



# Integrated BIM

## **Chris Pennington**

Director, Energy & Utilities

Global Sales & Services

Siemens PLM







The *(Construction)* Task Force's ambition for construction is informed by our experience of radical change and **improvement in other industries**, and by our experience of delivering improvements in quality and efficiency within our own construction programmes.

*Sir John Egan Rethinking Construction Report for the UK Deputy Prime Minister* 



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#### **Challenges & Trends**

#### **Information Quality**

The right information...

#### **Collaboration**

...to the right person...

#### **Project Control**

...in the right context

#### Summary







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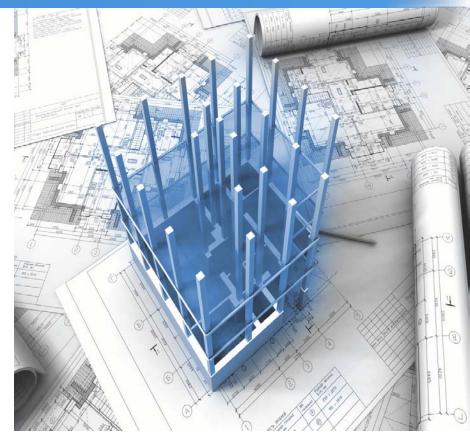




#### **Drivers for BIM**

- Predictability & Profitability
  - Accuracy of quote
  - Reduce issues on site
  - Schedule overruns

- Client & stakeholder pressure
  - Government push
- Available technology
- Benefits understood







#### **Challenges & Trends**

**Pre-fabrication** 

## Collaboration

By moving from on-site construction to manufacturing in a controlled factory environment, we can drive down costs while increasing quality

Economic pressures are forcing companies to work globally, increasing the demand for collaboration tools and driving the need for effective digital communication





## Complexity

Complex projects put more pressure on companies to perform. When ROI figures are often around two to five percent, cost overruns, delays and mistakes can result in financial loss



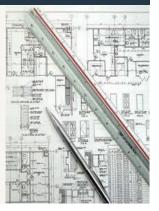




## **AEC Maturity in IT adoption**

#### Lack of project definition

Requirements 2D tools Error prone Lacking information Ambiguous



#### Inadequate Data Management

Windows folder structures Excel Lack of revision control No traceability



#### Fragmented delivery organization

Client Design company Specialist design agencies Contractors Suppliers Building occupier



#### Islands of excellence

Infrastructure 4D & 5D simulation Plant design Visualization



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#### **Product Lifecycle Management**

#### Adding value with PLM

#### Complexity

- Regulations
- Customer requirements
- Permits / Licenses
- Documents
- Improved project definition results in creation of more data

#### **Project and Process**

- Schedule deliverables
- Transmittals
- Collaboration
- Change control
- Handover













#### **Challenges & Trends**

#### **Information Quality**

The right information...

#### Collaboration

...to the right person...

## **Project Control**

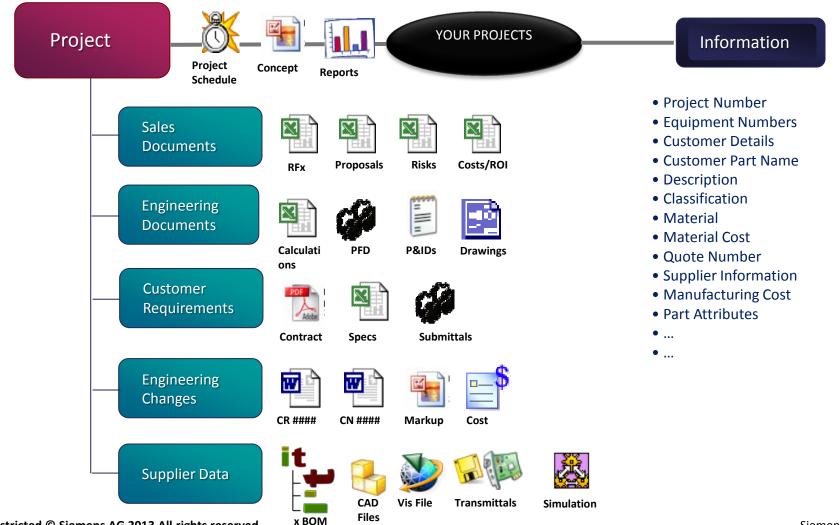
... in the right context

#### Summary





#### **Document Management – unstructured data**



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Siemens PLM Software





#### **Document Management – through the project life of a**



- Access Teamcenter from within Microsoft Office
- Edit Teamcenter data live via Microsoft Office
- Insert data from Teamcenter into Word, Excel, or PowerPoint



