visualize and collaborate on product related intellectual (digital/virtual) information, including related processes
- Tools
 - Application that are used to create intellectual assets
 - Authoring, analysis, modeling, simulation and documentation of product and plant/facility information
- Digital Manufacturing
 - Process planning, resource definition, factory floor layout and product flow simulation and analysis (including ergonomics)

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Overall PLM Results

Growth in 2019

- Overall PLM growth (7.6%) below forecast (8.9%)
 - All segments grew
 - MCAD-MD struggled
- Autodesk and PTC largely complete their license model transition, will others follow?
- Continued industry consolidation, new entrants, investor interest and action
 - 95 acquisitions in 2015, 74 in 2016, 135 in 2017, 123 in 2018, and 106 in 2019
 - SI/Reseller/VAR the most active segment, led by Accenture (again)
 - Major PLM players trying to differentiate, expand reach

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2019 Market Results

Results by segment (US\$ Millions) mostly positive

Segment	2019 Revenues	YoY Growth
cPDM Comprehensive Technology Providers	\$6,656.5	7.3%
cPDM-Focused Applications	\$2,566.3	6.8%
Digital Manufacturing	\$886.5	8.6%
SI/Reseller/VAR	\$8,196.9	7.3%
Tools		
MCAD-Multi Discipline	\$3,927.3	0.7%
MCAD-Design Focused	\$3,515.2	8.6%
Non-Bundled CAM	\$1,565.6	4.5%
Simulation & Analysis	\$7,076.6	9.5%
Other Tools (e.g., ALM)	\$1,669.5	11.2%
EDA	\$10,342.3	4.7%
AEC	\$5,027.6	17.7%
Total	\$51,430.2	7.57%

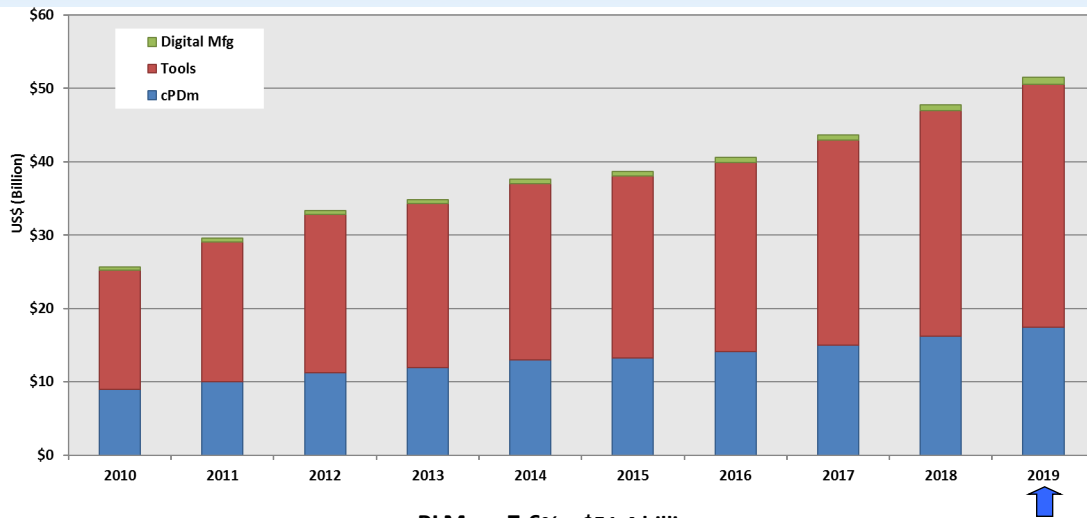
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PLM Market Investment

Spend increased during 2019



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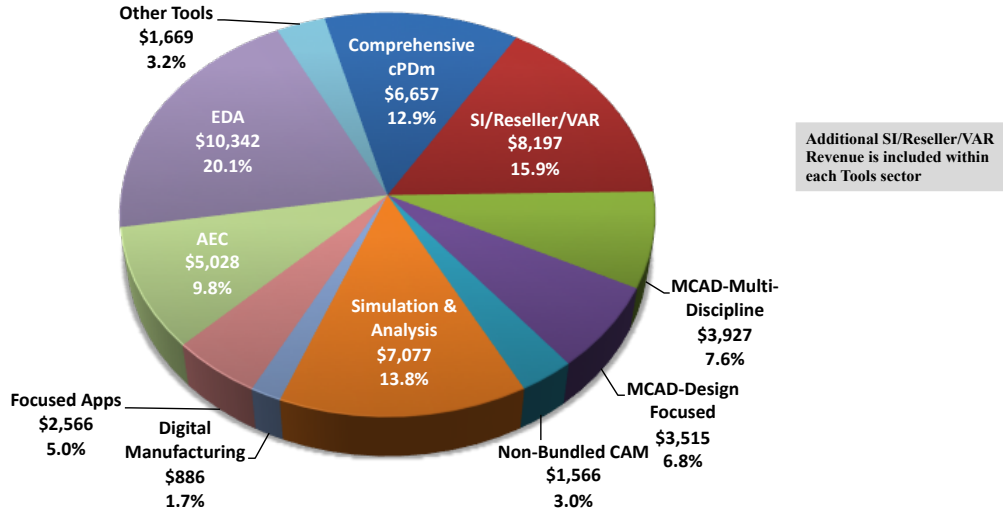
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PLM Investments by Segment

Market grew by 7.6% to US\$51.4 Billion in 2019



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Estimates are US\$ (Millions)

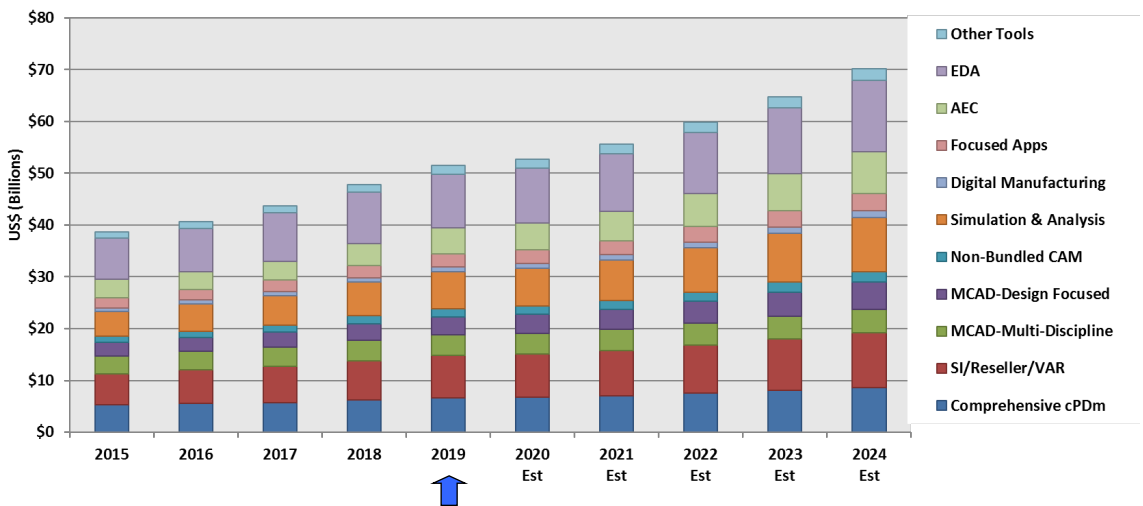


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PLM Investments

Market history and forecast – software + services



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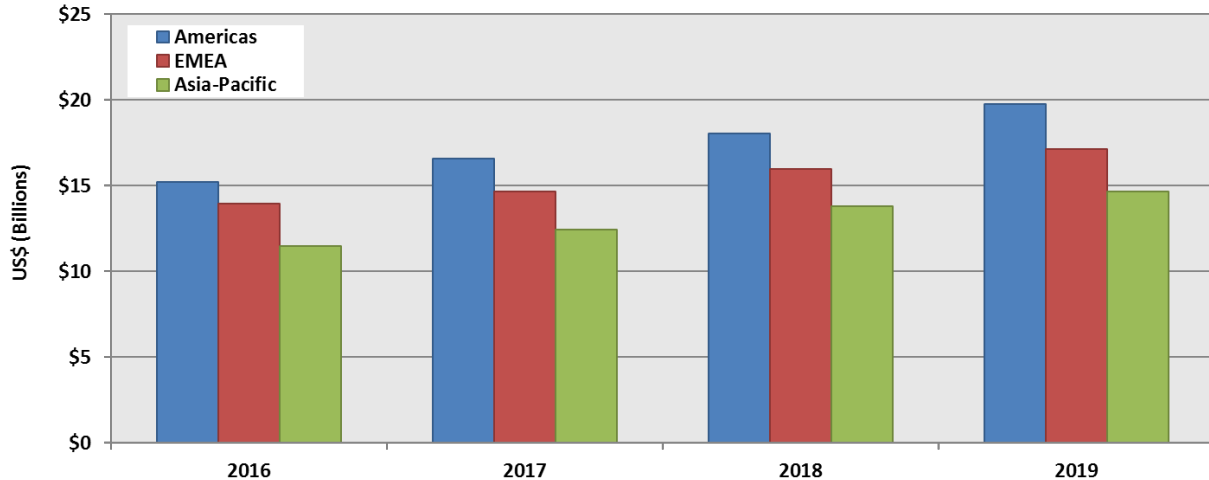
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PLM Geographic Distribution

History of investment by geography



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PLM Market in 2019

Big IT changes on-going, global economic growth stopped in its tracks by COVID-19

- What does 2019 mean for the coming years?
 - While some results were mixed, the outlook was solid
 - COVID-19 is changing everything
 - Business already slowing in Q4, hit a brick wall now
 - Forecast assumes business will resume in the fall, regain strength through 2021
 - Increase in subscription revenue provides a backstop in some segments
- Will COVID-19 slow the growth in M&A in 2020?
- CIMdata believes the market still has a lot of potential

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PLM Forecast

Impact of changes to subscription models

- COVID-19 will have huge impacts over the next 12-18 months
- PLM during the Great Recession, the last major disruption, offers a model
- Considered impacts of market and technology changes since then
 - Move to subscription provides some help to stop the bleeding
 - The cloud helps people work anywhere, anytime, can be an upside as the model takes hold in PLM
 - How face-to-face consulting services might have to change is a big question facing the industry
- How long will it take to get back to normal, or will there be a “new normal”?



