Real Life Experiences with Cloud-based PLM

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About the Presenter

• Teamcenter Discipline Lead for VMHI
• 14 years experience with PLM
• 34 years experience in IT (management, development, operations)
• Medical device, consumer products, defense, engineering services
• BS, California Institute of Technology
• MBA, UC Irvine
Sponsor Perspective

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• VMHI is a CAD/CAM/PLM software VAR, focused on Small-to-Medium Businesses

• Visit our booth in the Exhibitor display area
Agenda

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• Business Challenges and PLM
• PLM and the Cloud
• VMHI experiences with PLM in the Cloud
## Business Challenges We All Face

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<tbody>
<tr>
<td>Clear communications</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Process controls</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Finding information</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Knowledge capture &amp; reuse</td>
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<td>✓</td>
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<tr>
<td>Leveraging technology</td>
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</table>
Product Lifecycle Management Software can help:

- Better communication, version & change control, workflow, search & classification
- While common in large companies, much less so in Small-to-Medium businesses
Barriers to PLM Adoption

- Implementation costs
- Ongoing operations costs
- Managing process transition
- Cultural / organizational issues
Cloud Computing can Help Break Down the Barriers

- Cost hurdles
- Cash flow management
- Capital restrictions
- Facilities expansion
Cloud Concepts – Service Delivery Models

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- **Infrastructure as a Service (IaaS)**
  - Virtual Machine / Network

- **Platform as a Service (PaaS)**
  - IaaS + Platform Services

- **Software as a Service (SaaS)**
  - PaaS + Application
Cloud Concepts – Deployment Models

- Public Cloud
  - Shared tenancy

- Private Cloud
  - Internal only

- Hybrid
  - Private-Public mix
What is “Cloud-based PLM”?  

- PLM software running in a cloud environment  
- May be IaaS, PaaS, SaaS  
- May be Public, Private or Hybrid cloud  
- Of particular interest to many - Public cloud offerings
### Examples of Cloud-based PLM Products

<table>
<thead>
<tr>
<th>Vendor / Product</th>
<th>IAAS</th>
<th>PAAS</th>
<th>SAAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aras Spectrum</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Arena Solutions</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Autodesk PLM 360</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Dassault 3D Enovia</td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>PTC Windchill</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Siemens Teamcenter</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>
Cloud-based PLM Advantages

- Can lower implementation costs
  - Expense not capital
  - Minimal impact on existing Data Center or facilities
  - Ease of setup
  - Instant global reach via the Internet
Cloud-based PLM Advantages

• Operational cost management
  • Pay for what you use, when you use it
  • Costs tracked at a granular level
  • Staffing and facility cost relief
  • Easy expansion
Cloud Concerns - Security

- ISO 27001, ITAR, FISMA compliance
- SSAE 16 Audits
- IaaS and PaaS require more from the customer
- Customer are ultimately still responsible
Cloud Concerns - Performance

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- Bandwidth is better than ever, but is it enough?
- Application architecture and evolving network technologies have had a tremendous impact
- Most document file types can be easily accommodated
Cloud Concerns - Performance

- Large CAD/CAM files can be problematic
- SaaS options in CAE are here now
- Virtual CAD/CAM workstations on the near horizon
Cloud Concerns - Reliability, Availability, Service

- IaaS cloud providers have Service Level Agreements in place (99.95 – 99.999% availability)

- PaaS and SaaS RAS/SLAs should also be considered

- Internet service bottlenecks, hack attacks are not covered
Understanding Costs

Could be fixed or variable, depending on vendor and type of delivery model

Flat monthly fees - more typical of SaaS or managed service

Size-, service-, and activity-based fees - more typical of IaaS and PaaS
VMHI Cloud Configuration

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Western US

- VMHDMGDEMO
  - Teamcenter 10.1
  - Corporate Server
  - Windows 2012
  - SQL Server 2012

- VMHNETWORK
  - Insight Server
  - Windows 2012
  - SQL Server 2012
  - Sharepoint 2010

- VPN Gateway
- Laptop

Eastern US

- VMHTCDEMO2
  - Teamcenter 10.1
  - Web Service, FSC
  - Windows 2012

- Azure Gateway
- Laptop

- Azure Recovery Service
- Backup Vault

Laptops and Tablets:
- MS SurfacePro
- iPad
- Tc Mobility App

Servers:
- Windows 2012
- SQL Server 2012
- Sharepoint 2010
- Active Directory
- DNS
- Web Service, FSC
PLM Software Installed

- Teamcenter 9.1, 10.1, and Teamcenter Rapid Start 10.1
- Windows Server / SQL Server 2008 and 2012
- Connections through proxy server, Point-to-Site VPN and Site-to-Site VPN
- Windows AD and Teamcenter security + cloud provider protections (firewall, port restrictions, etc.)
- IaaS provisioned using Microsoft Azure™
Client platforms

