

The Internet of (Smart) Things

PLM Leadership

The Internet of Things – and what it means for PLM

CIMdata PLM Leadership Webinar Series
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#cimdatawebinar

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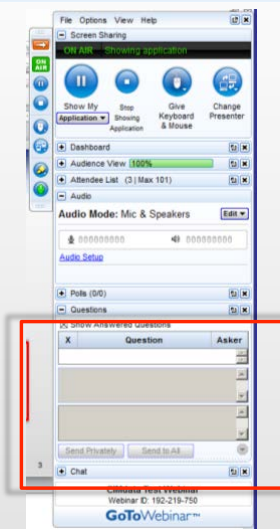
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Questions?

Please use the GoToWebinar Question panel

- Please enter questions in the GoToWebinar Question panel
- We will answer as many questions as time allows...
- Those that can't be answered live will be answered by email



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The Internet of (Smart) Things

Presenters' Profile

Your presenters' professional background



- Stan Przybylinski, VP of Research
 - Responsible for CIMdata's research program
 - 2003-2010 – Manager of Market and Competitive Intelligence at Dassault Systèmes
 - 2000-2003 – Senior Consultant at CIMdata
 - 1980-2000 – R&D work, mostly in aerospace and defense and automotive, around software technology development and deployment
- BS, MS – Mathematics, University of Vermont
- MBA – Finance, New York University
- ABD – Technology Management, University of Michigan



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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 the PLM market.

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



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The Internet of (Smart) Things

Key Takeaways

The Internet of (Smart) Things

- The Internet has transformed commerce, and enhanced human interaction, and the Internet of Things (IoT) will do it again
- The continued growth of smart, connected products can enhance customer experience in existing markets, and create new opportunities across a wide spectrum of industries
- Product companies must navigate the evolving IoT standards landscape and security issues while optimizing their products and value chains to thrive in this new world
- PLM software & service providers must adapt their offerings to support more agile and continuous development processes



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The Birth of the Internet

"Intergalactic Computer Network" goes live in 1969, Internet arises in mid-1980s

- J.C.R. Licklider of Bolt, Beranek and Newman (BBN) sent "Intergalactic Computer Network" memo in 1963
- ARPA RFQ had 140 potential bidders, ARPANET established in 1969, built by BBN
 - First operational packet switching network
 - Added TCP/IP
 - Four nodes (UCLA, UCSB, Utah, SRI – Augmentation Research Center)
 - After the "Mother of All Demos"
- No specific Internet creation date – mid-1980s
- Commercialization began in the 1990s
- The platform of all platforms?

<http://en.wikipedia.org/wiki/ARPANET>
<http://en.wikipedia.org/wiki/Internet>
<https://www.youtube.com/watch?v=yJDv-zdHzMY>