- Save an email to Teamcenter
- Browse & Search Teamcenter from Outlook
- Insert data from Teamcenter in Outlook messages
- Track and Manage Teamcenter tasks in Outlook

Perform Teamcenter signoff tasks in Outlook Unrestricted © Siemens AG 2013 All rights reserved.





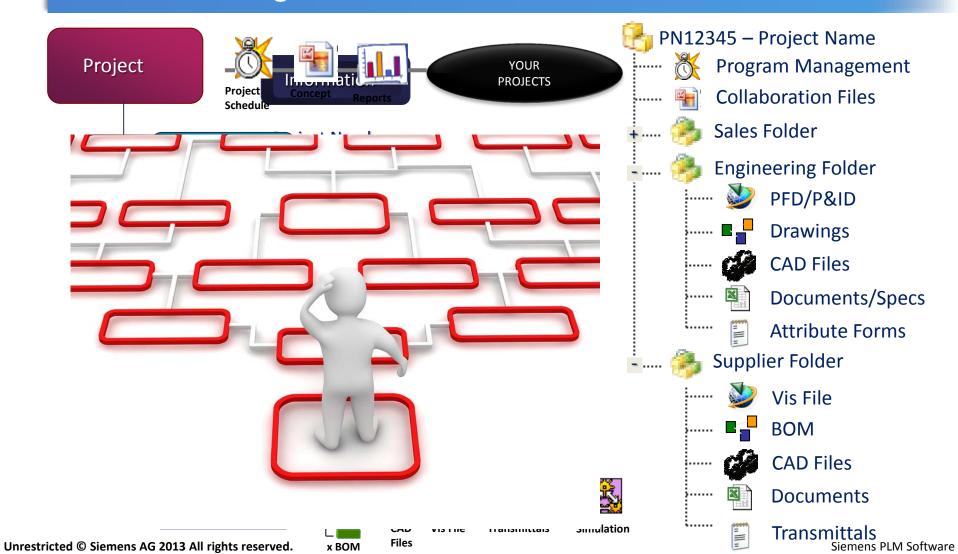








#### **Document Management – structured data**

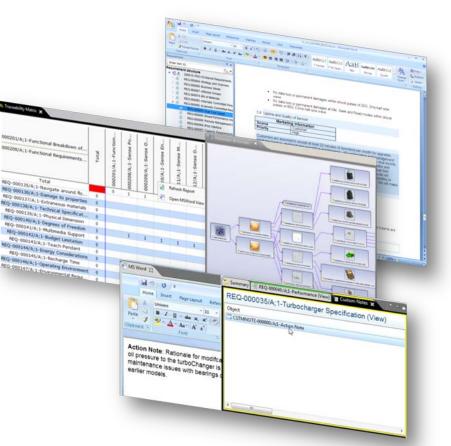






**Requirements Management** 

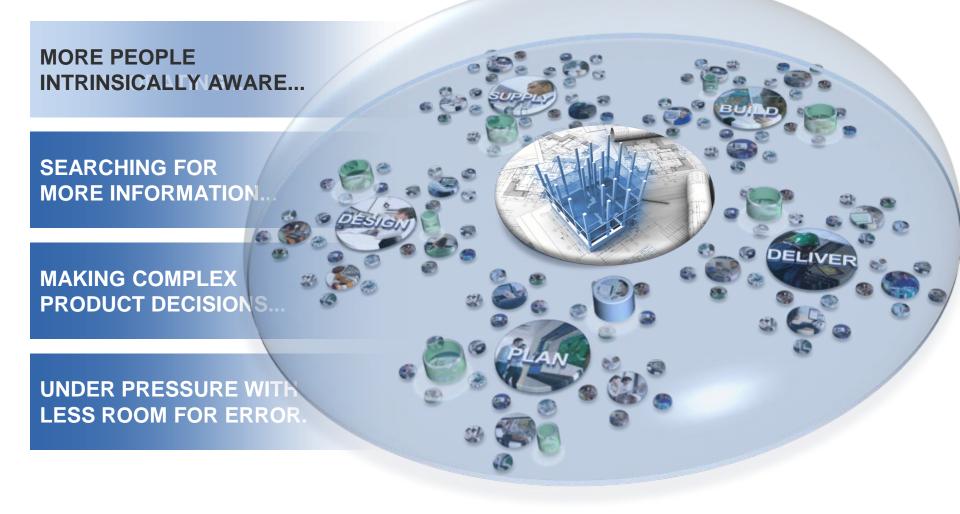
- Use standard tools such as Microsoft Office client to improve productivity
- Real-time traceability to see allocations and validate compliance
- Rationale and decision capture to enable reuse







