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

RETHINKING CONSTRUCTION

Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right information…

Collaboration

…to the right person…

Project Control

…in the right context

Summary

Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right information…

Collaboration

…to the right person…

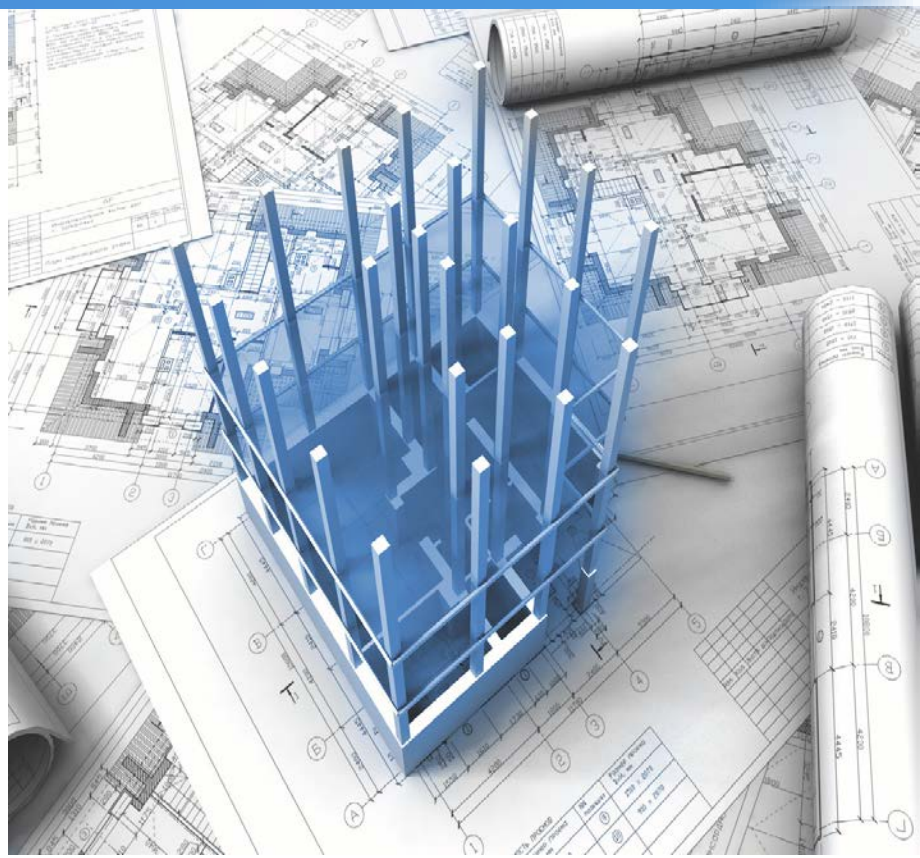
Project Control

…in the right context

Summary

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

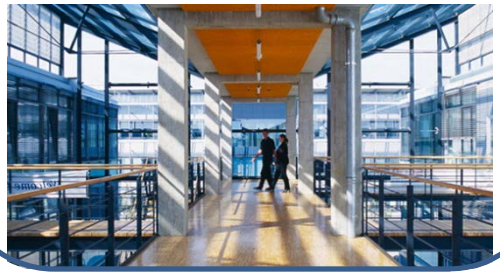
By moving from on-site construction to manufacturing in a controlled factory environment, we can drive down costs while increasing quality

Collaboration

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

Complexity

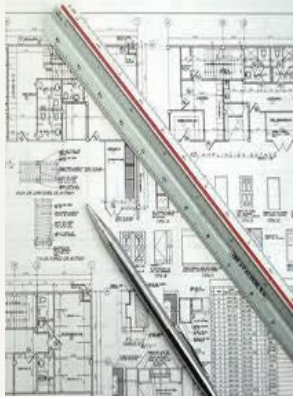
Complex projects put more pressure on companies to perform. When ROI figures are often around two to five percent, cost overruns, delays and mistakes can result in financial loss



AEC Maturity in IT adoption

Lack of project definition

Requirements
2D tools
Error prone
Lacking information
Ambiguous



Inadequate Data Management

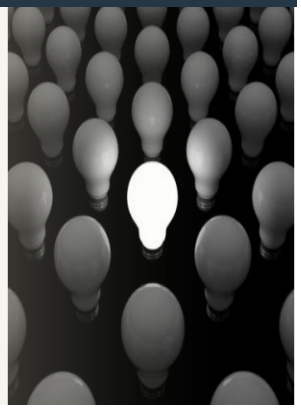
Windows folder structures
Excel
Lack of revision control
No traceability

Fragmented delivery organization

Client
Design company
Specialist design agencies
Contractors
Suppliers
Building occupier