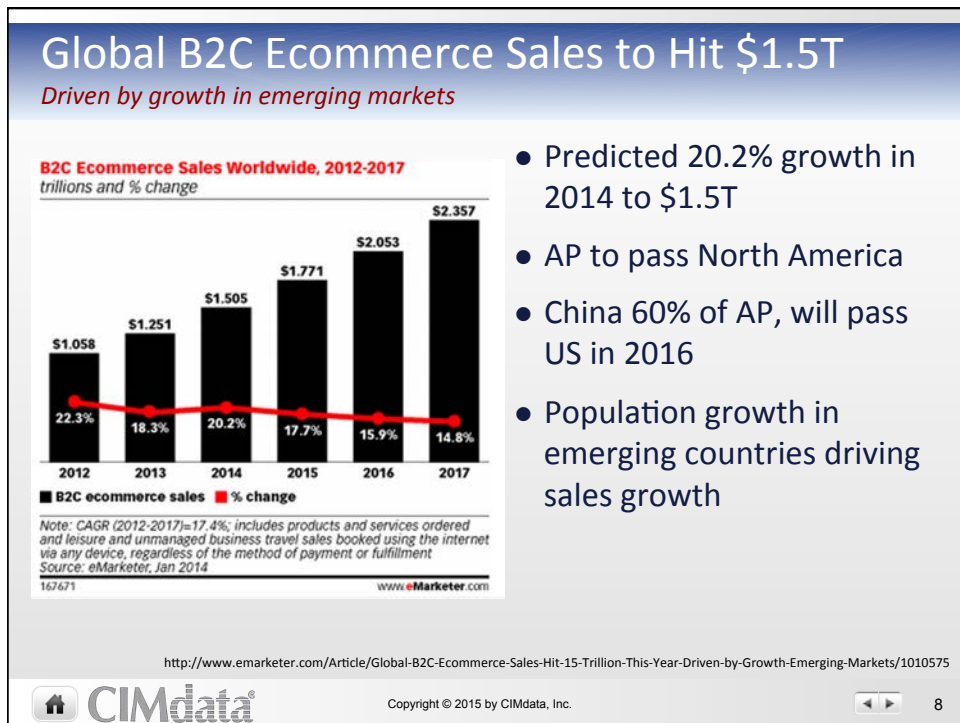
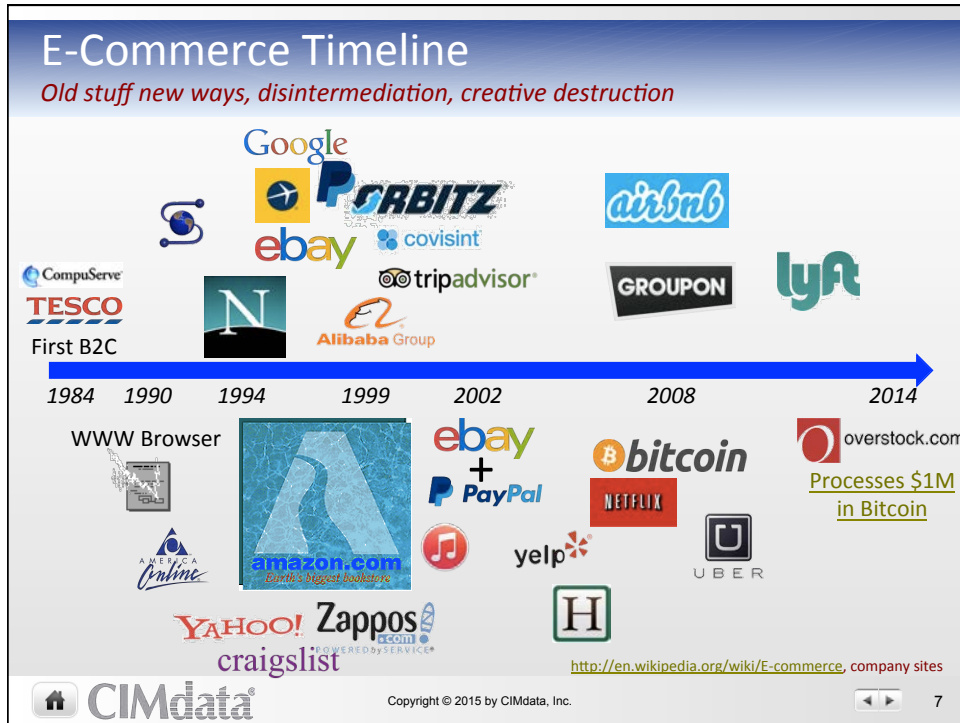