#### Intelligently integrated information









#### **Challenges & Trends**

## **Information Quality**

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...to the right person...

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... in the right context

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#### **Transmittals**

Vendor Management

- Record vendor contact details, contracts, quality agreements
- Create vendor parts
- Manage preferred parts

#### Workflow

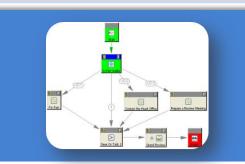
- Dynamic Participant for assignments
- Forward / backward branching
- Specify custom signoffs per Task

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- Manage supplier interaction
- Capture target and actual dates
- Report supplier status

endor		
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	Phone:	
	Email: Contact Name:	

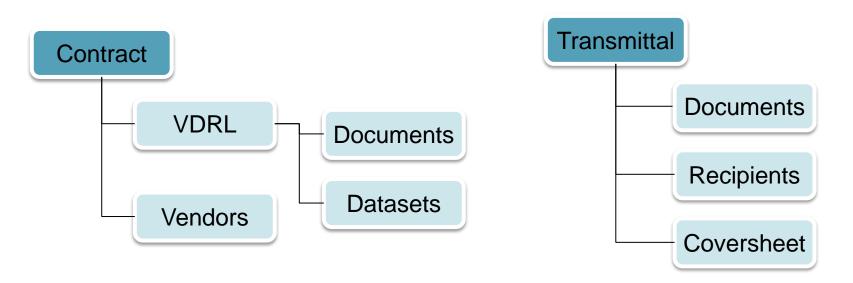
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 Capture the agreed supplier terms and conditions, provide direct access to vendor contact information, quality ratings and current tasks.

Record the data sent to the vendor, manage the transfer of data. Automatic generation of cover sheet, and ability to capture vendor response.





#### Contractors

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#### Vendor Data Requirements List (VDRL)

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	VDI_000025/A;1-Manufacturing QC book	VDRItemR	Vivian Willi	Planning		31-Jan-20
	VDI_000012/A;1-Noise Level Datasheet	VDRItemR	Vivian Willi	Planning		31-Jan-20
	VDI_000008/A;1-P&ID Diagrams	VDRItemR	Vivian Willi	Planning	31-Jan-20	
۵	VDI_000027/A;1-Control Systems Configuration	VDRItemR	Vivian Willi	Planning		
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#### **Documents being sent for review**

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#### **Transmittal Recipients**

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Senthil Kumar	senthilkumar@siemens.com	+91-44-2322422	Chennai				





#### Automatic email & cover sheet

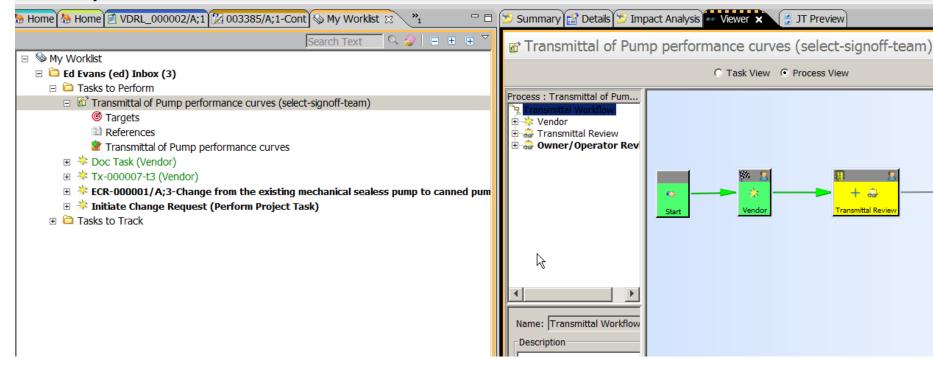
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#### **Review & Approval**