Islands of excellence

Infrastructure
4D & 5D simulation
Plant design
Visualization



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

Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right information…

Collaboration

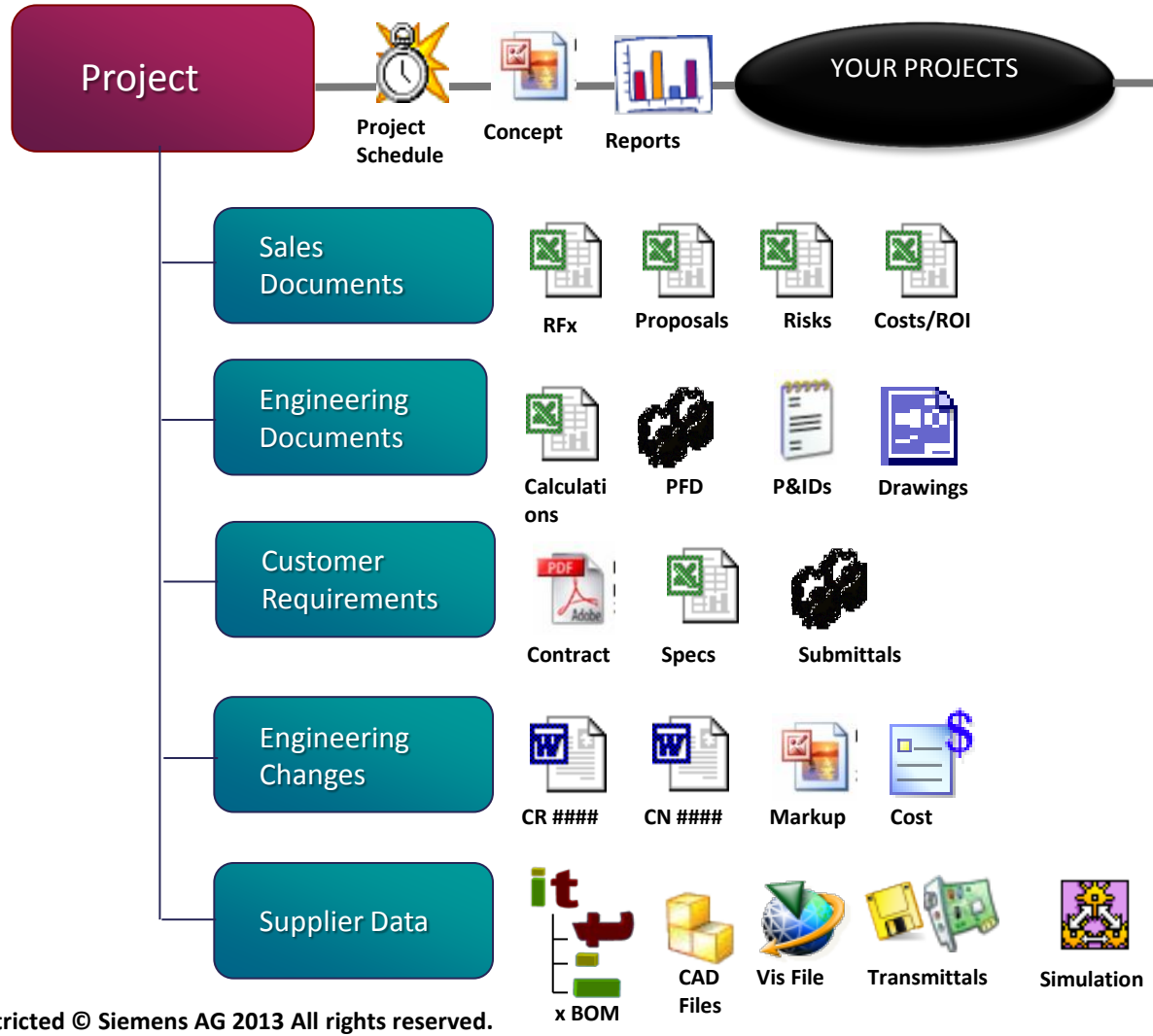
…to the right person…

Project Control

…in the right context

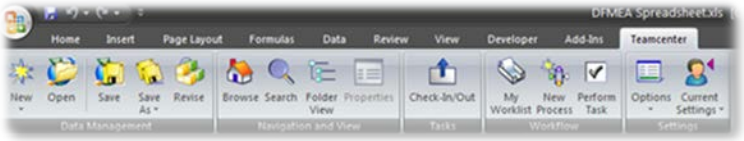
Summary

Document Management – unstructured data

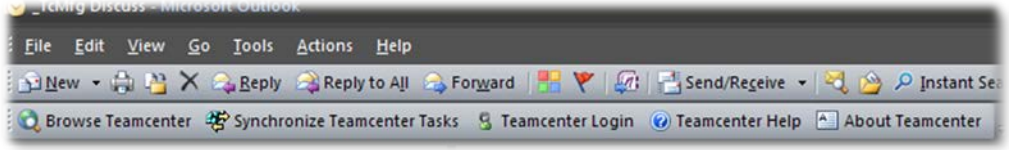


- Project Number
- Equipment Numbers
- Customer Details
- Customer Part Name
- Description
- Classification
- Material
- Material Cost
- Quote Number
- Supplier Information
- Manufacturing Cost
- Part Attributes
- …
- …

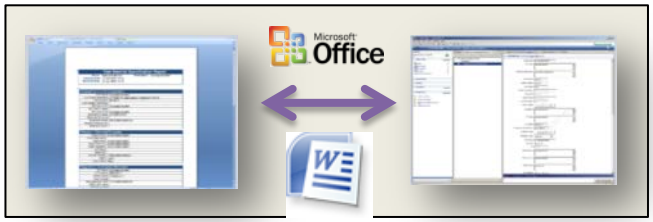
Document Management – through the project life of a

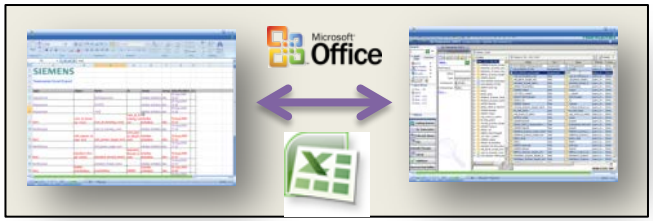


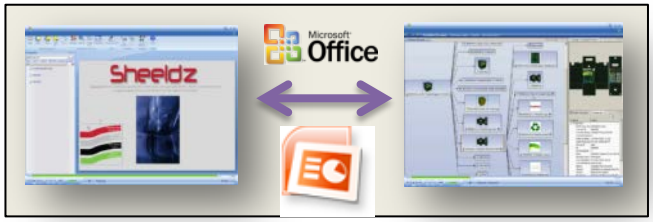
- Access Teamcenter from within Microsoft Office
- Edit Teamcenter data live via Microsoft Office
- Insert data from Teamcenter into Word, Excel, or PowerPoint