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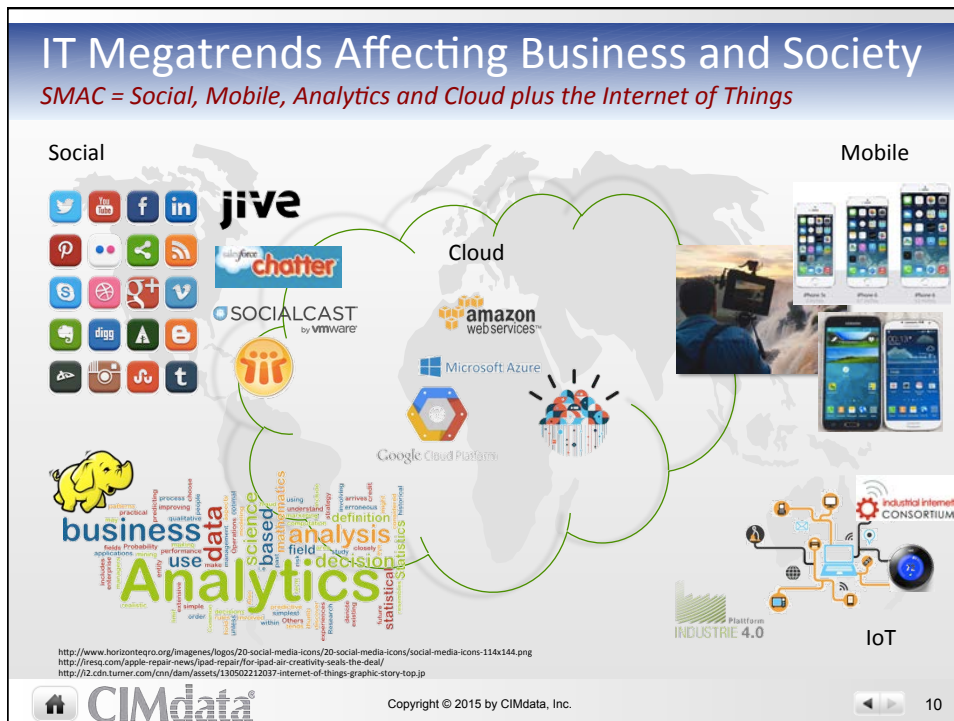
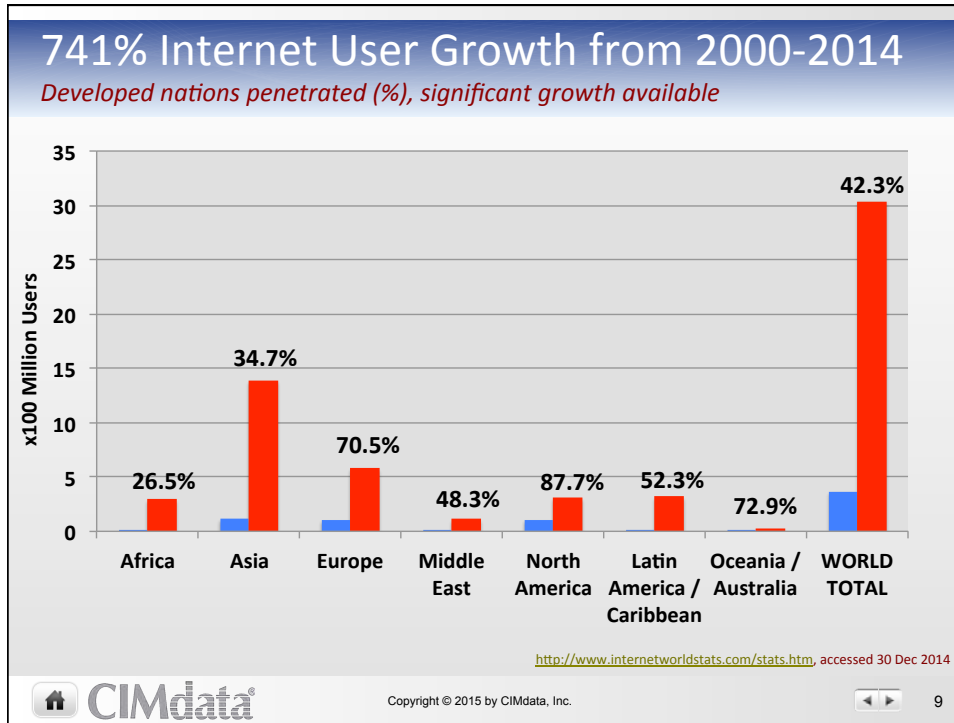


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The Internet of Things

Smart products part of larger trend driving toward IoT

- Beyond SMACI, megatrend toward expanding the reach of the Internet
 - Pervasive networking and collaboration, systems of systems
- Drivers for the Internet of Things (IoT)
 - Dramatic increase in processing power, storage, connectivity and bandwidth at ever-lower costs
 - Add in sensors for everything, usable everywhere
 - Growth of cloud, social media, and mobile computing
 - Ability to analyze Big Data and turn it into actionable information
 - Improved ability to combine technologies (both hardware and software) in more powerful ways
- Focus on the factory: Industry 4.0
 - Machine-to-Machine (M2M) often used in this domain
 - Smart Factory, the Industrial Internet
 - [Industrial Internet Consortium](#) – AT&T, Cisco, GE, IBM and Intel link up to promote IoT



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What is a Thing?

Not "The Thing" or Thing or a VW Thing – Aware, Smart and Connected



Aware
Smart
Connected



1974 Volkswagen 181 Thing



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Smart, Connected Products

Taking product value delivered through software to the next level in IoT

- Where does PLM come in? Developing products, after all
- Recent trend to delivering product value through software/electronics
- CIMdata's definition from idea through life
 - Products delivered to customers, often "fire and forget"
 - Done well in some industries that really take a full lifecycle view, e.g., elevator companies like Otis and Schindler in the 1990s
 - As-maintained data valuable, but often rare/incomplete
 - Now as-operating data readily available
- Smart is good, smart connected is better
 - Sense the local environment, collaborate locally or broadly, and potentially take (independent) action



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How Smart is a Thing?