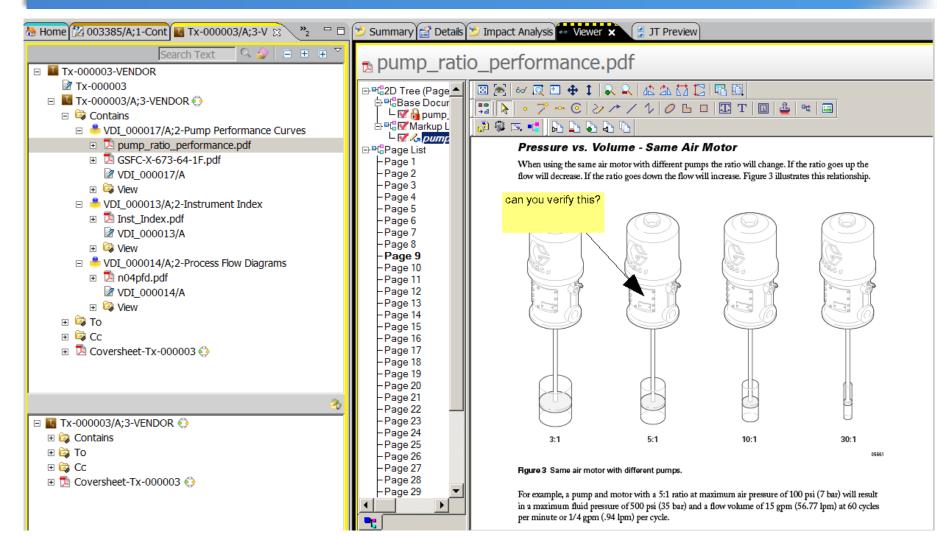
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#### **View & Markup of Documents**



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#### **Project Handover**

#### Open model for document-based data exchange

Transfer neutral files using mechanism of choice – email, ftp etc

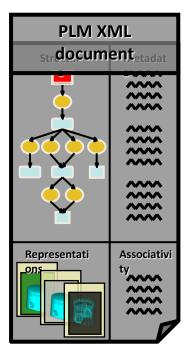
#### Provides flexibility for a rapidly changing environment

Separation of application internal data model from external view

Support for data model extensions

Simple mapping to other data models

Enables us to map to standards-of-choice



#### White Paper - PLMXML

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DELIVE

#### Intelligently integrated information

MORE PEOPLE INTRINSICALLY AWARE...

RECEIVING THER RIGHT INFORMATION...

MAKING COMPLEX PRODUCT DECISIONS

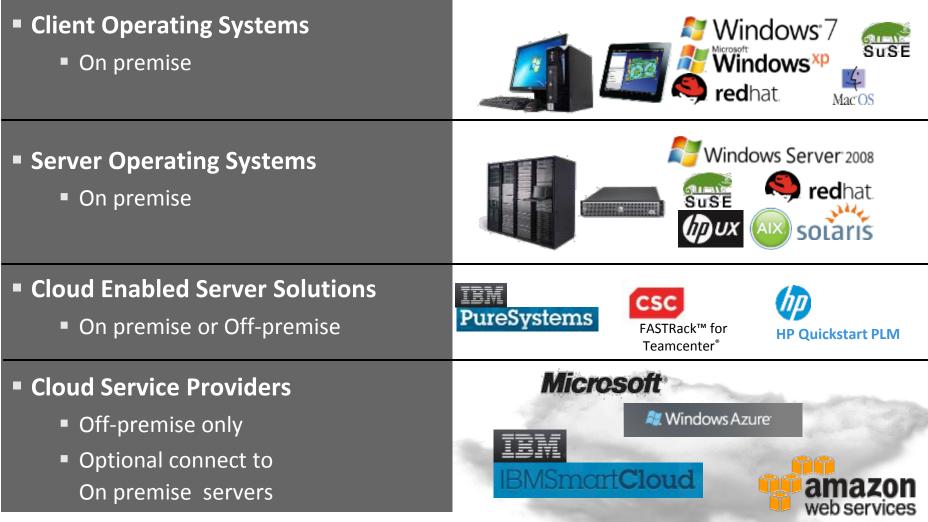
UNDER PRESSURE WITH LESS ROOM FOR ERROR.