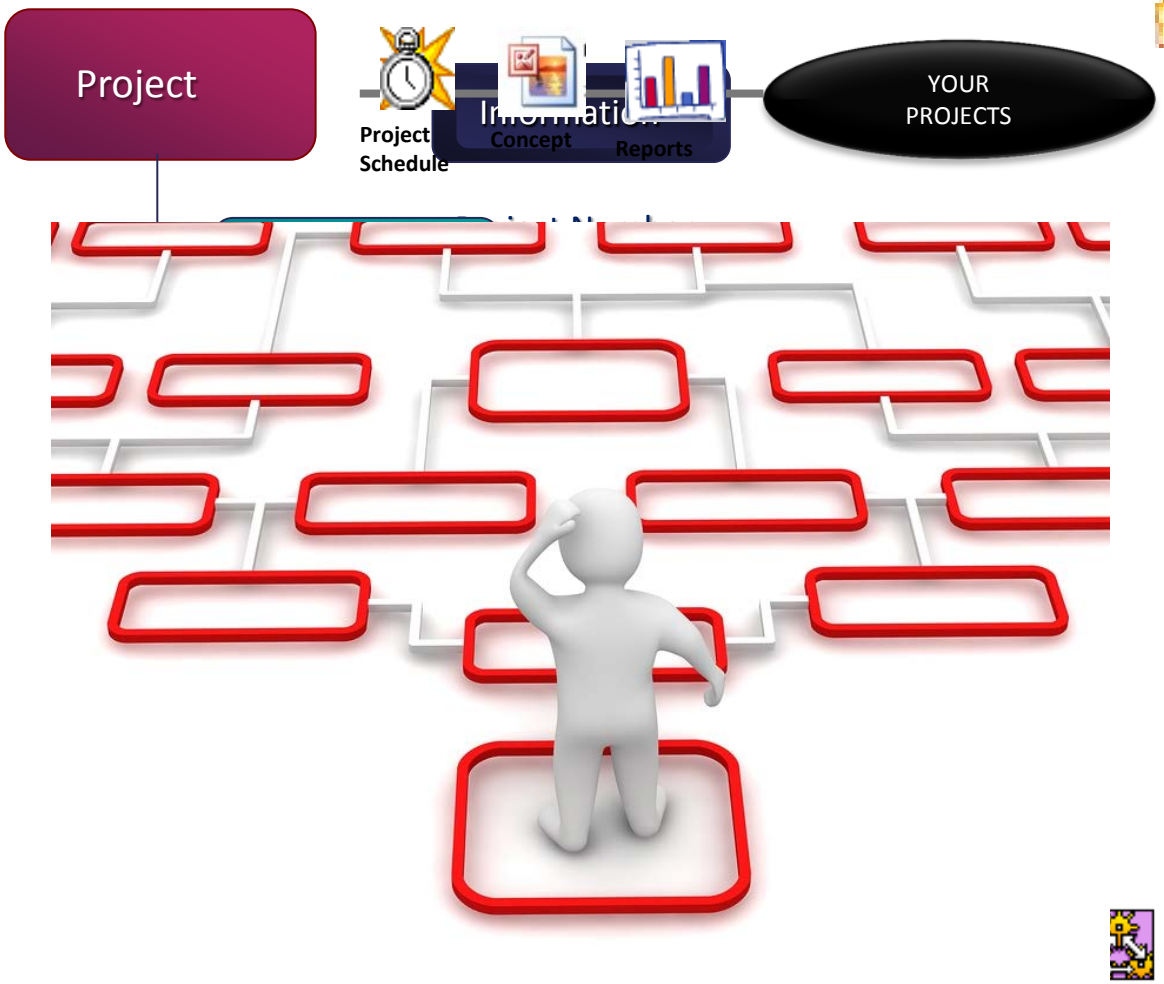
- Save an email to Teamcenter
- Browse & Search Teamcenter from Outlook
- Insert data from Teamcenter in Outlook messages
- Track and Manage Teamcenter tasks in Outlook
- Perform Teamcenter signoff tasks in Outlook