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PLM & the Great Recession

Solid growth, slowing, reversing, and turning back to growth

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Comprehensive cPDM	\$ 2,240.2	\$ 2,864.8	\$ 2,804.5	\$ 2,734.4	\$ 3,095.0	\$ 2,958.2	\$ 3,307.6	\$ 4,003.8	\$ 4,566.9
SI/Reseller/VAR	\$ 2,033.3	\$ 2,287.2	\$ 3,294.6	\$ 4,132.7	\$ 4,518.7	\$ 4,208.4	\$ 4,805.0	\$ 4,902.5	\$ 5,179.7
MCAD-Multi-Discipline	\$ 2,718.7	\$ 2,600.4	\$ 2,645.0	\$ 2,872.0	\$ 2,970.0	\$ 2,536.0	\$ 2,554.2	\$ 3,053.4	\$ 3,209.2
MCAD-Design-Focused	\$ 1,563.0	\$ 1,704.8	\$ 1,891.7	\$ 2,045.3	\$ 2,307.0	\$ 1,939.0	\$ 2,108.3	\$ 2,361.0	\$ 2,566.2
CAM Non-bundled	\$ 902.0	\$ 943.2	\$ 1,011.6	\$ 1,081.3	\$ 966.1	\$ 775.0	\$ 883.0	\$ 970.2	\$ 1,045.4
Simulation & Analysis	\$ 1,766.7	\$ 1,805.3	\$ 1,823.6	\$ 2,167.9	\$ 2,340.9	\$ 2,149.0	\$ 2,412.5	\$ 2,974.3	\$ 4,029.1
Digital Manufacturing	\$ 400.0	\$ 403.0	\$ 433.5	\$ 470.0	\$ 511.9	\$ 438.2	\$ 473.8	\$ 498.6	\$ 525.4
Focused Apps	\$ 1,004.5	\$ 947.4	\$ 830.5	\$ 1,010.2	\$ 952.0	\$ 1,079.4	\$ 1,159.7	\$ 1,428.3	\$ 1,553.2
AEC	\$ 1,179.5	\$ 1,355.0	\$ 1,686.4	\$ 2,121.5	\$ 2,319.6	\$ 2,075.7	\$ 2,381.9	\$ 2,664.4	\$ 3,165.8
EDA	\$ 3,801.3	\$ 4,082.2	\$ 4,566.0	\$ 5,029.0	\$ 5,285.0	\$ 4,686.3	\$ 5,112.5	\$ 6,128.5	\$ 6,539.0
Other Tools	\$ 375.0	\$ 550.0	\$ 600.0	\$ 685.0	\$ 725.0	\$ 644.0	\$ 836.5	\$ 931.9	\$ 1,007.8
Total	\$ 17,984.1	\$ 19,543.3	\$ 21,587.4	\$ 24,349.3	\$ 25,991.3	\$ 23,489.1	\$ 26,035.1	\$ 29,916.8	\$ 33,387.5
		8.7%	10.5%	12.8%	6.7%	-9.6%	10.8%	14.9%	11.6%



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Market Forecasts

For 2020 (US\$ Millions) and 5-year compound annual growth rate (CAGR)

Segment	2020 Estimate	YoY Growth	5 Year CAGR
cPDM Comprehensive Technology Providers	\$6,773.10	1.8%	5.3%
cPDM-Focused Applications	\$2,612.45	1.8%	5.9%
Digital Manufacturing	\$906.43	2.3%	6.7%
SI/Reseller/VAR	\$8,336.21	1.7%	5.3%
Tools			
MCAD-Multi Discipline	\$3,966.62	1.0%	2.8%
MCAD-Design Focused	\$3,641.74	3.6%	8.1%
Non-Bundled CAM	\$1,593.77	1.8%	5.5%
Simulation & Analysis	\$7,274.71	2.8%	8.0%
Other Tools (e.g., ALM)	\$1,719.58	3.0%	6.9%
EDA	\$10,600.84	2.5%	5.8%
AEC	\$5,213.65	3.7%	9.8%
Total	\$52,639.08	2.4%	6.4%

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Agenda

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cPDM Segment of the PLM Market

cPDM is a core element of a PLM environment

- Managing intellectual assets
 - Management of product information and processes
 - Workflow, vaulting, content, document management
 - Visualization and collaboration
 - Product structure
 - Configuration and change management
 - Strategic product planning
 - Project and program management
 - Compliance and sourcing
 - Others

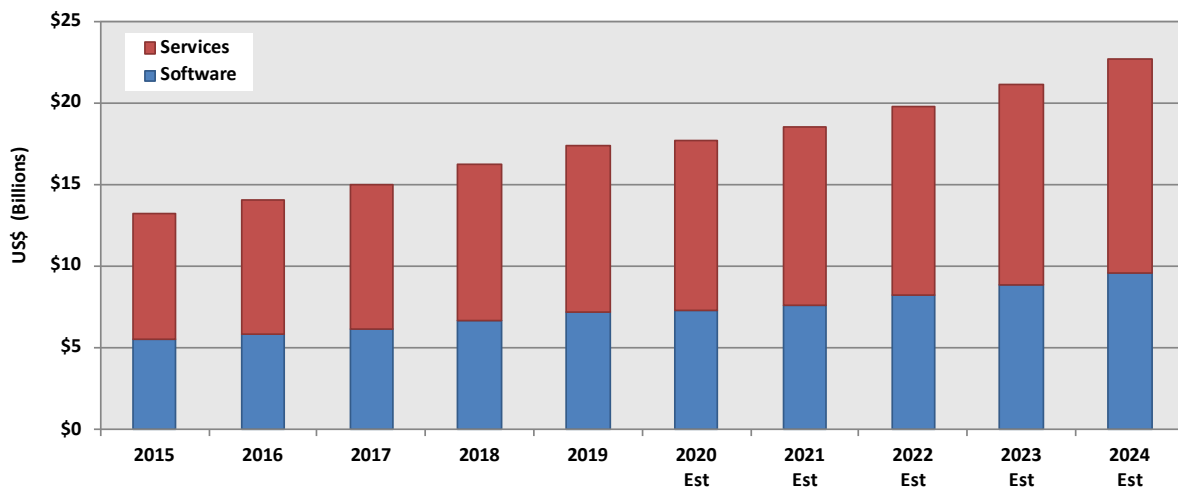


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2019 cPDM Revenue Distribution

Total investment = software + services – Five year CAGR estimate = 5.4%



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Revenue Ratios – Software vs. Services

Services is a major revenue area

- Overall cPDM market: services are 58.8%
 - Driven by independent services providers
- Comprehensive cPDM providers
 - In 2019, Software was 67.4% vs. 32.6% for Services
 - In 2018, Software was 66.7% vs. 33.3% for Services
- Services ratio can change for several reasons
 - PLM solution providers developing products, packaging, and delivery bundles to reduce services
 - Cloud-based products often claim to require less services
 - Nature of services changing – more need for skills in advanced PLM topics vs. IT installation and integration

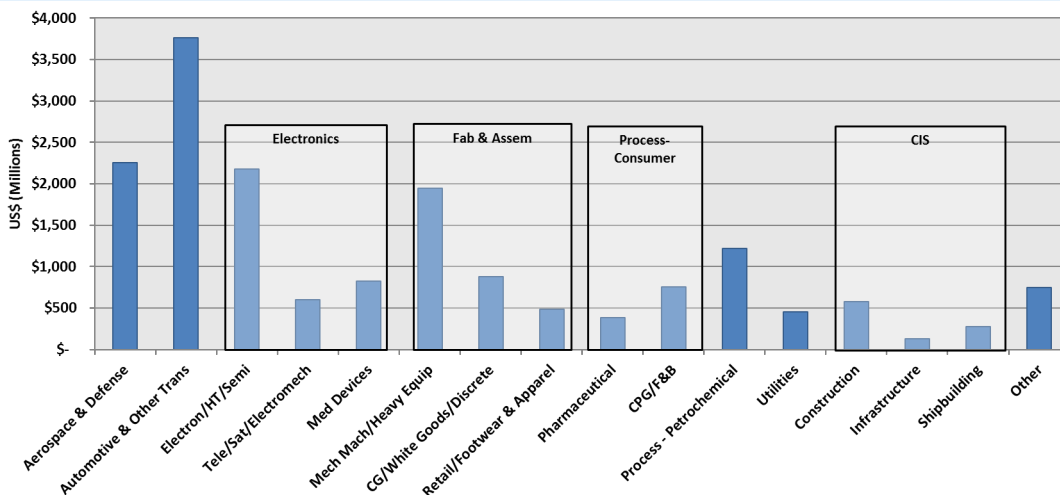


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cPDM Investment

Investments by industry—2019



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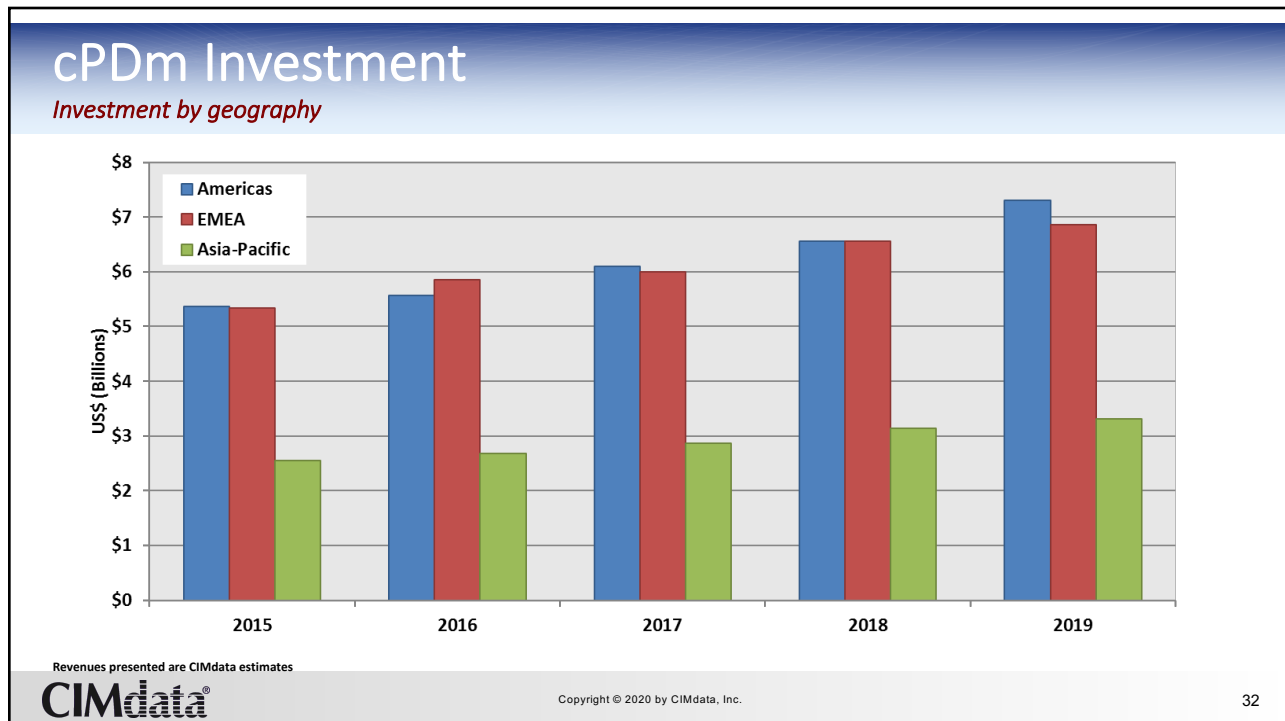
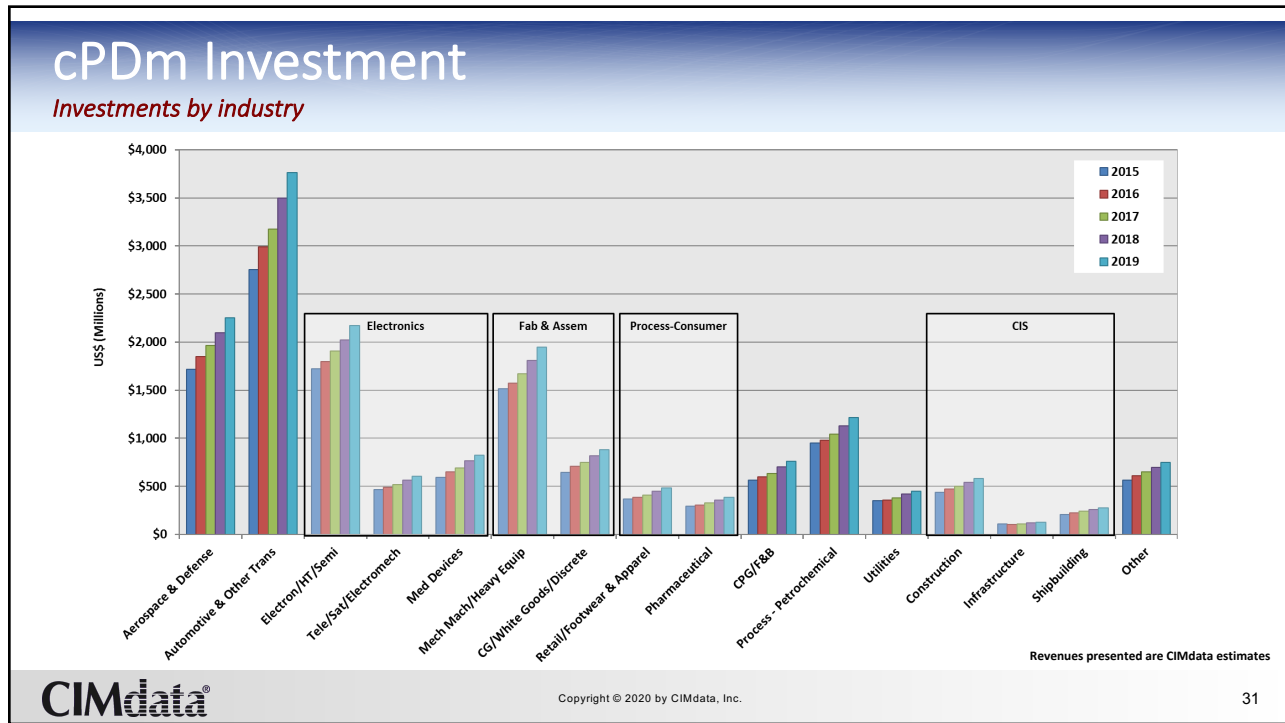