Siemens PLM Software

#### Supported on the platforms that you use in your enterprise



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#### **Business Philosophy**

	OPEN PLM COMMUNITIES	OPEN PLM APPLICATIONS						
	<ul> <li>Open partners</li> <li>Open adopters</li> <li>Customers</li> <li>Interest groups (GAAG,)</li> <li>Standards (STEP, ISO,)</li> </ul>	<ul><li>NX</li><li>Teamcenter</li><li>Tecnomatix</li></ul>						
<b>a</b>	OPEN PLM COMPONENTS	OPEN PLM ARCHITECTURE						
	<ul> <li>Parasolid</li> <li>D-Cubed</li> <li>PLM Vis</li> <li>NX Nastran</li> <li>PLM XML SDK</li> <li>ISO14306 &amp; XT Toolkits</li> <li>FMI</li> </ul>	<ul> <li>Lifecycle data architecture</li> <li>Web services</li> <li>Knowledge Fusion</li> <li>NX automation kernel</li> </ul>						
	OPEN DATA MODEL							







#### **Challenges & Trends**

## **Information Quality**

The right information...

#### Collaboration

...to the right person...

### **Project Control**

...in the right context

#### Summary





#### **Teamcenter – Project Management Backbone**

Workflow	Schedule Manager	PPM Connector
<ul> <li>Dynamic Participant for assignments</li> <li>Forward / backward branching</li> <li>Specify custom signoffs per Task</li> </ul>	<ul> <li>Task Focused User Interface</li> <li>Specialized Change Objects PR → ECR → ECN</li> <li>Work Breakdown Structures tasks</li> </ul>	<ul> <li>Associate Deliverables and Reference Information with tasks</li> <li>Master/Sub-Schedule Management</li> <li>Extensible scheduling architecture</li> </ul>
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Change

Request

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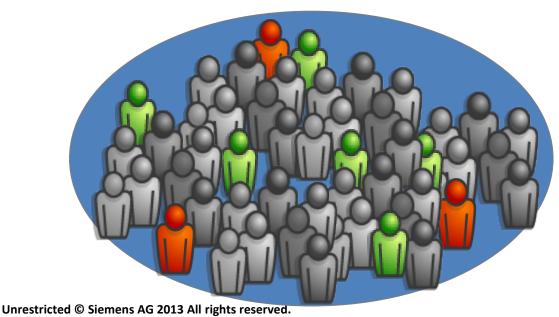
#### Program Management & Execution - Process Participants & Responsibilities

#### **Leadership Team**

Business unit managers, finance / operations, executives
 Business initiative success

#### PMO (program management office)

Planners, program managers, project managers
 Program definition, planning and management



#### **Products/Operations Organization**

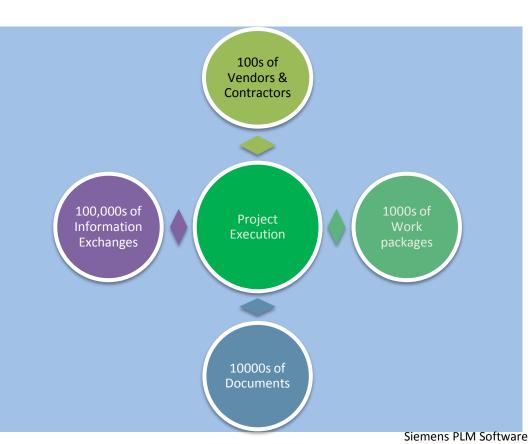
- Managers, team leaders / coordinators, team members
- $\rightarrow$  Program execution & delivery