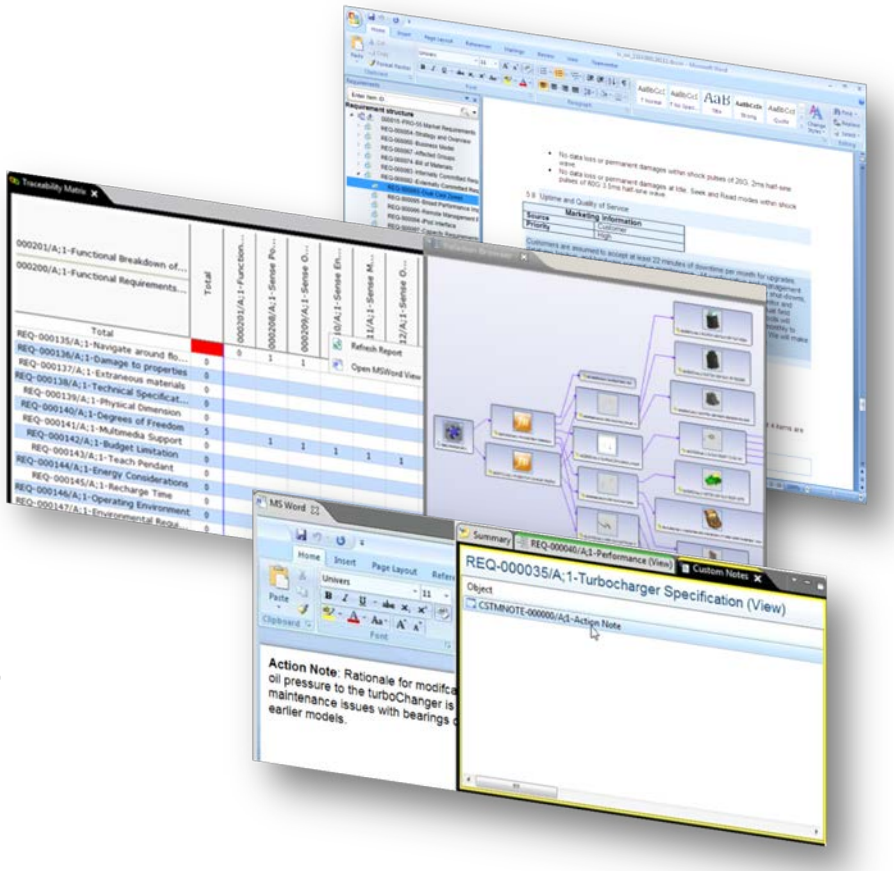


Document Management – structured data



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**



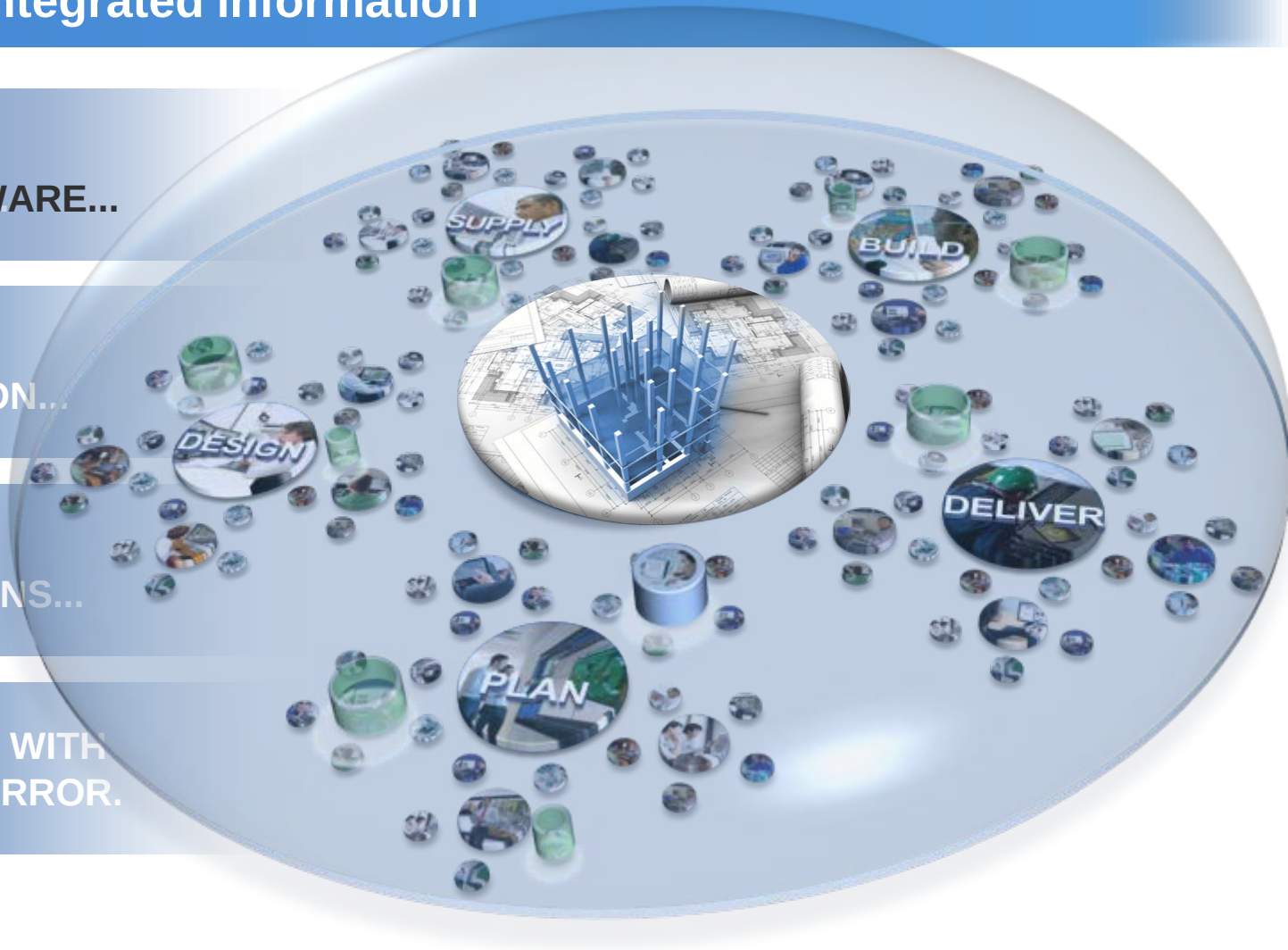
Intelligently integrated information

MORE PEOPLE INTRINSICALLY AWARE...

SEARCHING FOR MORE INFORMATION...

MAKING COMPLEX PRODUCT DECISIONS...

UNDER PRESSURE WITH LESS ROOM FOR ERROR.



Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right information…

Collaboration

…to the right person…

Project Control

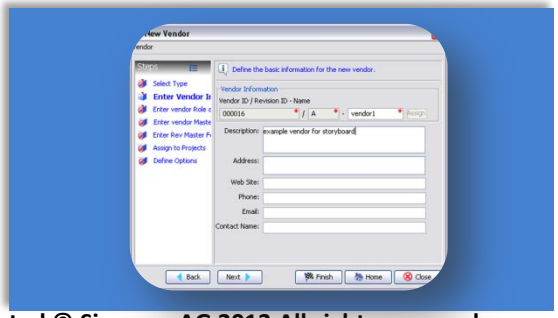
…in the right context

Summary

Transmittals

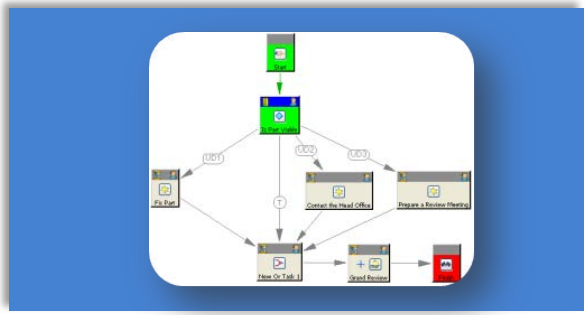
Vendor Management

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



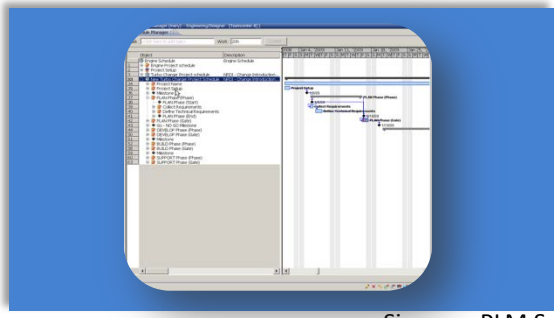
Workflow

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