About more than on-board computing – can it collaborate and act? SECURITY!

- Is it just a node with limited intelligence? Collecting and sharing data?
- Is it part of the infrastructure?
- Or is it a controller, an intelligent device with a user interface?
- Does it communicate only with its "base" or can it collaborate with other things?
- How much can it do on its own?
- Opportunities for smart, connected products in a wide range of industries and applications



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How Big Will IoT Be?

Depends on who you talk to and what measures you care about

- Cisco estimates 50 billion connected things globally by 2020, creating a \$19T “opportunity” (2013)
- Gartner says 26B things in 2020, product and service providers incremental revenue at \$300B in 2020, mostly services (2013)
- IDC says 30 billion connected things; IoT technology and services revenue “opportunity” from \$4.8T in 2012 to \$7.3T in 2017, with an 8.8% CAGR (2014)
 - Most immediate growth in automotive, transportation and utilities
- McKinsey says potential economic impact of IoT to be \$2.7 trillion to \$6.2 trillion per year by 2025

<http://www.in.techradar.com/news/world-of-tech/future-tech/IDC-report-highlights-growth-potential-of-Internet-of-Things/articleshow/38612359.cms>

<https://www.gartner.com/doc/2625419/forecast-internet-things-worldwide>

<http://postscapes.com/internet-of-things-market-size>

McKinsey Global Institute, Disruptive technologies: Advances that will transform life, business, and the global economy (2013)

<http://www.forbes.com/sites/gilpress/2014/08/22/internet-of-things-by-the-numbers-market-estimates-and-forecasts/>