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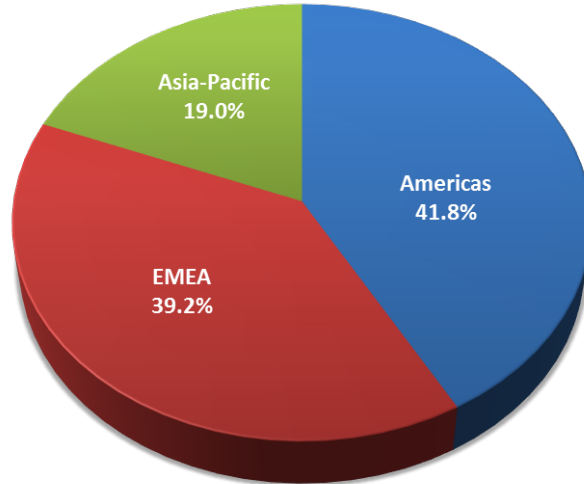


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2019 cPDm Geographic Distribution

Growth in all geographies



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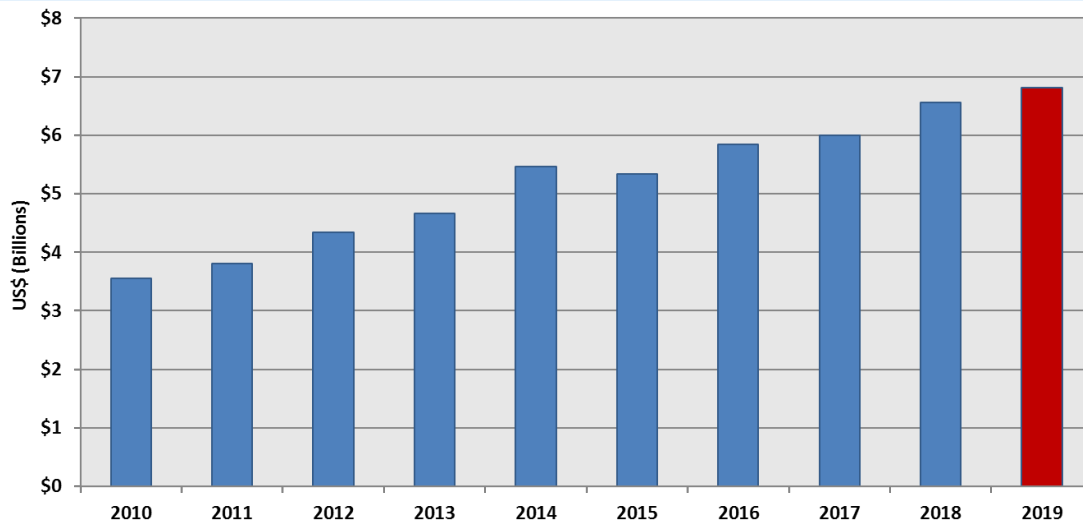
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EMEA cPDm Revenue

Growth across region



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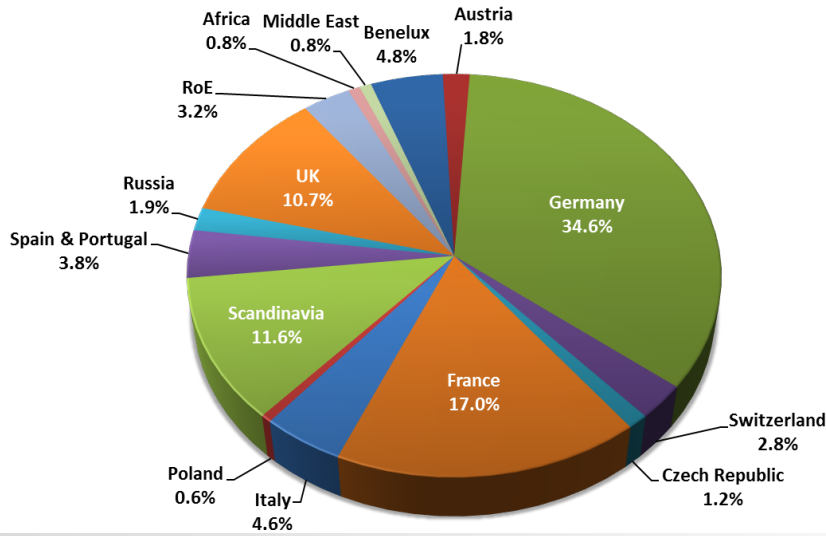
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EMEA 2019 cPDM Regional Market Shares

Growth across region



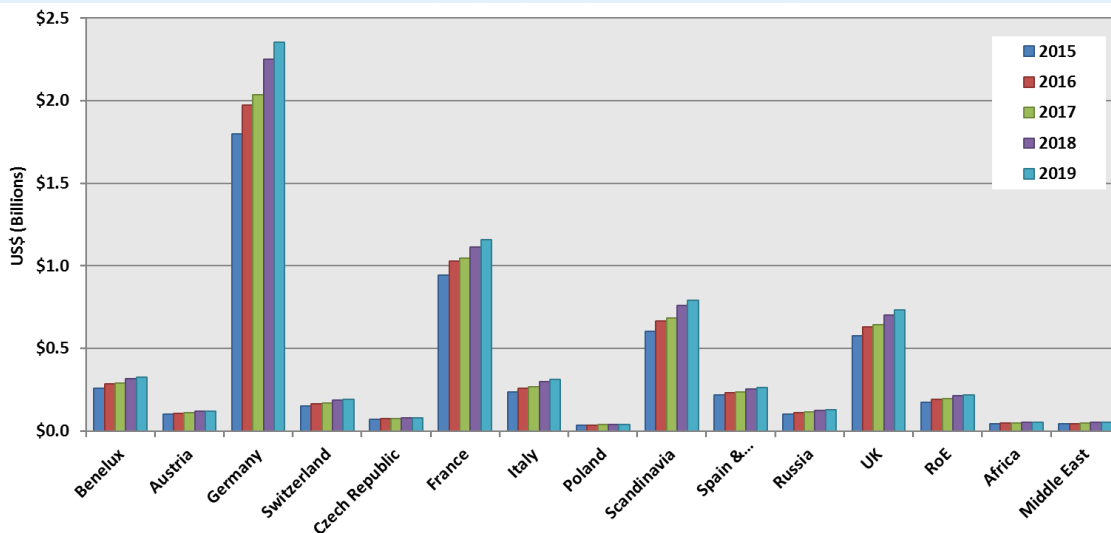
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EMEA cPDM Revenue History

Growth across region



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PLM Mindshare Leaders

Who do people think about?

- These companies are perceived as leading the market
 - Number, size, and scope of implementations
 - Technology and thought leadership
- All are comprehensive, lifecycle-focused providers
 - They were leaders in the PDM market
 - Some also provide tools – primarily MCAD and S&A
- Are developing broad PLM platforms, and addressing new industries and geographies
- Aras pushed its way into the group
 - Disruptive business model
 - Strong results with very large companies, e.g., Airbus, GM

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Market Presence

Evaluating a provider's impact in the marketplace

- Market presence includes
 - A provider's direct revenues
 - Partner revenues built around a provider's products and technology
 - Does not double count royalties paid
- Represents a provider's overall footprint in the PLM market
- Grows with a provider's partnerships and alliances

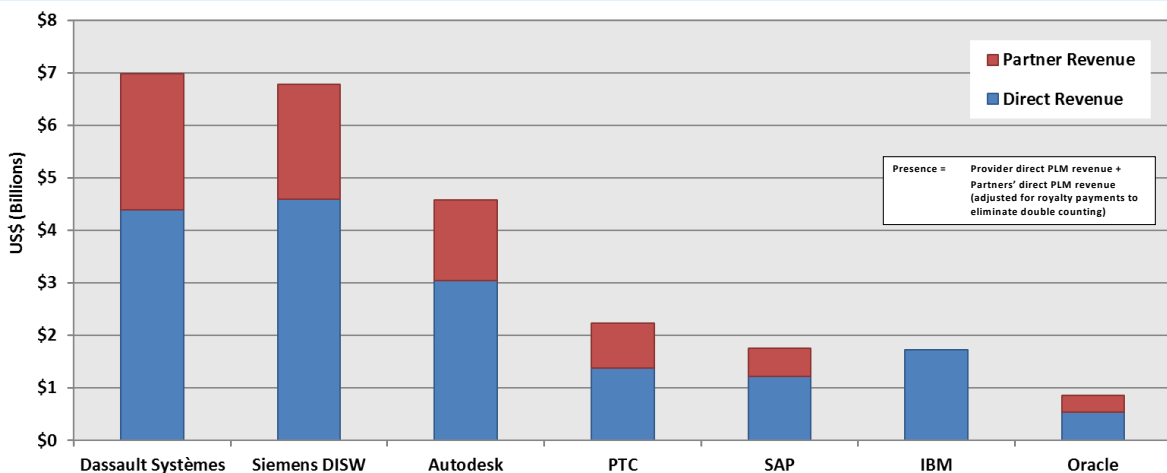


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2019 PLM Mindshare Leaders Presence

PLM leaders' footprints in industry—heavily leveraging partners



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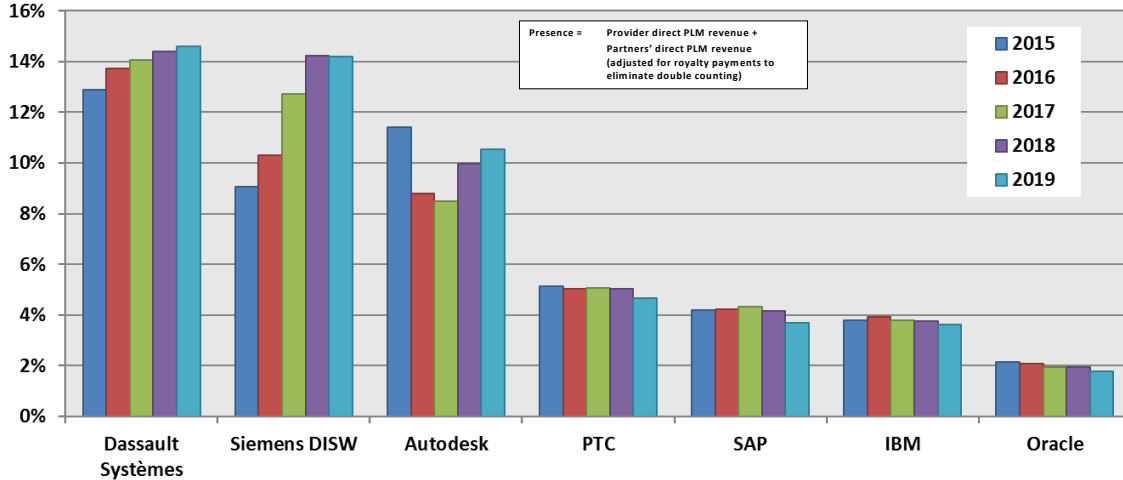
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PLM Mindshare Leaders Market Share History