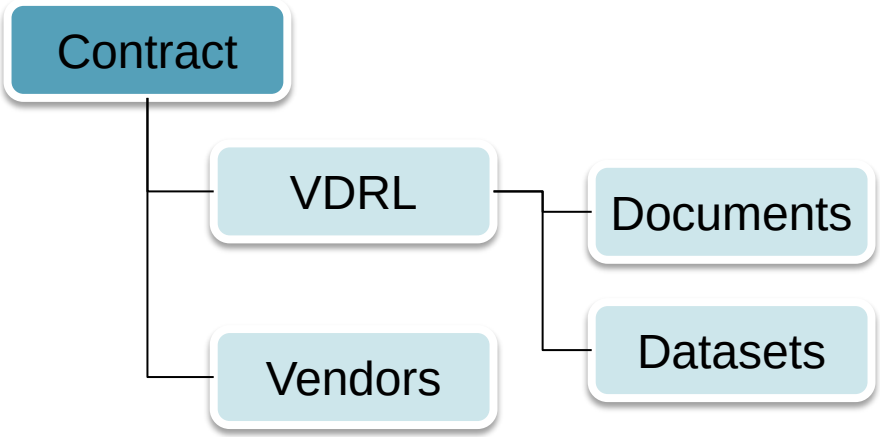


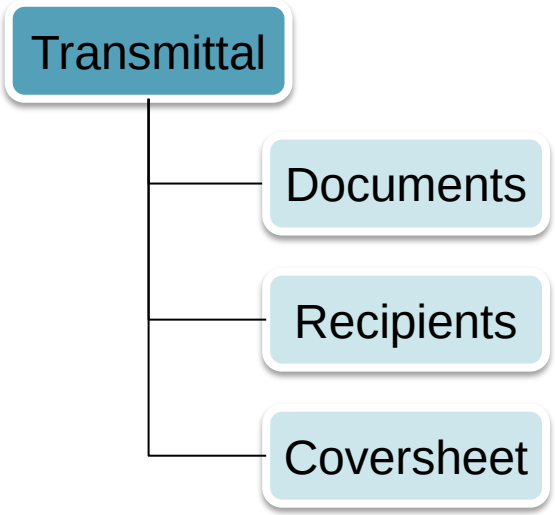
Schedule Manager

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



Supplier Interaction

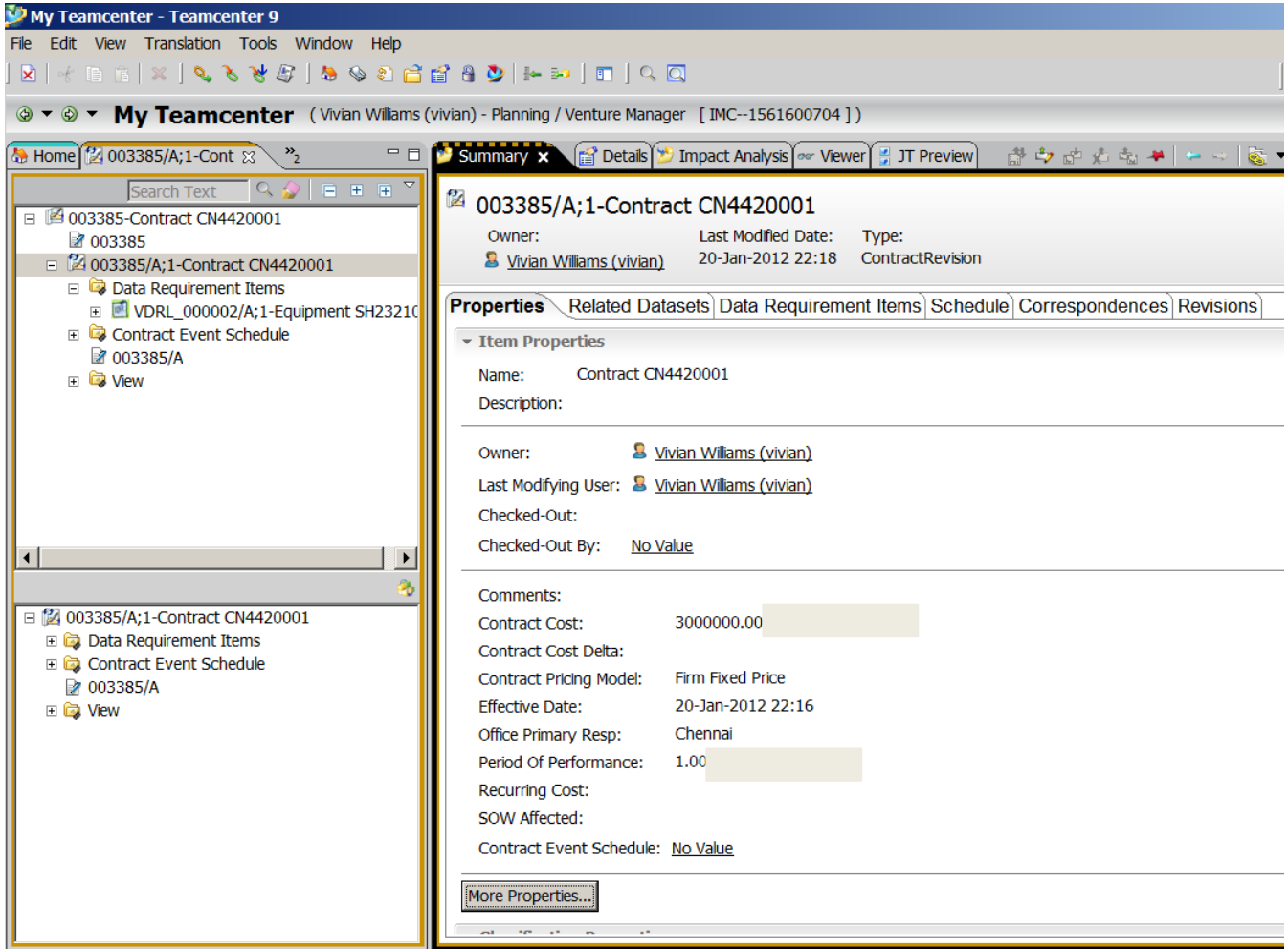




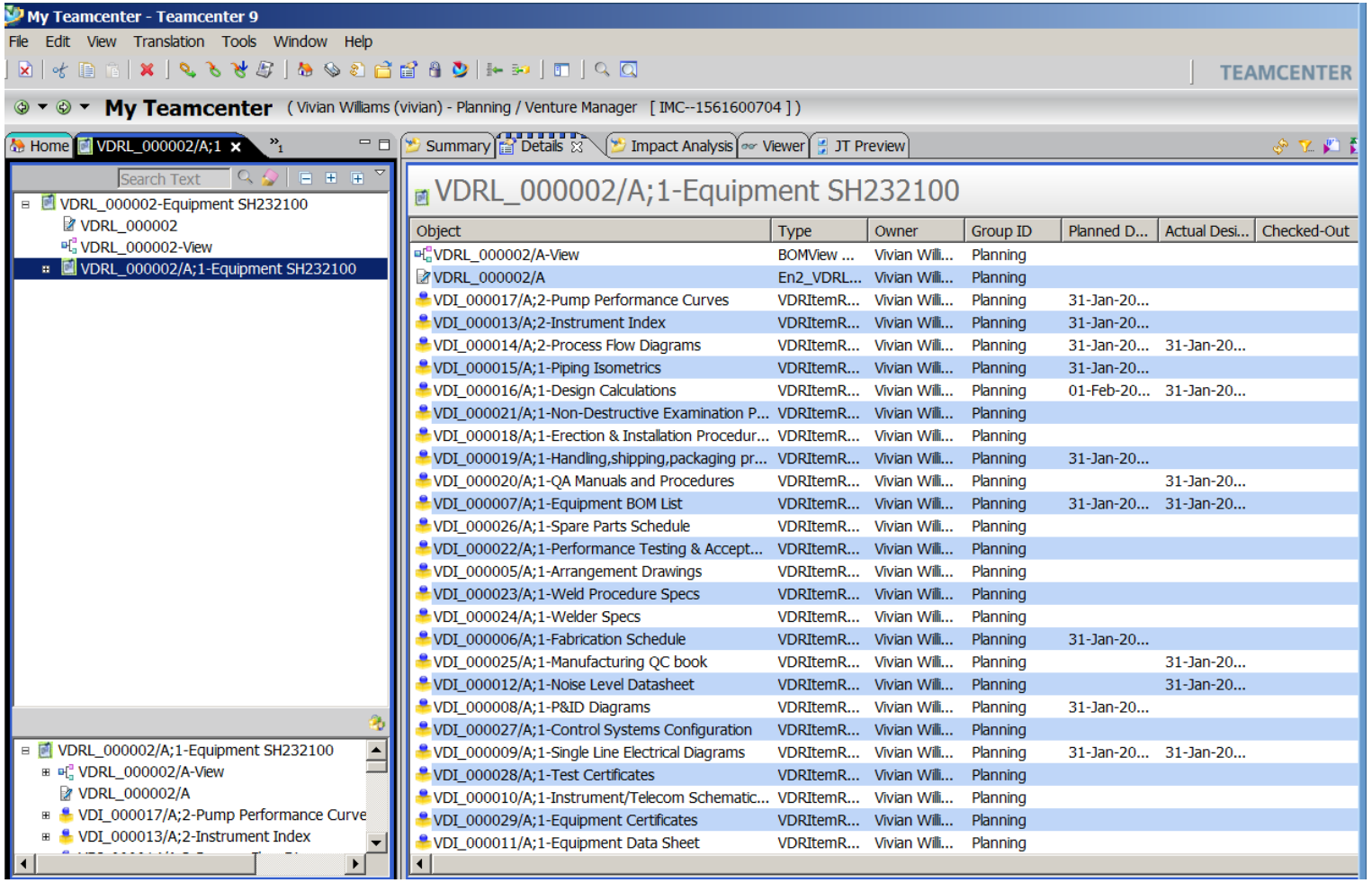
- Capture the agreed supplier terms and conditions, provide direct access to vendor contact information, quality ratings and current tasks.