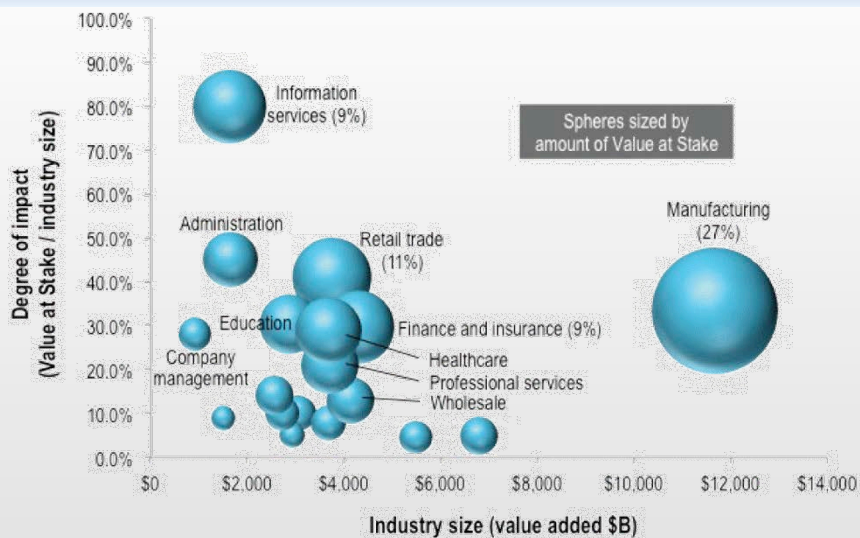


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High Value Applications

Manufacturing the biggest piece



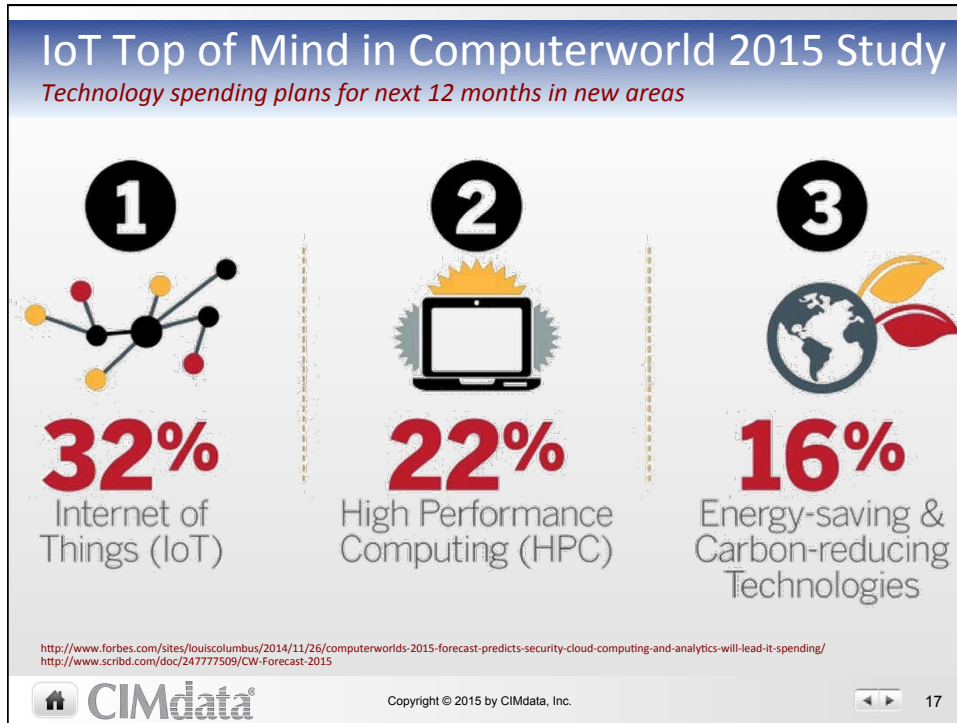
Embracing the Internet of Everything To Capture Your Share of \$14.4 Trillion, Cisco 2013.



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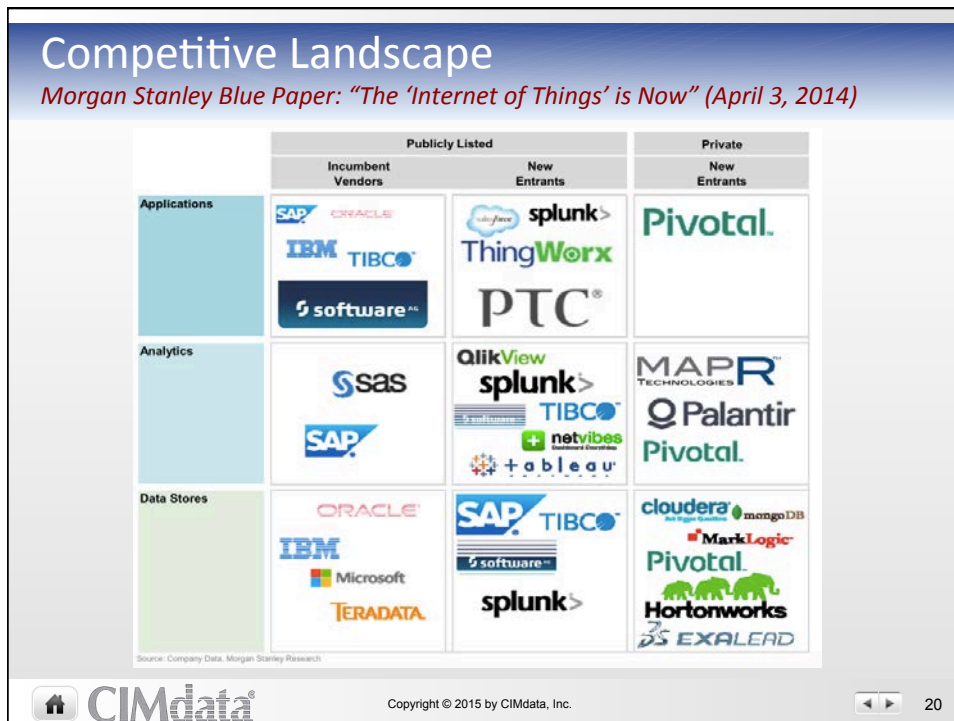
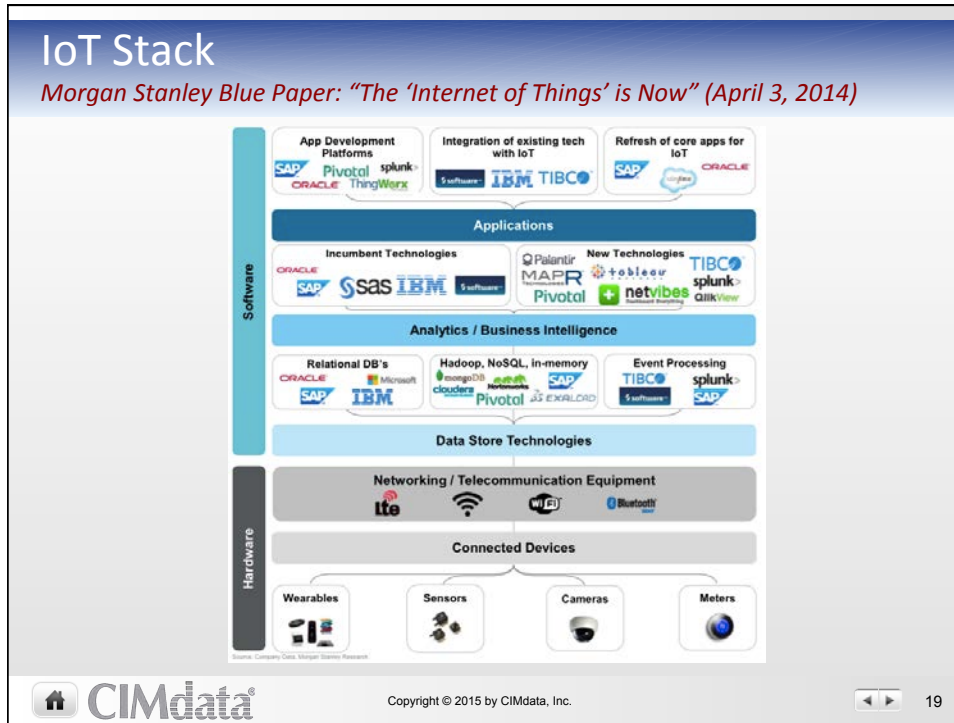
What Does this Mean to Manufacturers?