PLM mindshare leaders' five-year PLM market presence share trends



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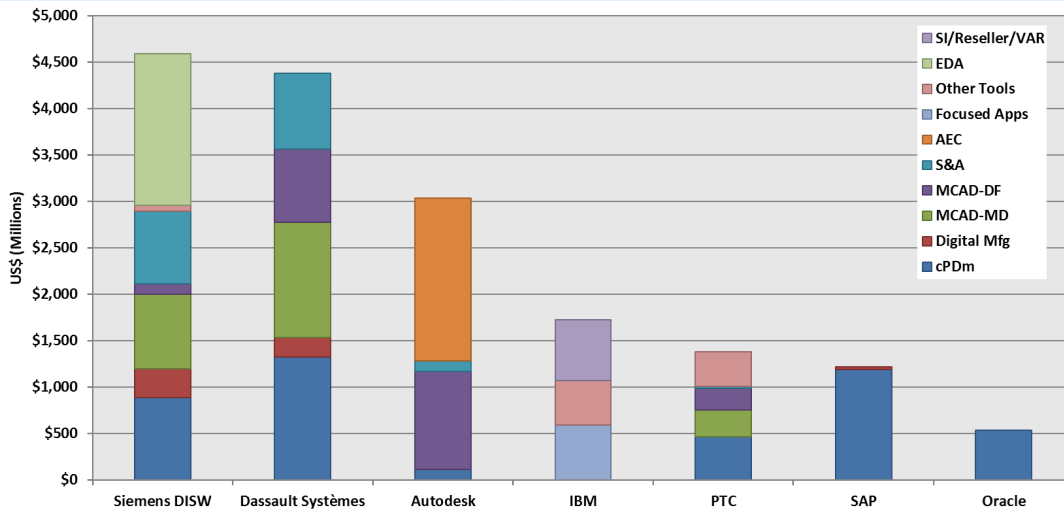


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2019 PLM Leaders Revenue

Leaders' direct revenues—led by providers of CAD tools



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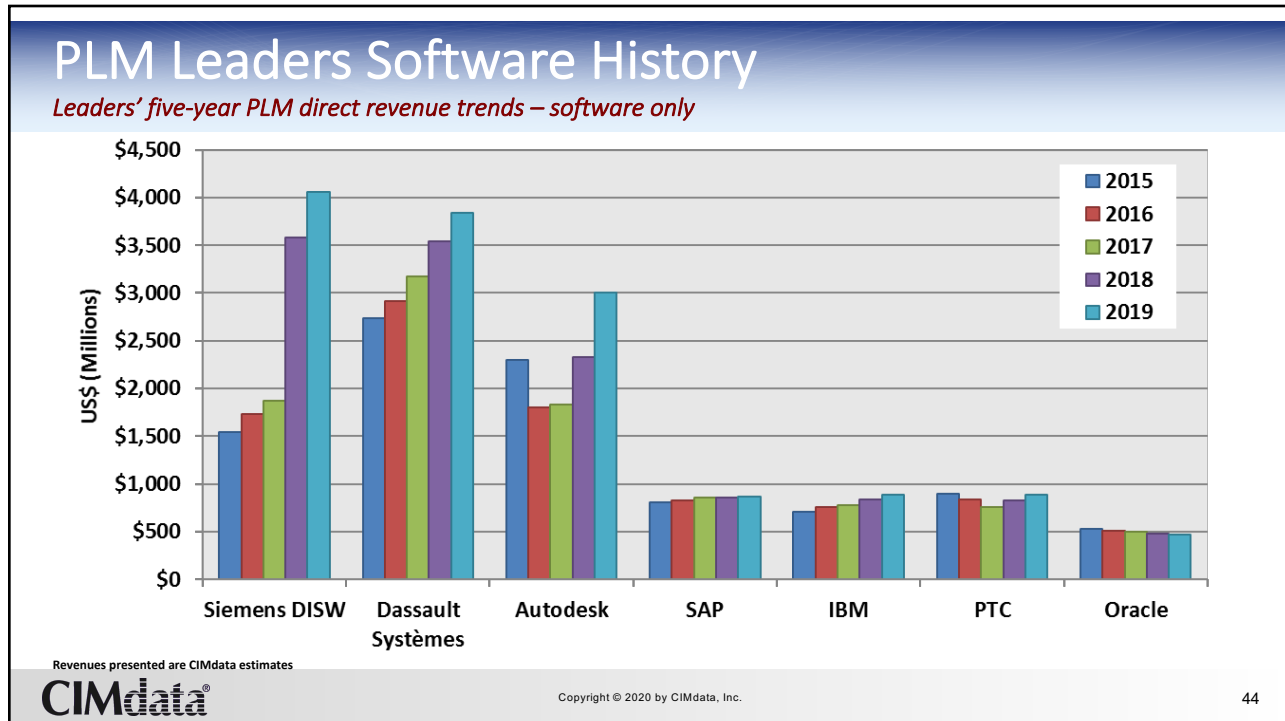
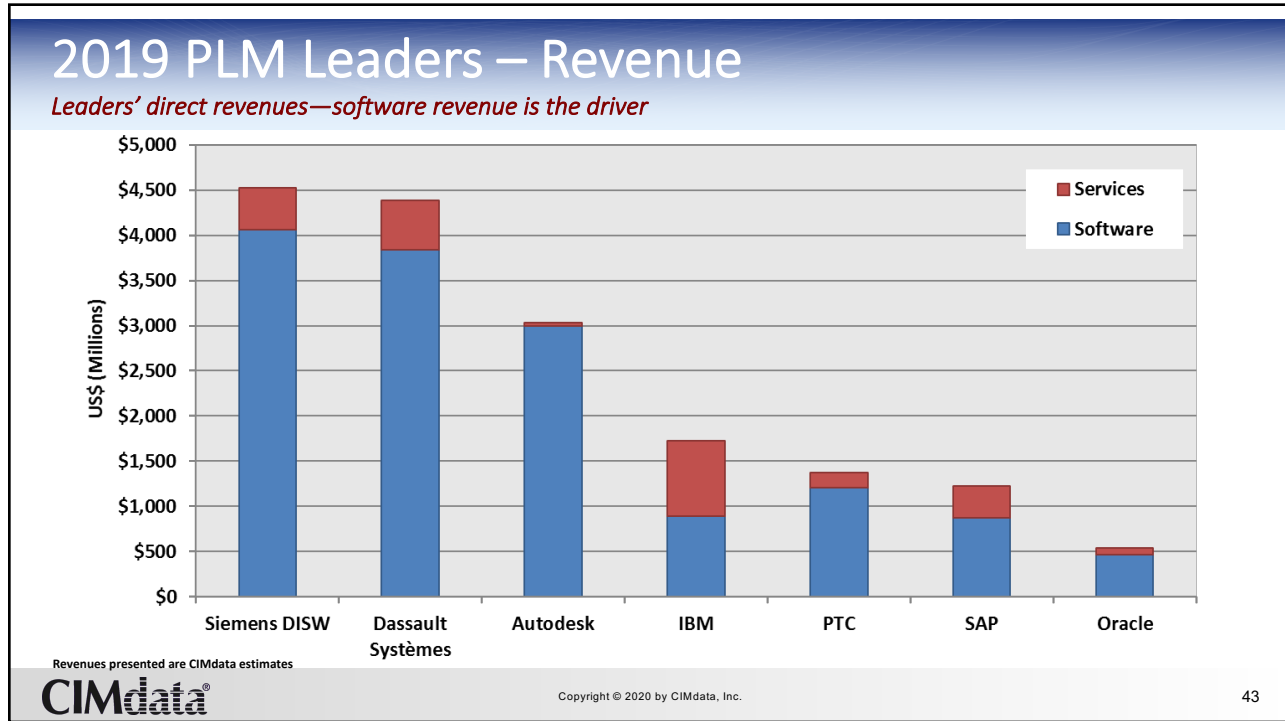


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Overall PLM Market Revenue Leaders

The market leaders are a diverse group

- Several are focused on specific technologies or industries
 - MDA, EDA, AEC, analysis, ...
- Some have multiple lines of business
- Some are partners of multiple other providers
- Many are not competitors
- Twelve companies over \$1 billion in revenue
 - Two EDA
 - Five Comprehensive cPDM
 - Two SI/Reseller/VAR
 - Two S&A
 - And Hexagon...

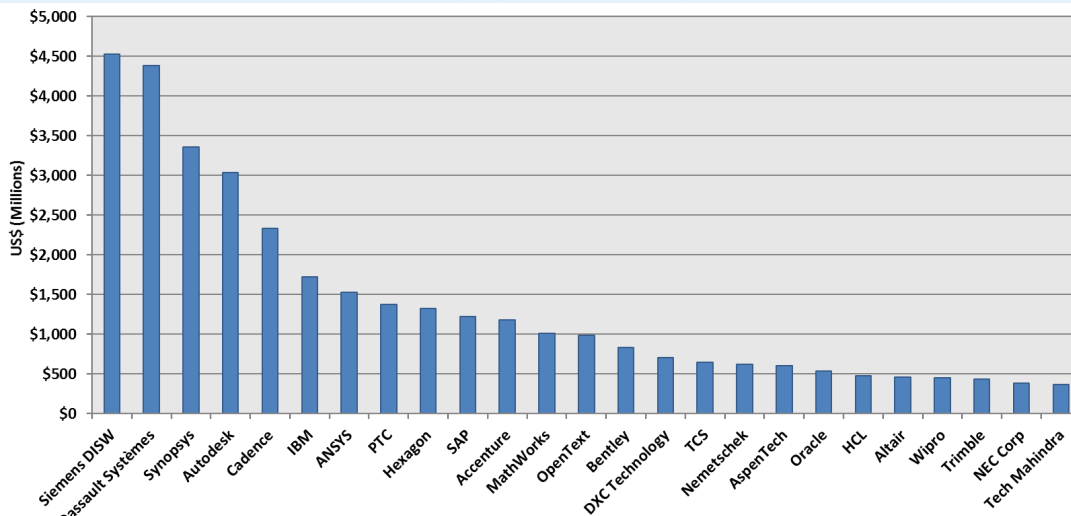


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2019 Overall PLM Revenue Leaders

Many diverse companies generate PLM revenue



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Scope of Services Continues to Evolve

As PLM solutions evolve, more and different services are needed—even more of a challenge now

- PLM continues to interface, exchange information and processes with more and more business solutions
 - Expanding footprint requires higher levels of integration
 - PLM expansion areas require deployment skills not normally available in-house – driving use of external expertise
 - Cloud – cloud to cloud, cloud to on-premise interconnection
 - IoT data will have to be analyzed, with results fed back to multiple systems
- Changes to software design, packaging, and delivery changing the types of services needed
 - Going beyond just implementation, IT integration
 - Helping customers to implement advanced topics/processes using a specific cPDM solution
 - Mobile access to multiple systems of record