Browser-based and thick clients

Integrations with:

- Siemens CAD (NX 8, 8.5, 9; SolidEdge ST6)
- SolidWorks 2014
- Teamcenter Visualization tools
- Microsoft Office
Teamcenter Modules Installed

Core Teamcenter:
- Part Management
- BOM Management
- Part Classification
- Machine Tool Library

- Document Mgt
- Trace Linking
- Workflows
Use case - Information on the Go

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Use case – Training, Demo, Testing
Results Summary

Reliability and VM performance have been excellent

Network performance has been very good, all things considered…

Costs are as expected

If considering IaaS, careful planning still required
Reliability & VM Performance

- Operational since January 2012
  - No unplanned downtime
  - 6 planned outages

- VM performance is as expected
  - Appreciate ability to increase / decrease machine size as needed
  - Usual VM perks
Performance Notes

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• Importing Assemblies:

<table>
<thead>
<tr>
<th>Network Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direction</strong></td>
</tr>
<tr>
<td>Down</td>
</tr>
<tr>
<td>Up</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>CAD Source</th>
<th># Parts</th>
<th>Total Size</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>309</td>
<td>72.9 MB</td>
<td>Import</td>
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</table>

<table>
<thead>
<tr>
<th>S2S VPN</th>
<th>P2S VPN</th>
<th>Proxy Server</th>
<th>Straight HTTP</th>
<th>Virtual Network</th>
<th>Server Console</th>
</tr>
</thead>
<tbody>
<tr>
<td>839</td>
<td>949</td>
<td>929</td>
<td>888</td>
<td>555</td>
<td>529</td>
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</table>
Performance Notes

• Working with existing parts

<table>
<thead>
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<th>Network Speed</th>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Up</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CAD Source</th>
<th># Parts</th>
<th>Total Size</th>
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</thead>
<tbody>
<tr>
<td>NX</td>
<td>40</td>
<td>12.1 MB</td>
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<table>
<thead>
<tr>
<th>Action</th>
<th>S2S VPN</th>
<th>P2S VPN</th>
<th>Proxy Server</th>
<th>Straight HTTP</th>
<th>Virtual Network</th>
<th>Server Console</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force Save All</td>
<td>109</td>
<td>94</td>
<td>104</td>
<td>102</td>
<td>125</td>
<td>100</td>
</tr>
<tr>
<td>Open Cached</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
### Performance Notes

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- **Working with existing parts**

#### Network Speed

<table>
<thead>
<tr>
<th>Direction</th>
<th>Rate (MBPS)</th>
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<tbody>
<tr>
<td>Down</td>
<td>31.5</td>
</tr>
<tr>
<td>Up</td>
<td>6.6</td>
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</table>

#### CAD Source

<table>
<thead>
<tr>
<th>CAD Source</th>
<th># Parts</th>
<th>Total Size</th>
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<tbody>
<tr>
<td>SolidWorks</td>
<td>131</td>
<td>34.8 MB</td>
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</table>

#### CAD Source

<table>
<thead>
<tr>
<th>Action</th>
<th>S2S VPN</th>
<th>P2S VPN</th>
<th>Server Console</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open assembly; checkout all</td>
<td>24</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Save all parts, no alternate reps</td>
<td>163</td>
<td>159</td>
<td>137</td>
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</table>
**Brief Cost Analysis**

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- **Your Mileage May Vary:**

<table>
<thead>
<tr>
<th>Cost Area</th>
<th>Cloud</th>
<th>On-Premises*</th>
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<tbody>
<tr>
<td>Servers (6)</td>
<td>$1,900 / mon</td>
<td>$1,500 / mon</td>
</tr>
<tr>
<td>Storage (approx. 1 TB)</td>
<td>Included</td>
<td>$150 / mon</td>
</tr>
<tr>
<td>HW Maintenance</td>
<td>Included</td>
<td>$150 / mon</td>
</tr>
<tr>
<td>Power &amp; cooling</td>
<td>Included</td>
<td>$150 / mon</td>
</tr>
<tr>
<td>Operations staff</td>
<td>Included</td>
<td>$300 / mon</td>
</tr>
<tr>
<td>Floor space</td>
<td>Included</td>
<td>$15 / mon</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>$1,900 / mon</td>
<td>$2,115 / mon</td>
</tr>
</tbody>
</table>

* Assumes cost of equipment spread evenly over 36 months
IaaS Considerations

- IaaS implementations require careful planning:
  - VM locations/groupings
  - Network structure and access
  - Application configuration and deployment

- Internal IT and/or Trusted partners still play a major role

- Managed services may be a reasonable deployment option
Conclusions

• Cloud-based PLM is real

• Performance and costs compare favorably to on-premises services, and will get better over time

• Expect all vendors to move to SaaS and / or managed services over time
Q & A

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