The impact of software becoming more important, IoT expands needs/reqts

- Design smart, connected products to improve customer loyalty and trust
 - Some still embracing software as part of the product, are they ready?
- Get products to market faster, update more often
- Even if you are not into servitization, an opportunity to sell more services
 - Major change to value proposition, business processes and relationships
- How do you get there? Embrace digital across your value chain, but can't do it alone
 - Many technologies, standards, regulations to navigate to deliver solutions
 - Will need to pursue acquisitions and alliances to bring in skills and technologies
 - New tools and processes required to fully embrace this new approach

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Got Standards?

No thanks, I have plenty (1 of 2)

- Standards Organizations
 - Internet Engineering Task Force
 - Association of Computing Machinery (ACM)
 - Third Generation Partnership Project 2 (3GPP2)
 - Inter-American Telecommunication Commission
 - Internet Protocol for smart object communications (IPSO)
 - Organization for the Advancement of Structured Information Standards
 - Open DeviceNet Vendors Association
 - Open Services Gateway Initiative (OSGi)
- Industry Working Groups
 - M2M Industry Working Group (M2MIWG)
 - ALLSEEN Alliance
 - Open Services Gateway Initiative (OSGi) Alliance
 - SIM Alliance
 - Zigbee Alliance
 - Continua Alliance
 - Weightless Special Interest Group



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Got Standards?

No thanks, I have plenty (2 of 2)

- Government Agencies
 - U.S. National Institute of Standards and Technology (NIST)
 - U.S. National Science Foundation (NSF)
 - ICT Standards Advisory Council of Canada (ISACC)
 - Administration of Quality Supervision, Inspection & Quarantine of the People's Republic of China (AQSIQ)
 - International Organization for Standardization (ISO)
- Other organizations
 - International Telecommunications Union (ITU)
 - M2M Standardization Task Force (MSTF)
 - Internet Protocol for Smart Object Communications (IPSO)
 - Telecommunications Industry Association (TIA)
 - CDMA Development Group (CDG)
 - GSM Association (GSMA)
 - Open Mobile Alliance (OMA)
 - Institute of Electrical and Electronics Engineers (IEEE)
 - Association of Radio Industries and Businesses (ARIB)
 - Alliance for Telecommunications Industry Solutions (ATIS)
 - China Communication Standardization Association (CCSA)



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What Does this Mean to PLM?

Solutions and services need to evolve, security an overriding issue in all applications

- Help customers design and implement systems of smart, connected things
 - Analytics get huge
 - AI advances can provide a force multiplier
 - Systems engineering, systems of systems concepts must be embraced
- Also help in creating, nurturing the value chain elements that companies need to fully leverage IoT
 - Devices, network, delivery platform, applications, and customers
 - Support relevant standards for target markets
 - Also need to acquire, partner to access needed expertise and technology
- Analytics
 - What's driving them? Requirements, in part
 - Who's doing analytics?