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Service Providers

Services companies continue to increase PLM commitments

- Systems integrators and consultancies continuing their PLM program expansion
 - Global firms
 - Accenture, Atos, Capgemini, IBM, T-Systems, CENIT, DXC Technology, Deloitte, Tata Technologies, TCS, HCL, Infosys, Wipro, Tech Mahindra,...
 - Regional/focused SIs continue expanding
 - NEC, Addnode, Samsung SDS,...
- These firms are developing solutions on top of solution provider technology
 - Adding their domain expertise
 - Industry and/or functional solutions
 - Selling through providers or direct to industrial companies

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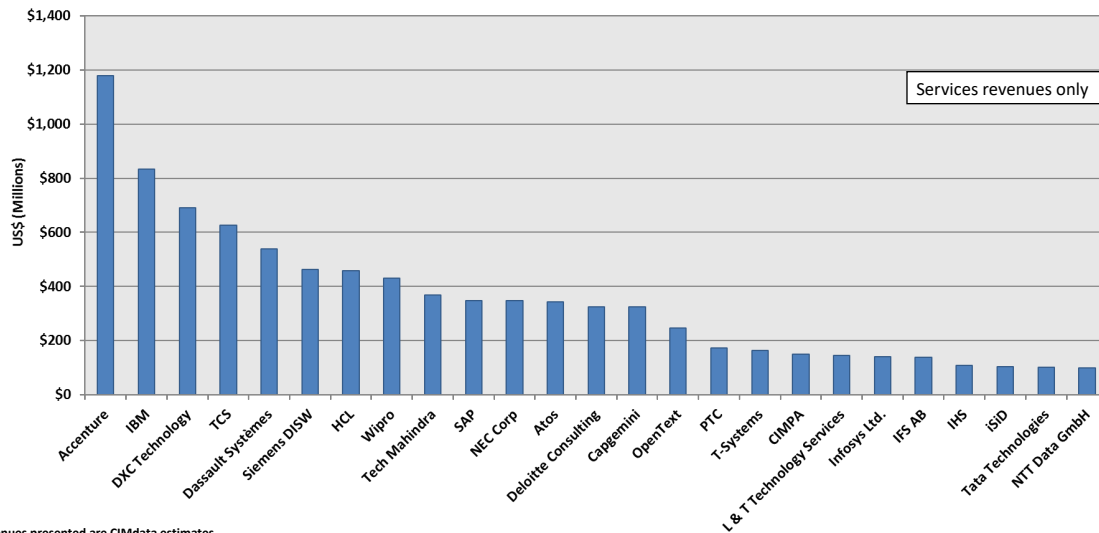
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2019 PLM Services Revenue Leaders

Changes in the services organizations of leading PLM solution providers



Revenues presented are CIMdata estimates

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Focused Application Providers

Expanding PLM through innovation

- Focused providers help expand the PLM market
 - Target specific market segments
 - Create solutions that complement major providers' suites
 - Introduce new technology and working paradigms into the PLM environments
- Many create technologies and solutions that are acquired or embedded into the comprehensive providers' product suites
- Frequently become acquisition targets
 - E.g., Ansys with Granta Design
- Harder (or impossible) to continue to measure separately post-acquisition

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- PLM Market Analysis
- Overall cPDM Market Analysis
- PLM Provider Analysis
- Provider Sector Analysis
- Concluding Remarks

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51

cPDM Provider Analysis

Review of cPDM provider revenue performance

- cPDM sector had another solid year
- Comprehensive segment dominated by “mindshare” leaders
 - Dassault Systèmes, Oracle, PTC, SAP, and Siemens DISW
 - Aras pushed their way into the Mindshare Leaders group
- Other major providers
 - Autodesk, IBM, IFS, and Infor
 - NEC focused on Japan
- New providers continue to emerge
 - Continuing the expansion, platforms play a role (Propel PLM/Salesforce)
 - Local providers, i.e., China, Russia, etc.

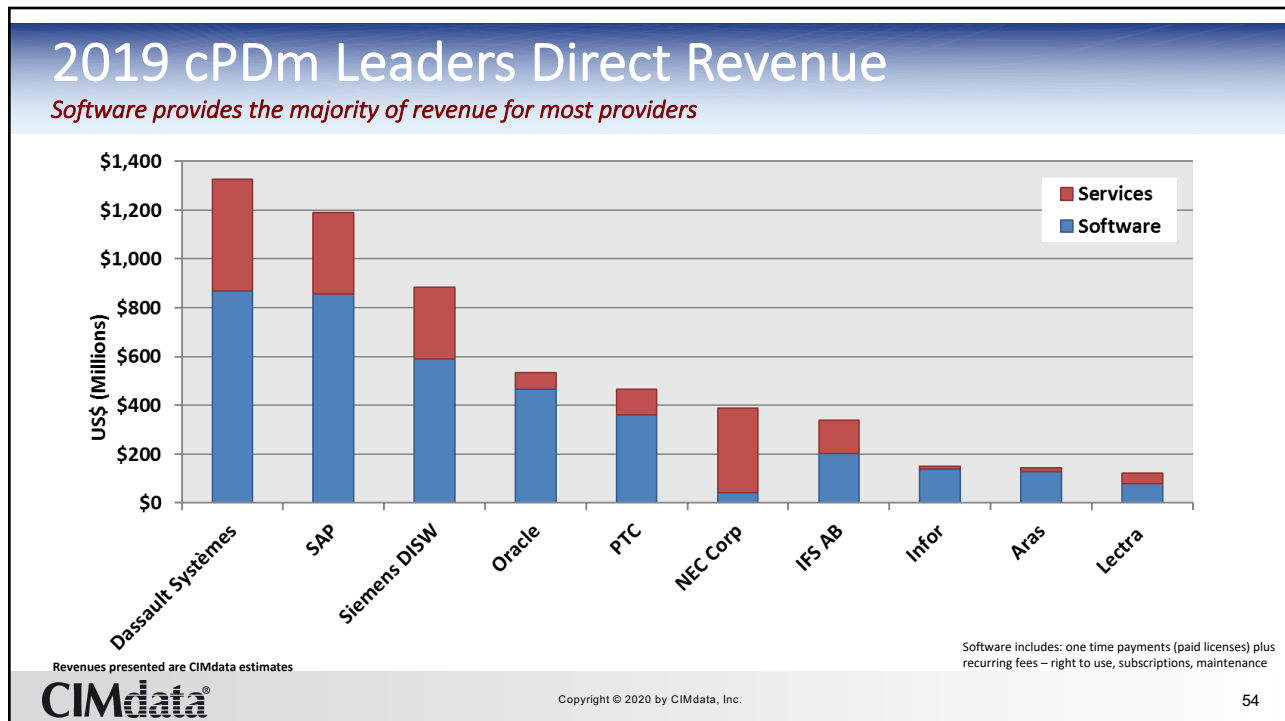
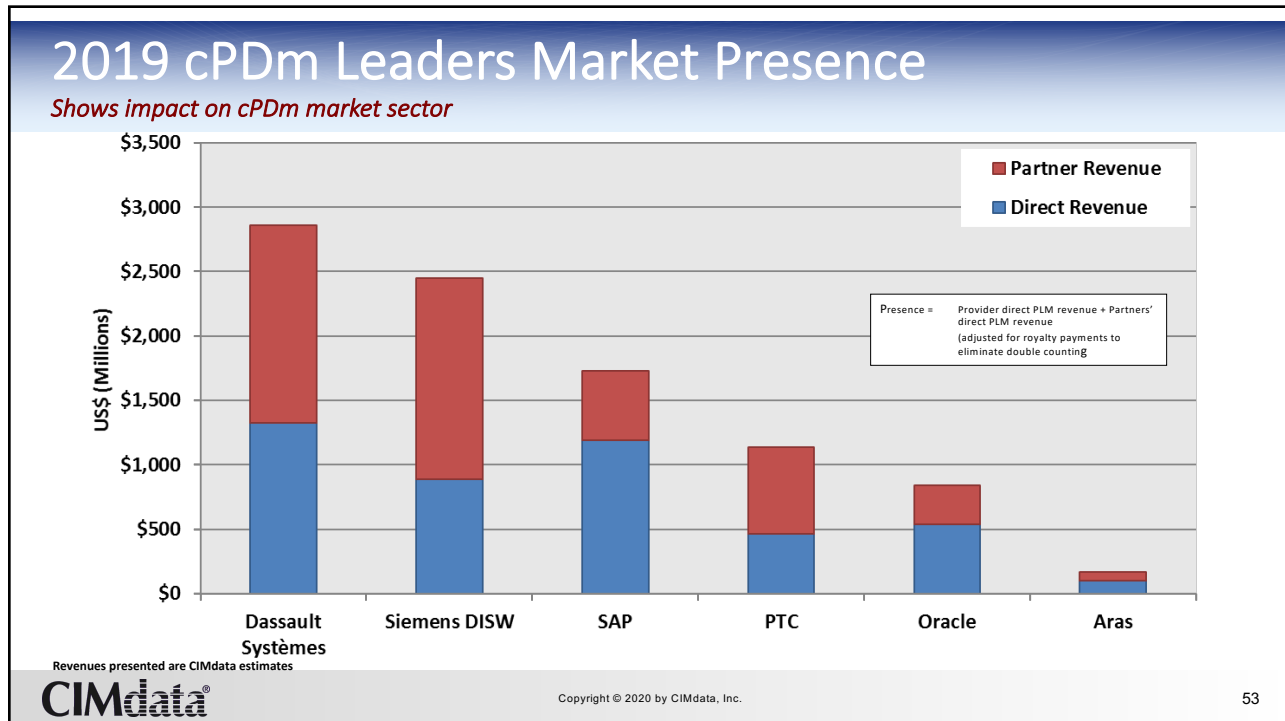
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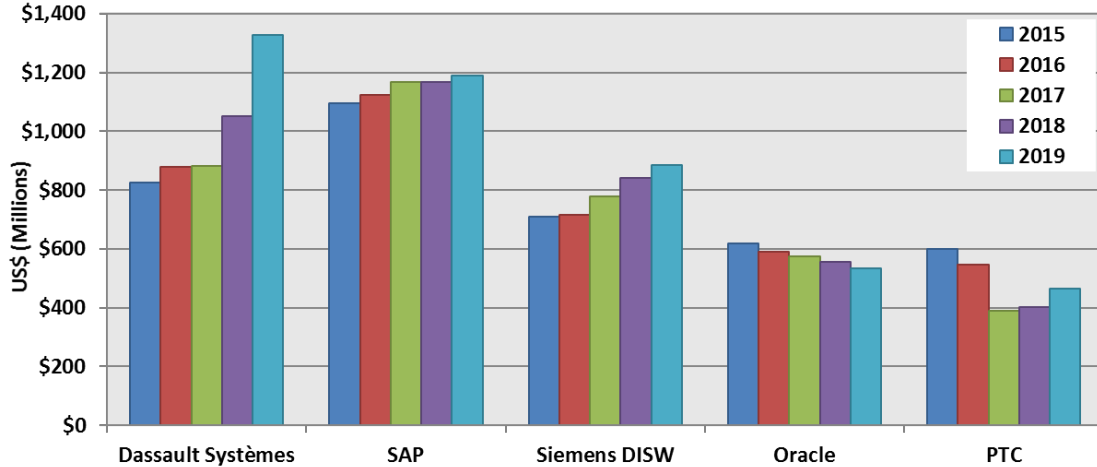


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Comprehensive cPDM Leaders Revenue History