#### **Project Execution Challenge -** Typical Project Complexity

- Concrete 460,000 cubic yards (not including concrete for site preparation).
- Reinforcing Steel and Embedded Parts 46,000 tons.
- Structural Steel, Miscellaneous Steel, and Decking 25,000 tons.
- Large Bore Pipe (> 2½ inch) 260,000 feet.
- Small Bore Pipe 430,000 feet.
- Cable Tray 220,000 feet.
- Conduit 1,200,000 feet.
- Power Cable 1,400,000 feet.
- Control Wire 5,400,000 feet.
- Process and Instrument Tubing 740,000 feet
  1000+ Equipment tag items



Source : IAEA (Gen III+ Plant)

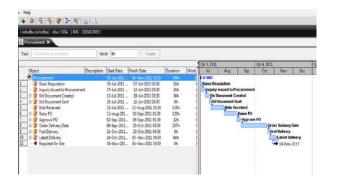




#### **Teamcenter delivers Project Execution**

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mand GB	Milling, Isolo- Pure Washington 2 Kas. to drige unit (White)	- 21	100	2	Congriss		112	1.01			TIL		11

## Master Schedule Management in Primavera

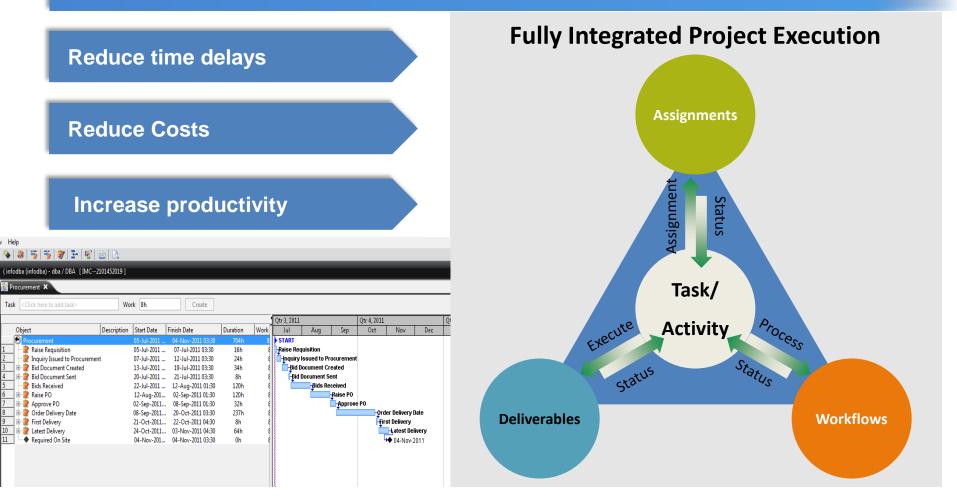


# Project ExecutionManagement in TeamcenterDrawingsDocumentsRequirementsCADSpecificationsProcesses





#### **Project Execution Management in Teamcenter**



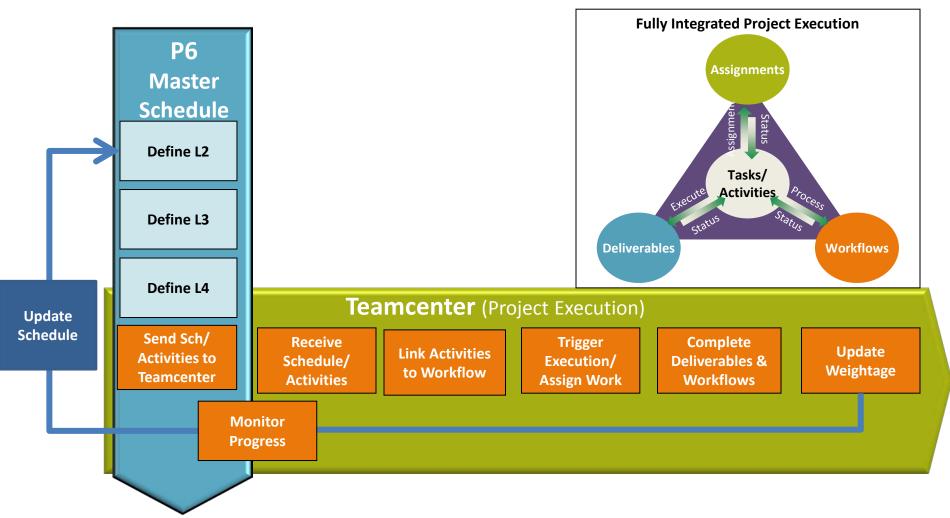
#### Drive Operational Execution Excellence Consistent with Strategy Unrestricted © Siemens AG 2013 All rights reserved.