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What Does this Mean to PLM?

Solutions and services need to evolve, security an overriding issue in all applications

- Security is paramount
 - Often “smart” devices have no security at all, e.g., late model cars!
 - Rises in importance as things interact and make their own decisions
- PLM also one of many backend systems to support IoT-enabled and enhanced use cases
 - What data are you prepared to share?
 - What level of access can you support?
- PLM software and service providers must adapt their offerings to support more agile and continuous development processes
 - Hardware in the Loop, Software in the Loop



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What Does this Mean to PLM?

The leading PLM solution providers are responding

- PTC has revamped their strategy around the IoT
 - Several key acquisitions, revamping staff
- IBM created a new IoT business unit, investing \$3+ B
 - Includes former Rational, Maximo businesses, among others
 - Expanding Watson's reach in analytics
- SAP joined the Industrial Internet Consortium, talking "Connected Products"
- Siemens PLM Software
- Dassault Systèmes
- Autodesk emphasizing "makers", with Arduino, etc. anyone can make things



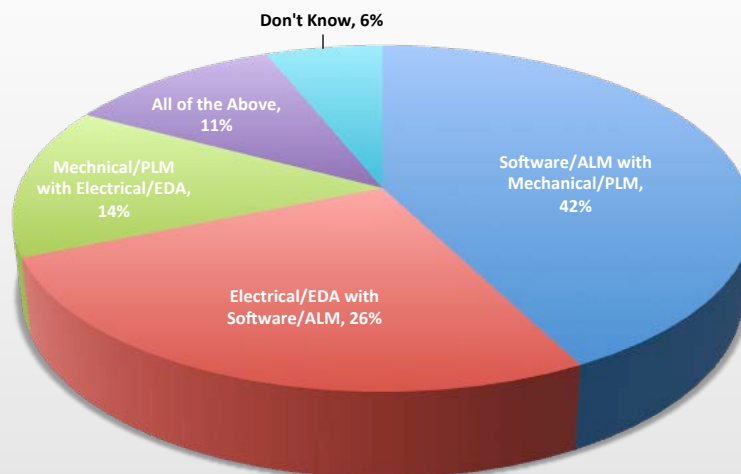
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Authoring Integration Into PLM Strategy

Source of initial motivation to investigate cross-engineering domain integrations



What's driving their curiosity?