Leaders' five-year cPDM direct revenue trends



Revenues presented are CIMdata estimates

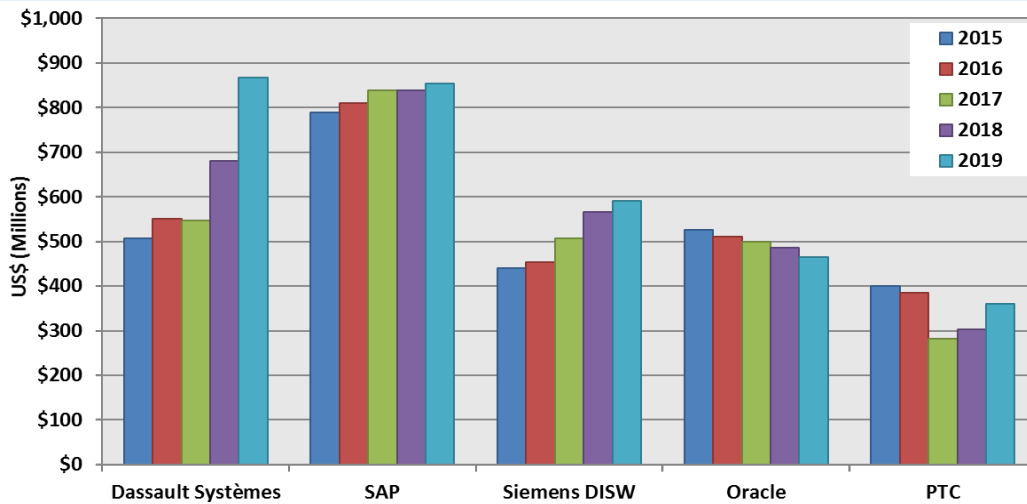


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Comprehensive cPDM Leaders S/W History

Leaders' cPDM direct revenue



Revenues presented are CIMdata estimates



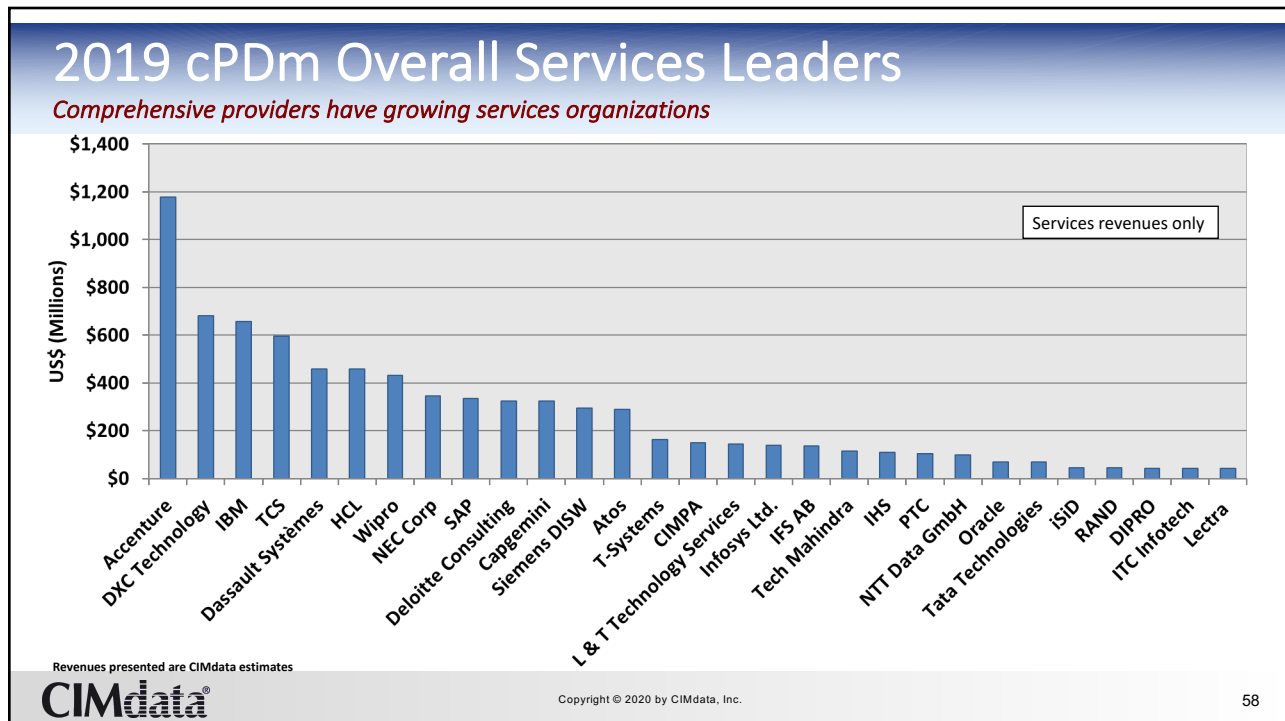
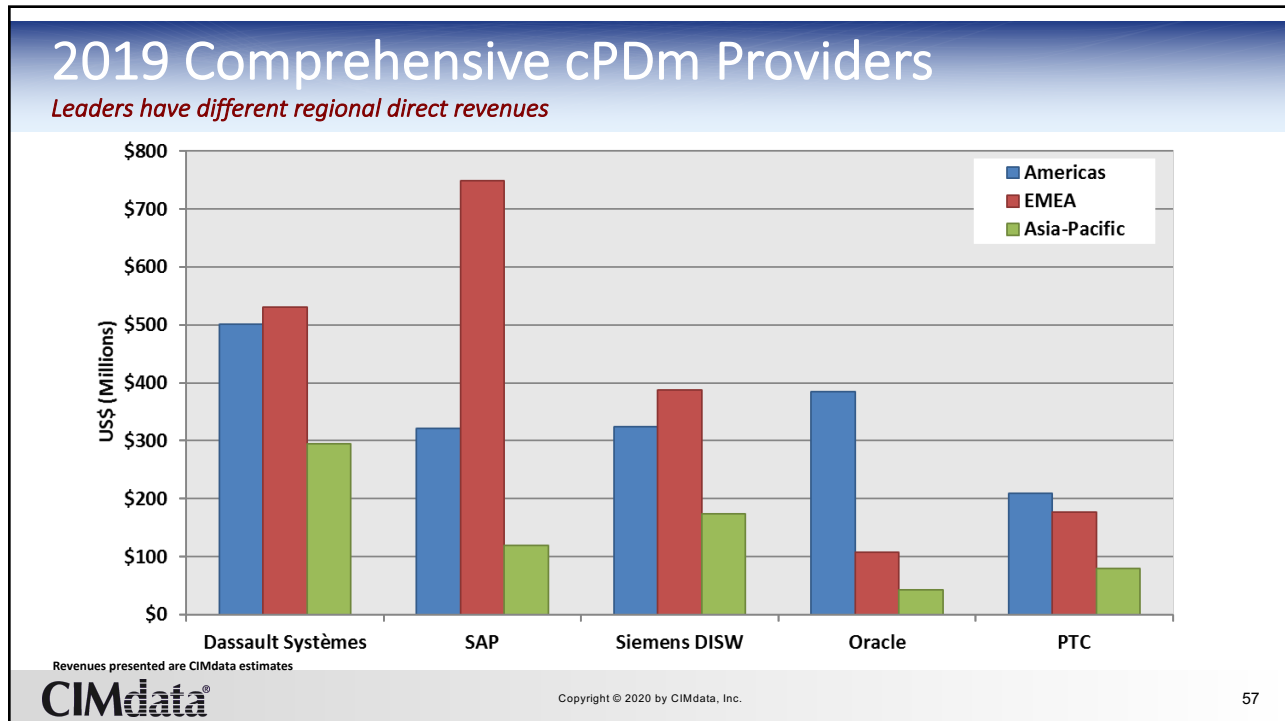
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Software includes: one time payments (paid licenses) plus recurring fees – right to use, subscriptions, maintenance

56

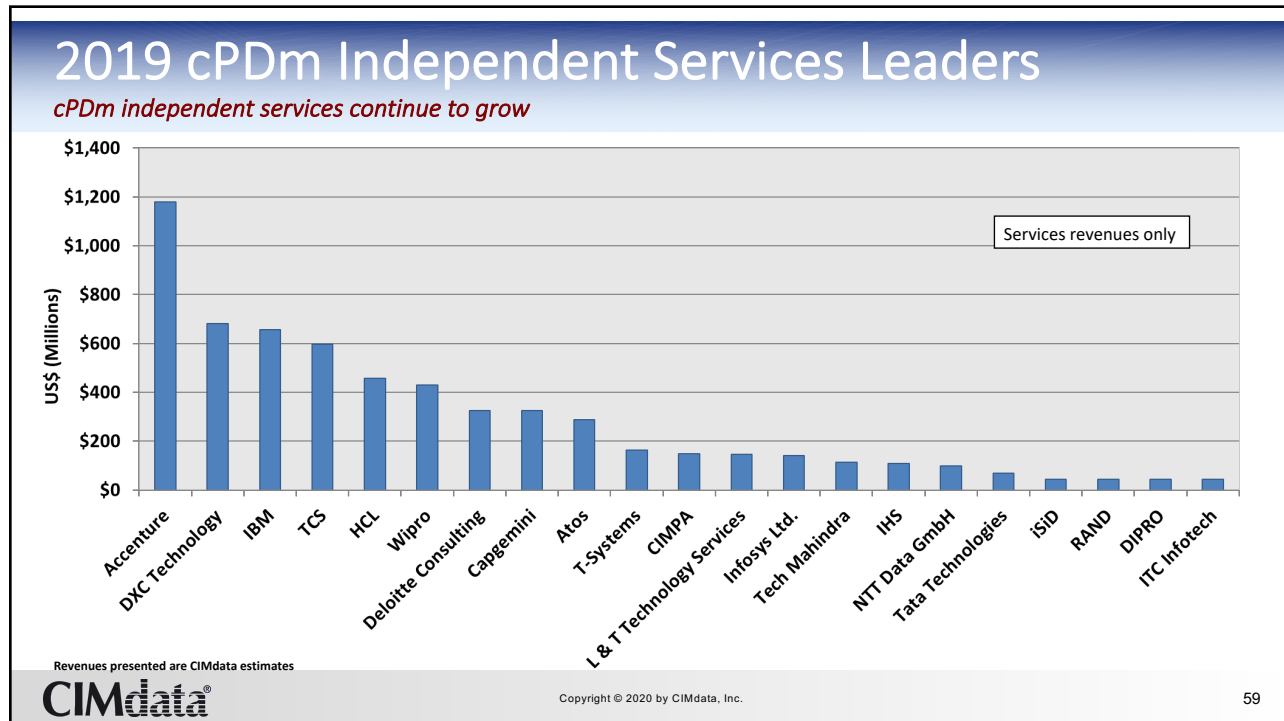
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Overall cPDM Providers

Continuing evolution among the overall leaders

- Leaders are from all cPDM segments
 - These providers do not always compete
 - Some partner on selected accounts
- Service providers continue to grow
 - Expect strong license growth in 2019 to lead to services growth in out years (eventually)
- Thirteen cPDM software and service providers larger than \$400M in 2019, up two from 2018