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

Contractors

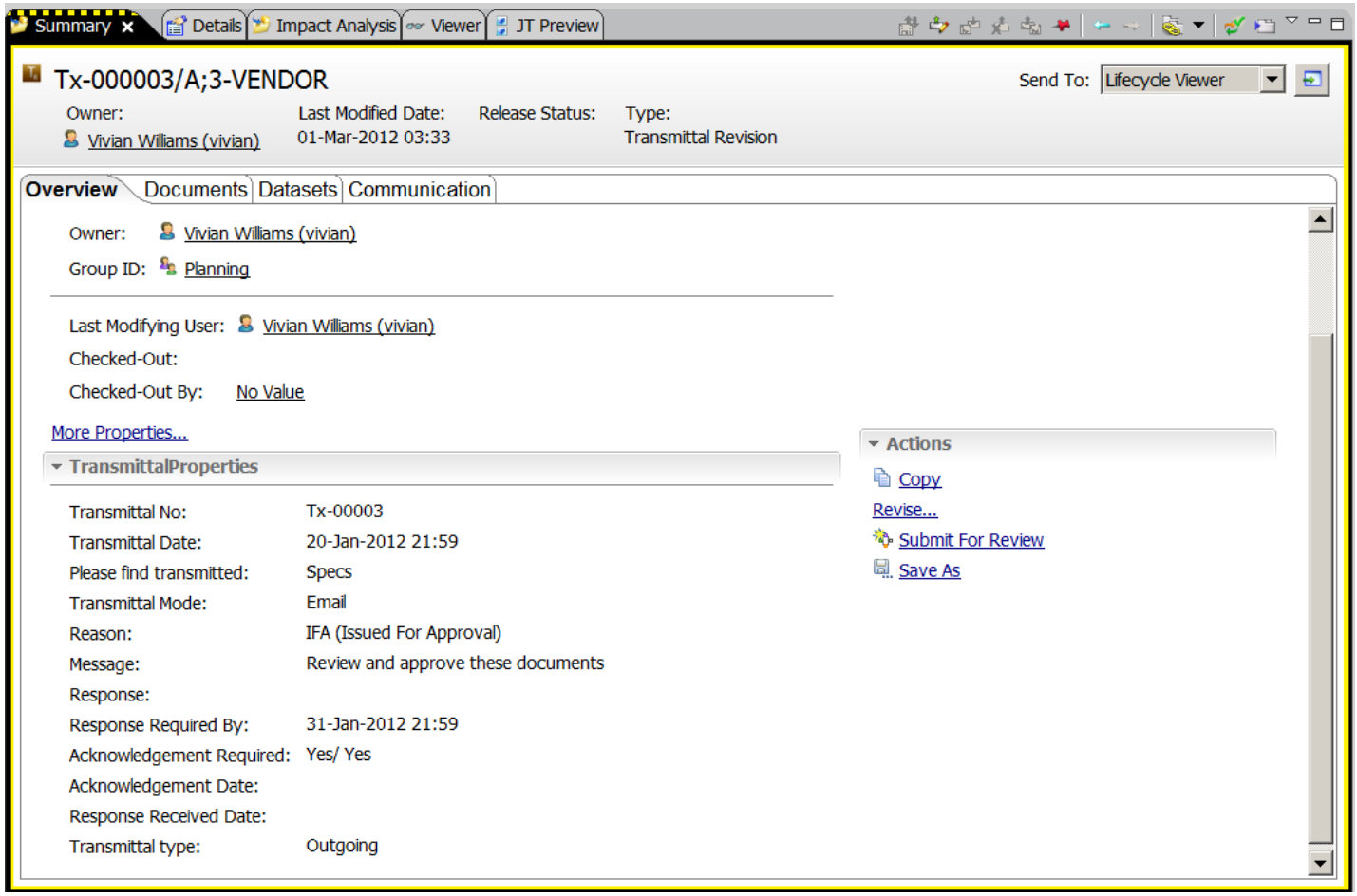


Vendor Data Requirements List (VDRL)