VDC Research's 2014 Software and System Development Survey

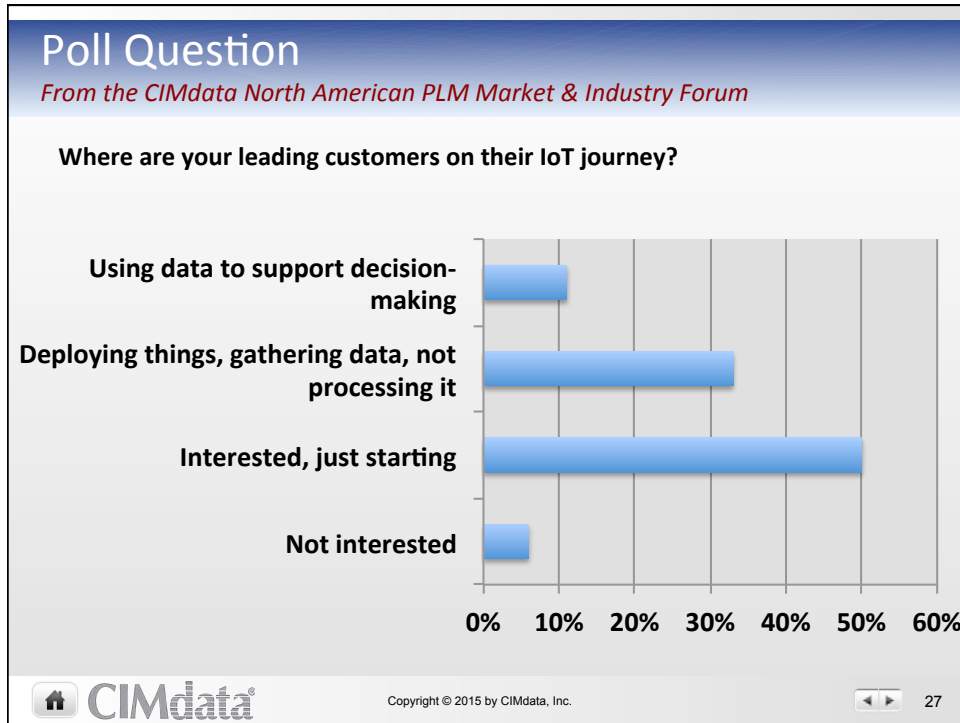


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Conclusion
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- The Internet of Things (IoT) will transform commerce
- Smart, connected products can enhance customer experience in existing markets, and create new opportunities across a wide spectrum of industries
- Product companies must navigate the evolving IoT standards landscape while optimizing their products and value chains to thrive in this new world
- PLM software and service providers must adapt their offerings to support more agile and continuous development processes, and help their industrial clients understand the landscape and to achieve their IoT objectives

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Wrap-up and Q&A

Let's hear what's on your mind?



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HTE PLM Road Map 2015

Innovating in a Nanosecond World



Innovating in a Nanosecond World

How PLM makes Innovation and Collaboration for the HTE Industry Repeatable, Sustainable and Scalable

Santa Clara Biltmore, June 16, 2015

The high technology industry is cyclical in nature, has extremely fast development cycle times, and has highly complex and integrated business collaboration supply chain models. Additionally, high tech companies tend to have multiple technical disciplines and tools. Regulation and compliance issues come into play with increasingly complex restrictions that must be efficiently and accurately addressed. This PLM Road Map event will explore these challenges and others, their impacts that often result in design delays and subpar product innovation when innovation must accelerate in this increasingly complex environment, and how PLM can and should play a key role in enabling innovation.

- 1 day single track event
- 2 CIMdata speakers
- 2 Industry key note speaker
- 7 Industry speakers
- 6 Solution provider case studies
- Collaboration Café for breaks
- June 17th – Model Based Systems Engineering Knowledge Council workshop

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Sample of PRM Topics

- ***How SunPower Deployed PLM Globally: Adopting PLM the Lean Way***

- Six years ago SunPower had a number of challenges in new product introduction—each product team had its own distinct process and system for managing configurations and changes, making cross functional collaboration difficult. In response, a small SunPower team made an attempt to launch a comprehensive, global PLM program. The plan failed to get funded. However, the need for a PLM solution did not go away, so SunPower leadership issued a challenge – to find a better way to get the same benefits faster and cheaper. This presentation will chronicle the exciting steps that came next.

- ***Doing PLM in a BIG Way***

- Inphi uses PLM to manage traditional functions like new product development, bill of materials, and document management. However, Inphi has gone beyond the traditional and uses PLM to manage a wide variety of non-traditional processes including legal and contract management, asset and equipment management, quality management, supplier management, training, and much more. Learn why Inphi chose to adopt a company-wide PLM solution and the benefits gained by this approach.



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Sample of PRM Topics

- ***Transforming Supply Base Collaboration and Integration***

- This presentation is focused on the challenges of collaboration and integration between the global automotive OEMs and their Tier-1 and lower tier suppliers and will provide a link to how these challenges are further complicated within the high tech sector. The presentation will offer a practical approach for addressing supply base collaboration and integration challenges.

- ***Divestitures – New Trend in Redefining Businesses – What About the Assets?***

- In recent years a number of companies in the high tech industry have been divesting and spinning off. This is a reversal of the extensive M&A activity of the prior decades. How are issues such as managing the data asset split, the enterprise licensing terms, and the re-deployment of the enterprise PLM best managed. The efforts to divest requires a full suite of IT projects to be fully successful. Hear how this company has been tackling its recent divestiture.



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Sample of PRM Topics

- ***Getting to the Heart of the Matter: How PLM is Enabling Edwards Lifesciences to Focus on Speed to Market***

- The use and proliferation of PLM is most mature in the automotive and aerospace markets. Many people will find it fascinating to understand the commonalities, and the differences between, these industries and lifesciences in regards to PLM. Lifescience companies are very focused on compliance, stringent approval processes, and the omnipresent FDA. At the same time, they prioritize time-to-market and agility in design and manufacturing. Learn why PLM is so important to the lifesciences industry, through the lens of a global implementation at Edwards Lifesciences; how PLM can easily prevent common FDA citations by providing traceability, verification and validation to the product development process; and more about the PLM best practices that Edwards Lifesciences is incorporating into their “Ignite” program.



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Take \$200 off the list price if you sign up to attend PLM Road Map for HTE



LOOK OUT FOR AN EMAIL WITH A SPECIAL
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