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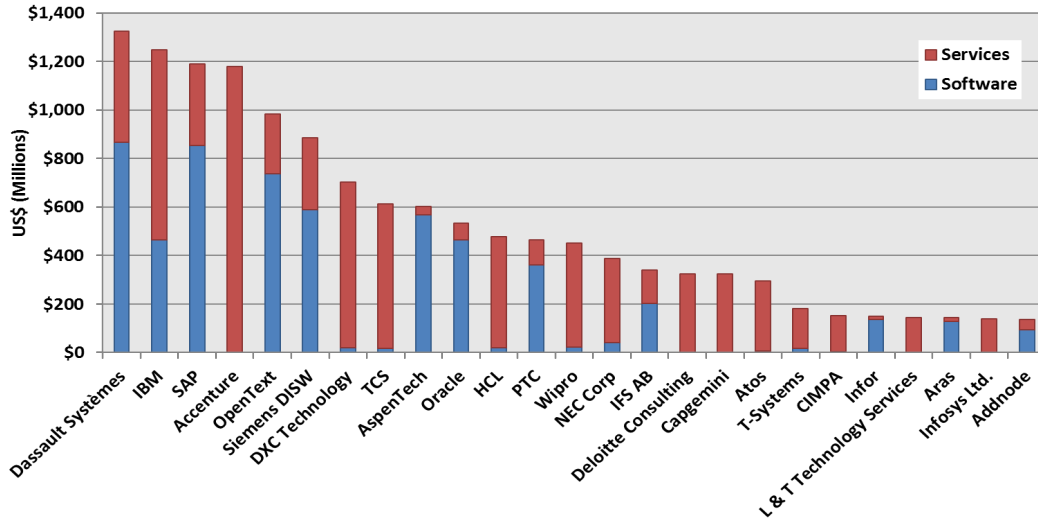
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Overall 2019 cPDM Revenue Leaders

Services are a major factor in overall revenue



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Software includes: one-time payments (paid licenses) plus recurring fees – right to use, subscriptions, maintenance

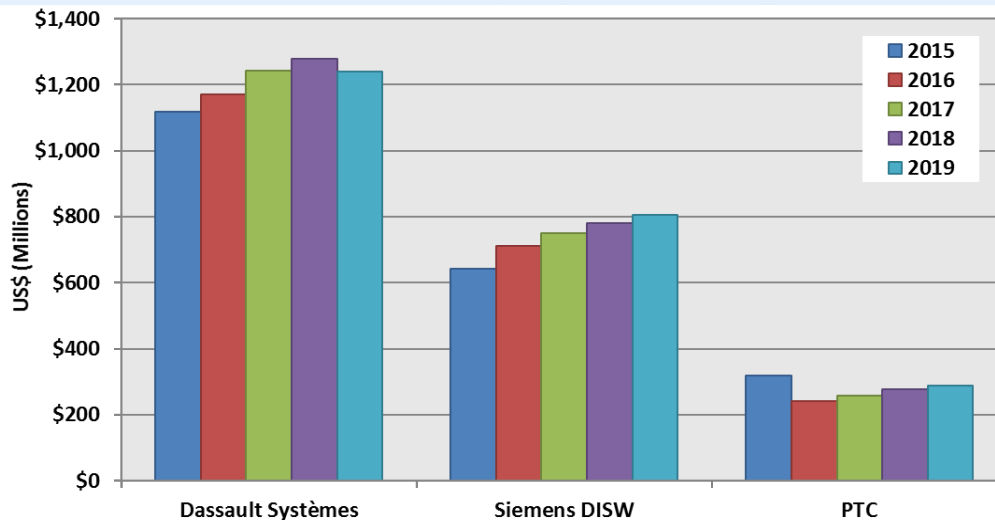


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MCAD-Multi-Discipline

Leaders revenue histories



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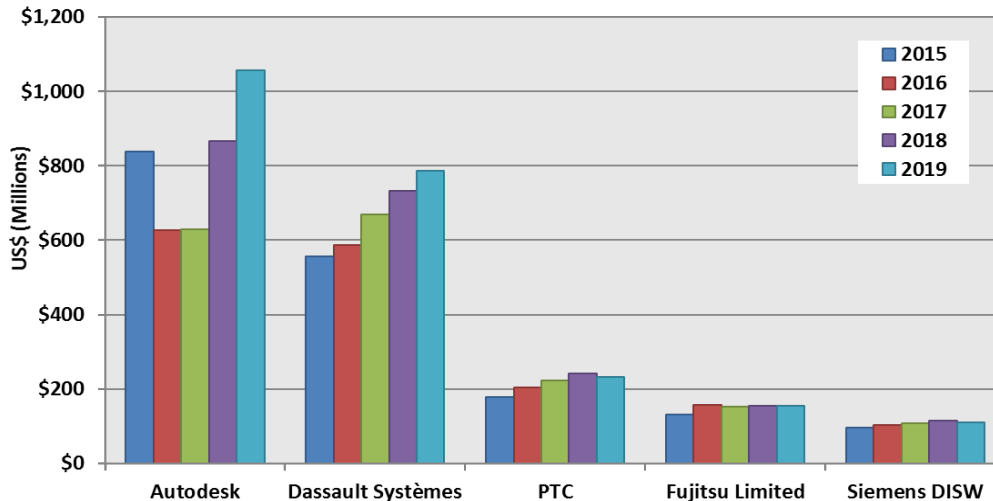
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MCAD-Design-Focused

Leaders revenue histories



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Combining MCADs

Does it make sense to separate MD and DF?

- Since CIMdata began reporting “Tools” revenues in the MAR, we used two categories
 - Multi-Discipline (MD)
 - Design-Focused (DF)
- Made sense at the time
 - Different markets
 - Different capabilities
- Times have changed – is it time to change to reporting to MCAD?
 - DF solutions have expanded their capabilities
- Major providers said “it makes sense to combine them, but please report them both ways”

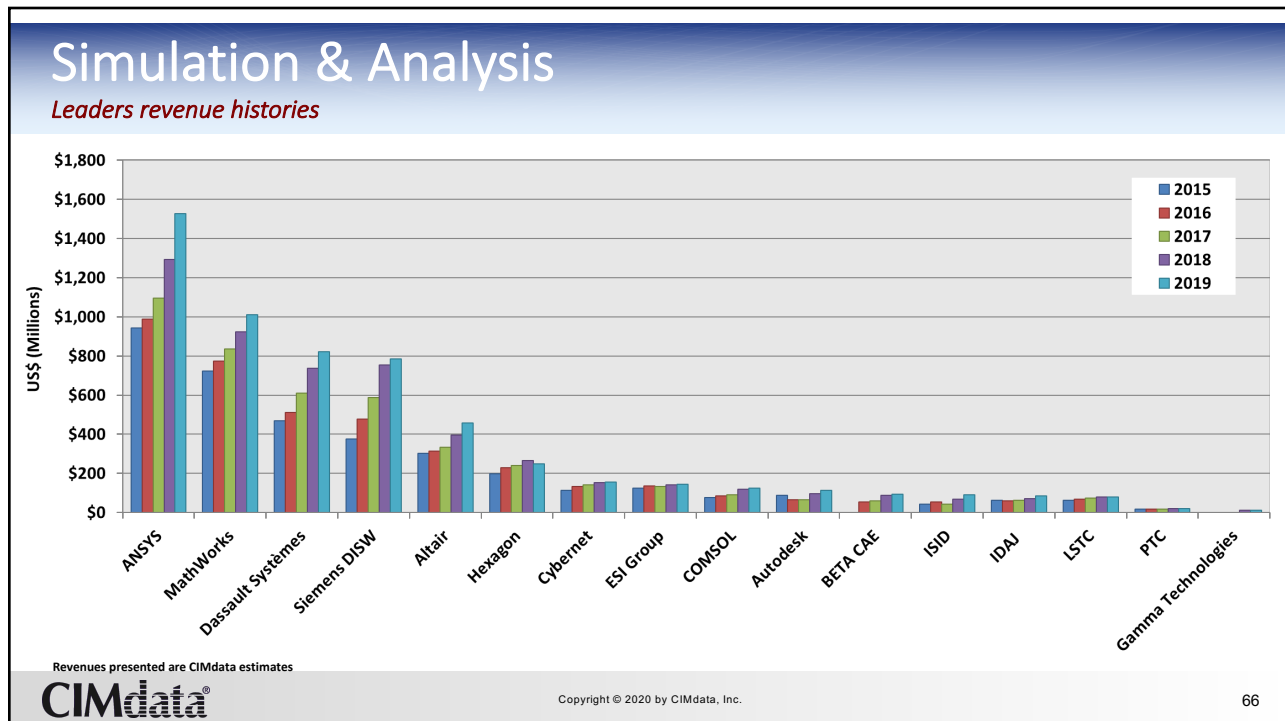
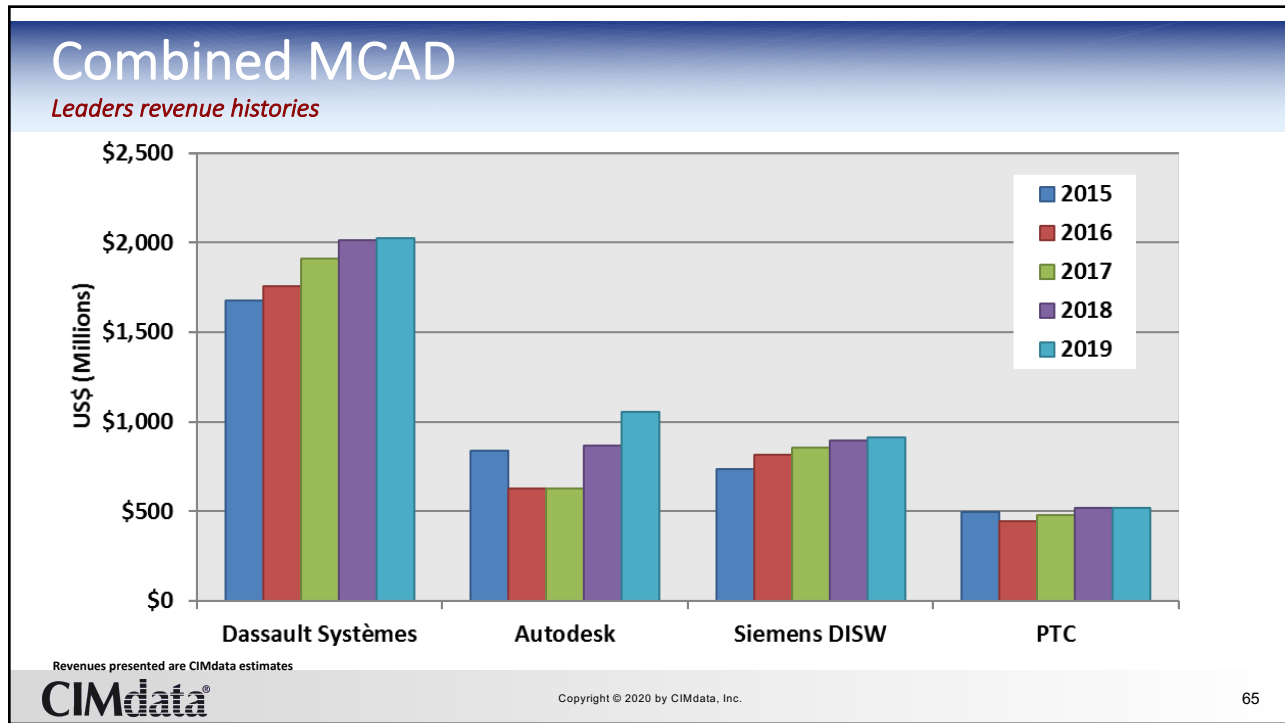
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64