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#### **Linking Master Schedule and Project Execution**

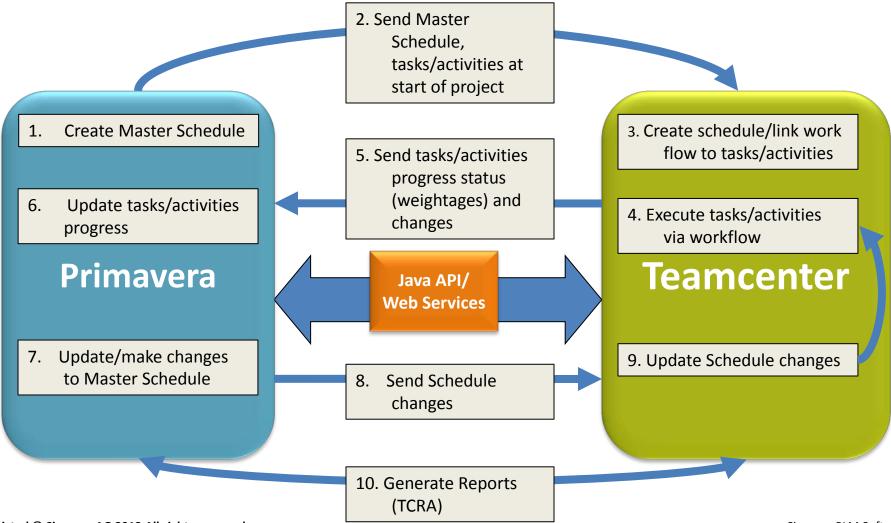


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#### **Integration Approach**



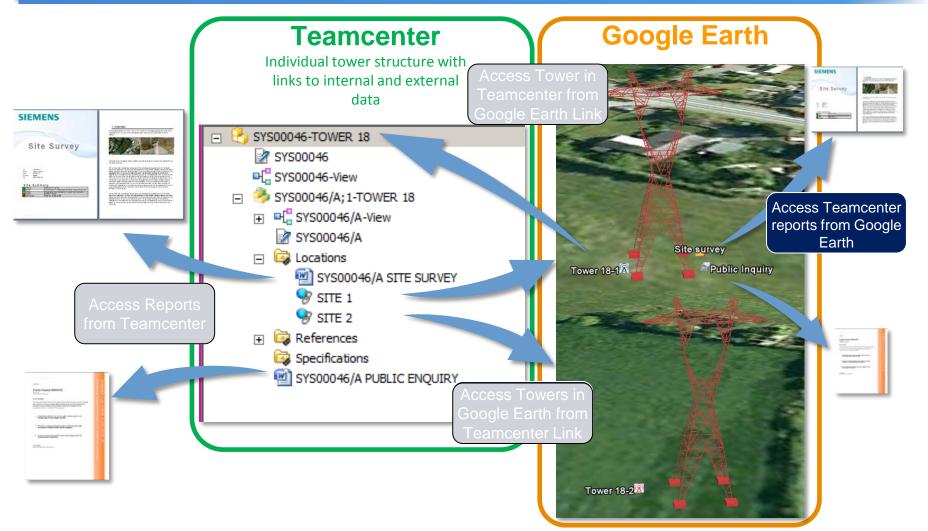
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#### **Google Earth Integration**

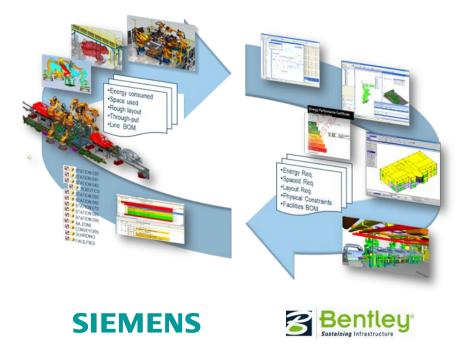


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#### **Strategic Collaboration – Bentley Systems**



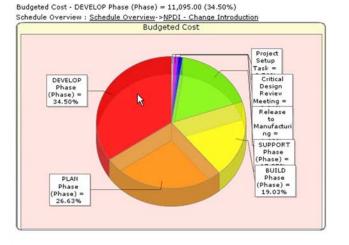
- Bi-directional transfer of information using ISO14306 (JT)
- Better design coordination
- Share knowledge between integrated lifecycles
- Predictable asset design and installation
- Reduction in launch time and costs

#### Siemens PLM and Bentley Systems – Redefining the Digital Factory

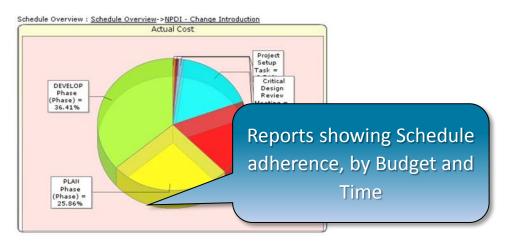


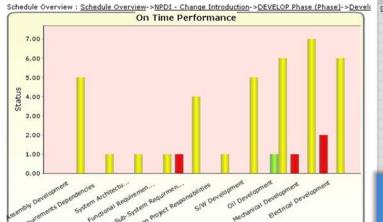


#### **Transparency** – Management Dashboards



#### **Schedule Overview**





Schedule Overview 🛧	Budgeted Cost 🛧	Actual Cost +*	Actual Eff	
E Schedule Overview	32,157.00	33,122.00	ñ	
NPDI - Change Introduction	32,157.00	33,122.00		
Milestone	0.00	0.00		
GO / NO-GO Milestone Meeting	0.00	0.00		
Release to Production	0.00	0.00		
Project Setup Task				
E Critical Design Review Meeting	E Contra de			
Final Issue Resolution	D	oporte	chow	ing status
Change Administration	L L	eports	SHOW	ing status,
Update Requirments				
Update eBOM / CAD-eBOM Ali	gnment	and o	n Mat	turity and
Project Plan Update		Jaseu u	li ivia	tunty and
Update Dashboard				
Release to Manufacturing	fi	Itorod k	av Dro	iact Dhaca
E SUPPORT Phase (Phase)		iteleu i	UY PIU	ject Phase
Quarterly Service Review				~
On-going Service Sustainment				
Support Phase Start	5,400.00	5.400.00		

**Continuous visibility** 

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DELIVE

#### Intelligently integrated information

MORE PEOPLE INTRINSICALLY AWARE...

RECEIVING THER RIGHT INFORMATION...

#### MAKING INTEGRATED SYSTEMS DECISIONS...

## ON TIME WITH URE WITH GREATER ACCURACYOR.







### **Challenges & Trends**

# Information Quality

## Collaboration

...to the right person...

## **Project Control**

... in the right context

#### Summary







**Siemens PLM is committed to AEC** *The strong position of Siemens AG provides us with unrivalled access to industry information* 



**Open Tools** *Our 'open solutions' approach enables the integration with other software tools – ERP, Program Management and Authoring* 



Support the entire lifecycle

PLM has a role to play throughout the industry lifecycle, from portfolio planning through to product decommissioning





**Integrated design and Capital project** construction management Visually and collaboratively Collaboratively manage **3D Simulation** manage the process for Integrated RFP, your innovation projects Provide a fully interactive developing and producing with respect to O/O, EPC contract and 3D environment for your equipment and suppliers specification testing and analysis management Manage the entire contracting and Develop Construct specification process **Supplier** relationship Governance and management compliance Identify and validate suppliers around the reporting world Ensure compliance and trace decisions and actions end to end Integrated **Portfolio** Construction management Plan Link Virtual development Support Gain full visibility into your with physical operational risks and construction rewards **Asset lifecycle** Maintenance, Repair and overhaul management Maintain lifecycle Manage the service-Commission/ information from design to **Sustainability** related aspects of mission decommissioning critical equipment decommissioning Execute responsible Fully leverage all business practices information required at the start-of-life or end-of-

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#### Making the HD-PLM Vision a Reality HD-PLM Investments Delivered in Every Product