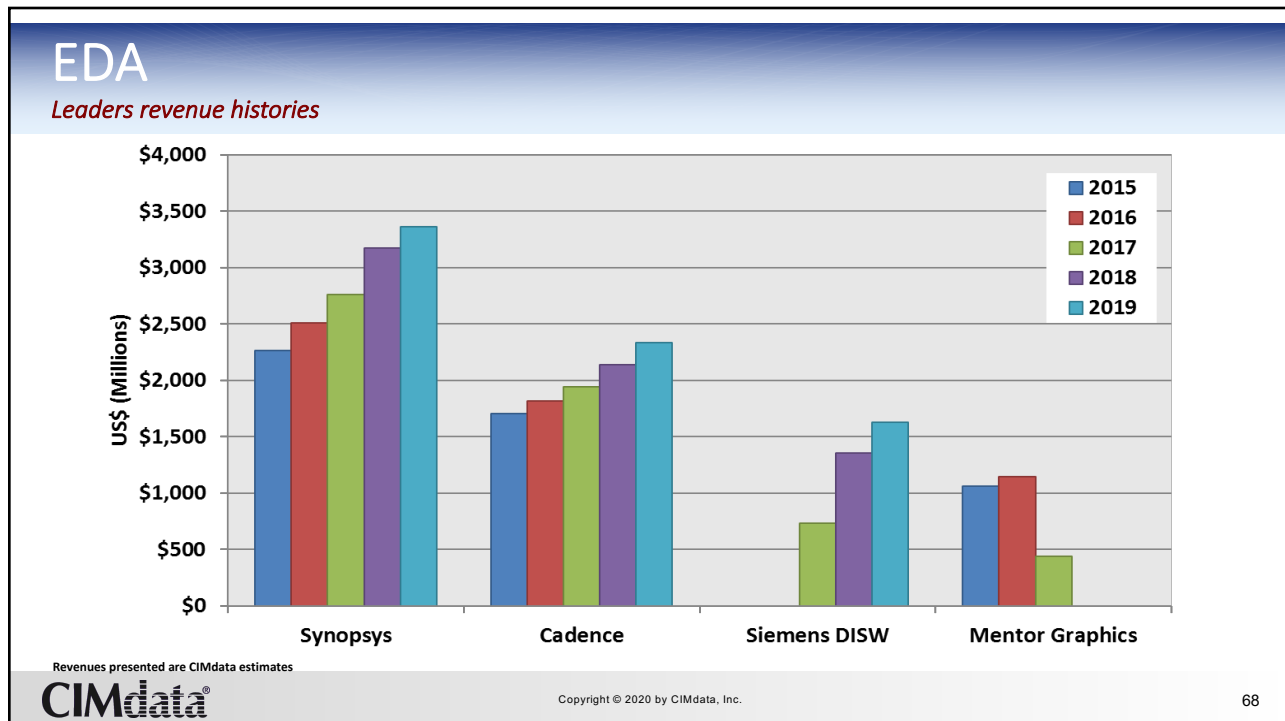
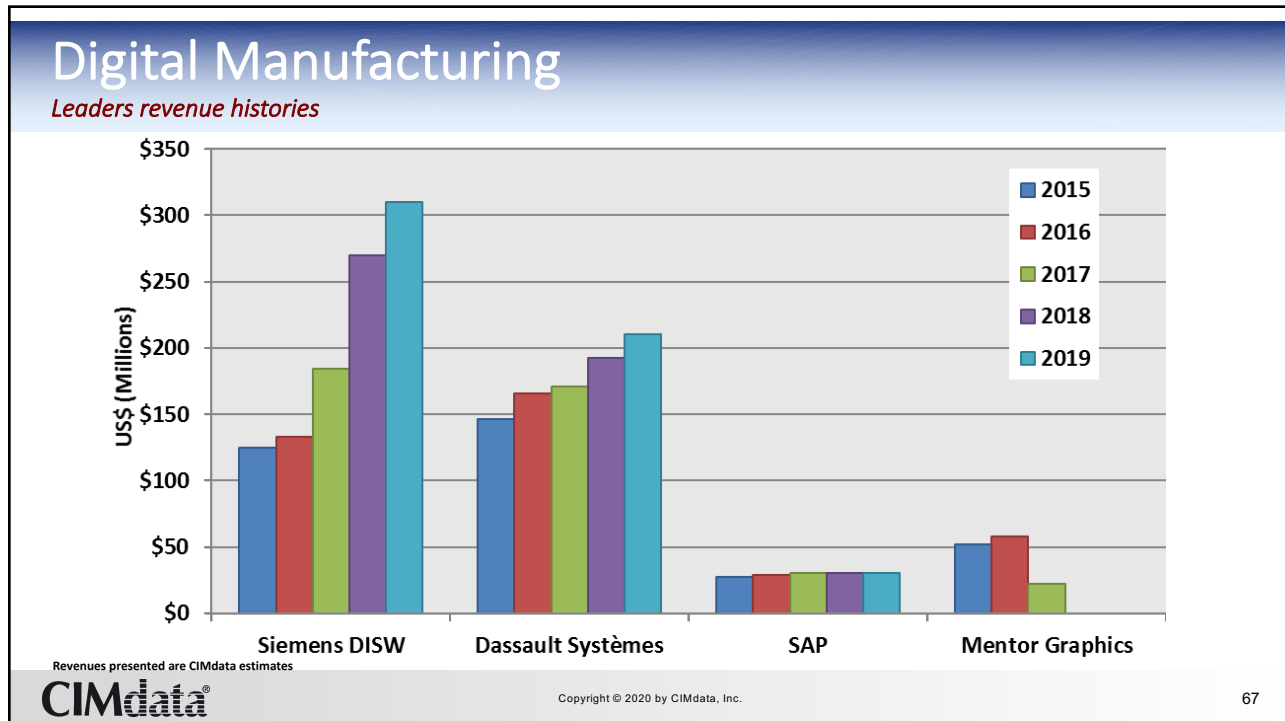
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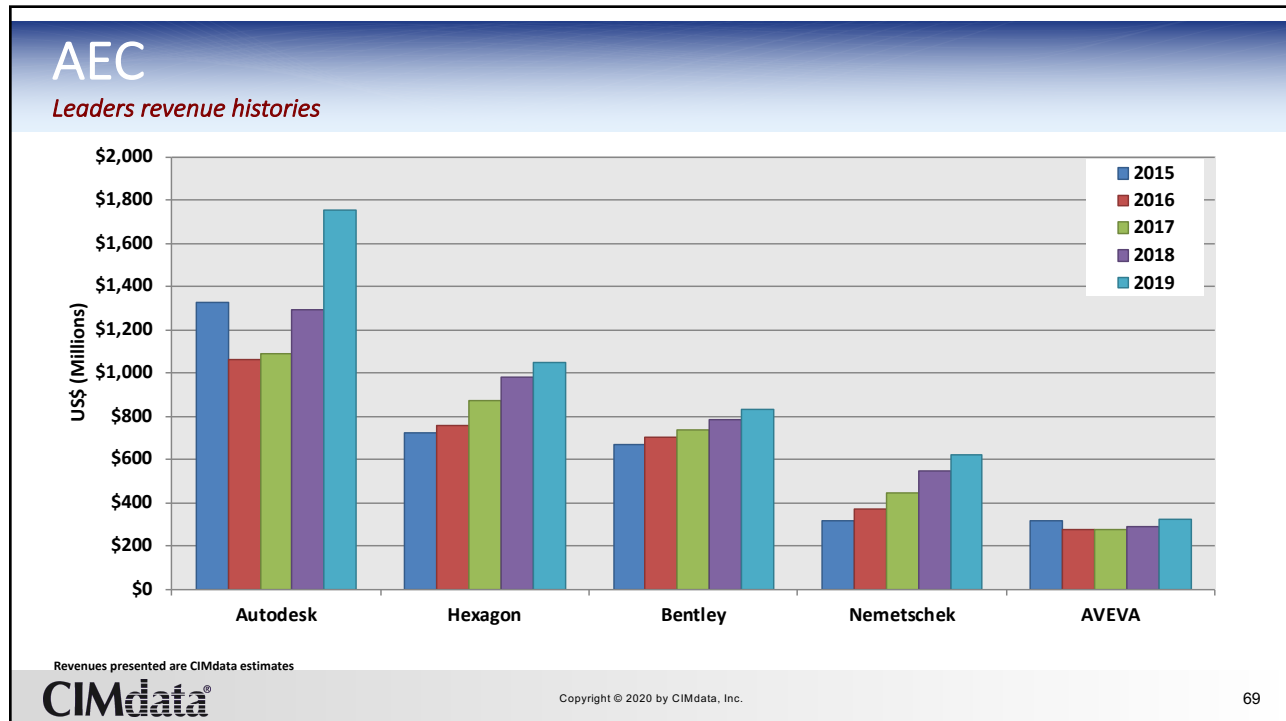
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Agenda

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Concluding Remarks

Factors impacting the PLM Economy (1 of 2)

- Just under forecast, too optimistic in MCAD segment
- COVID-19 will impact all segments, some potentially in a big way
- Subscription can back stop declines, assuming no defections
- Simulation and systems engineering still key
- Mergers and acquisitions will continue to play a role
 - Providers look to fill out their portfolios
 - An important part of the platformization trend
 - A lot of activity in the SI/Reseller/VAR space

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71

Concluding Remarks

Factors impacting the PLM Economy (2 of 2)

- Still waiting for cloud, PTC thinks Onshape will help them transform
- Services continue shrinking as a percentage of the cPDM market
 - Packaged solutions reducing services requirements
 - Cloud will contribute
 - Changes in types of services needed
 - More consolidation to come?
 - Will this crisis create a new normal in service delivery?
- PLM refresh programs will continue, as suggested in recent CIMdata research

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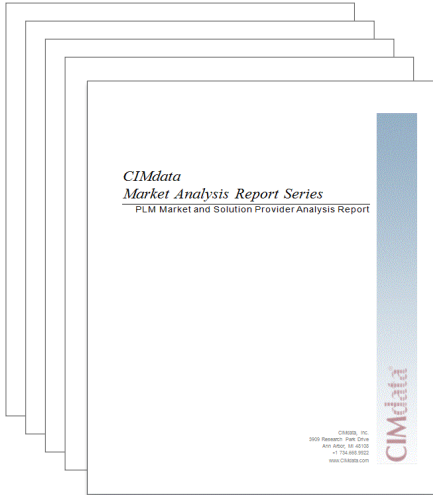
72

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The CIMdata PLM Market Analysis Report

Major PLM Foresight deliverables, a growing MAR series



- CIMdata PLM Market Analysis Report
 - CIMdata Executive PLM Market Report
 - CIMdata PLM Industry Review and Trends Report
 - CIMdata PLM Market and Solution Provider Analysis Report
 - CIMdata PLM Market Geographic Analysis Report
 - CIMdata PLM Market Industry Analysis Report
- Country reports for the Brazil, China, Germany, India, Japan, Russia, South Korea, Italy, United Kingdom, France, and the United States
- CAM MAR (29th year)
- Simulation & Analysis (S&A) MAR

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73

Next Sessions

We look forward to you joining us

Tuesday, 7 April 2020 – SESSION 2

8:00 am – 8:15 am (EDT) / 2:00pm (CEST) | Q&A - 2019 Market Analysis Results

Stan Przybylinski, Vice President, CIMdata

8:15 am – 8:50 am | Synching Siloed Development

Craig Brown, Executive Consultant, CIMdata

8:50 am – 9:25 am | xBOM Management Across the Lifecycle

Tom Gill, Practice Manager, PLM Enterprise Value & Integration, CIMdata

9:25 am – 10:00 am | Closed-Loop Product Development

Stan Przybylinski, Vice President, CIMdata

Thursday, 9 April 2020 – SESSION 3

8:00 am – 8:20 am | Multiple View Bill of Materials Solution Evaluation Benchmarks

James Roche, Director, A&D Practice, CIMdata

8:20 am – 8:40 am | Agile Methodologies & PLM

Tom Gill, Practice Manager, PLM Enterprise and Integration, CIMdata

8:40 am – 9:00 am | Closing the Smart, Connected Lifecycle Loop with IoT

Peter Bilello, President & CEO, CIMdata

9:00 am – 9:30 am | Q&A Session

Peter Bilello, President & CEO, CIMdata

9:30 am – 9:45 am | Closing Comments

Peter Bilello, President & CEO, CIMdata

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74

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