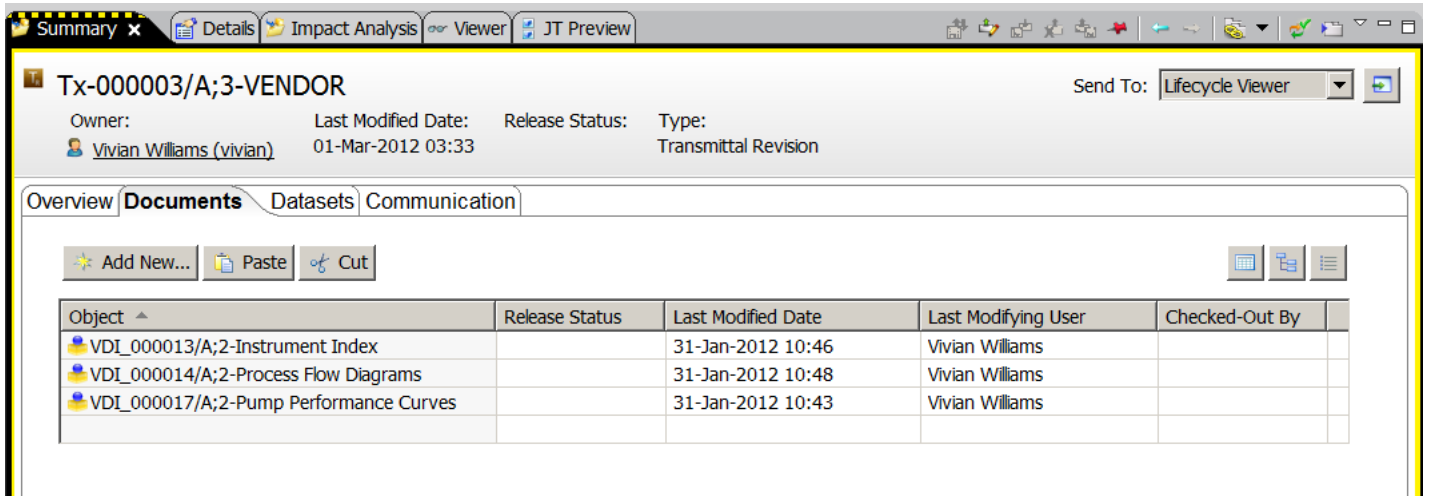


Object	Type	Owner	Group ID	Planned D...	Actual Desi...	Checked-Out
VDRL_000002/A-View	BOMView ...	Vivian Willi...	Planning			
VDRL_000002/A	En2_VDRL...	Vivian Willi...	Planning			
VDI_000017/A;2-Pump Performance Curves	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...		
VDI_000013/A;2-Instrument Index	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...		
VDI_000014/A;2-Process Flow Diagrams	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...	31-Jan-20...	
VDI_000015/A;1-Piping Isometrics	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...		
VDI_000016/A;1-Design Calculations	VDRItemR...	Vivian Willi...	Planning	01-Feb-20...	31-Jan-20...	
VDI_000021/A;1-Non-Destructive Examination P...	VDRItemR...	Vivian Willi...	Planning			
VDI_000018/A;1-Erection & Installation Procedur...	VDRItemR...	Vivian Willi...	Planning			
VDI_000019/A;1-Handling,shipping,packaging pr...	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...		
VDI_000020/A;1-QA Manuals and Procedures	VDRItemR...	Vivian Willi...	Planning		31-Jan-20...	
VDI_000007/A;1-Equipment BOM List	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...	31-Jan-20...	
VDI_000026/A;1-Spare Parts Schedule	VDRItemR...	Vivian Willi...	Planning			
VDI_000022/A;1-Performance Testing & Accept...	VDRItemR...	Vivian Willi...	Planning			
VDI_000005/A;1-Arrangement Drawings	VDRItemR...	Vivian Willi...	Planning			
VDI_000023/A;1-Weld Procedure Specs	VDRItemR...	Vivian Willi...	Planning			
VDI_000024/A;1-Welder Specs	VDRItemR...	Vivian Willi...	Planning			
VDI_000006/A;1-Fabrication Schedule	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...		
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...		
VDI_000027/A;1-Control Systems Configuration	VDRItemR...	Vivian Willi...	Planning			
VDI_000009/A;1-Single Line Electrical Diagrams	VDRItemR...	Vivian Willi...	Planning	31-Jan-20...	31-Jan-20...	
VDI_000028/A;1-Test Certificates	VDRItemR...	Vivian Willi...	Planning			
VDI_000010/A;1-Instrument/Telecom Schematic...	VDRItemR...	Vivian Willi...	Planning			
VDI_000029/A;1-Equipment Certificates	VDRItemR...	Vivian Willi...	Planning			
VDI_000011/A;1-Equipment Data Sheet	VDRItemR...	Vivian Willi...	Planning			

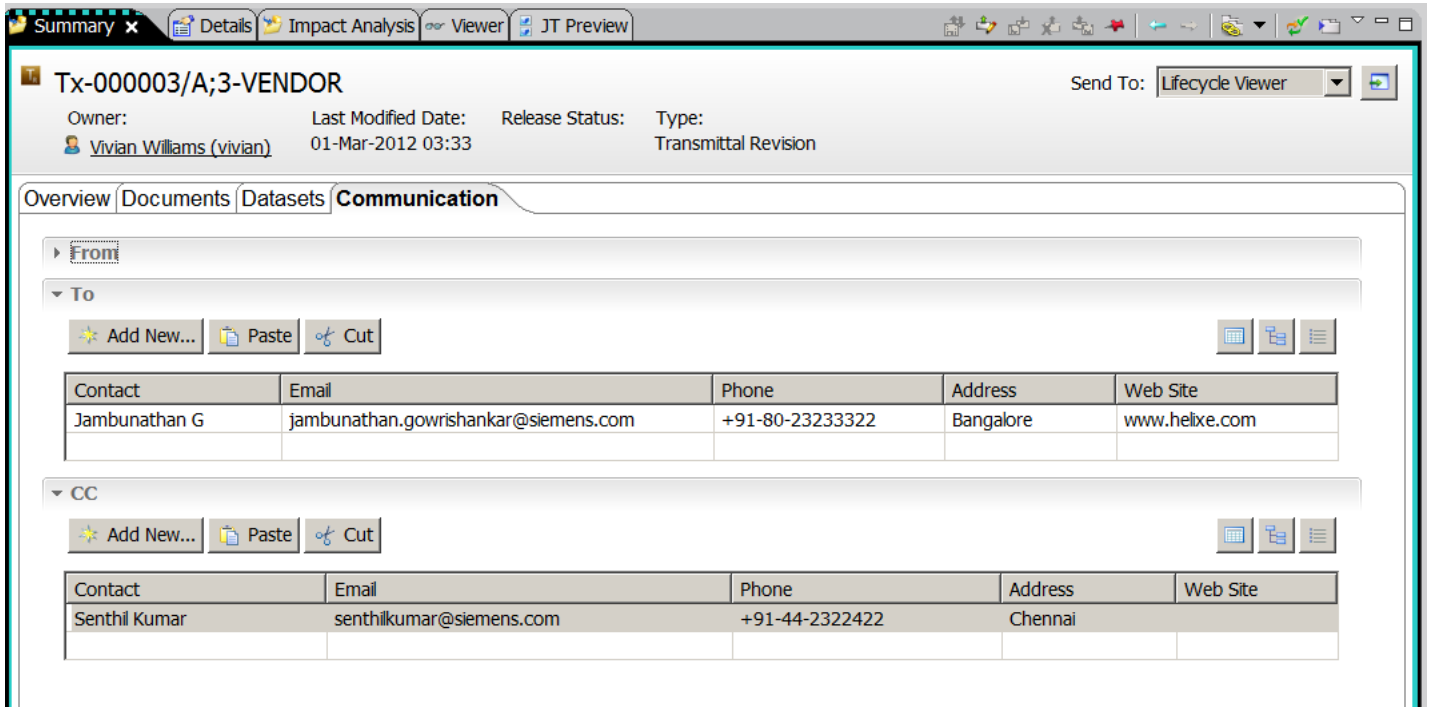
Create/update Transmittals



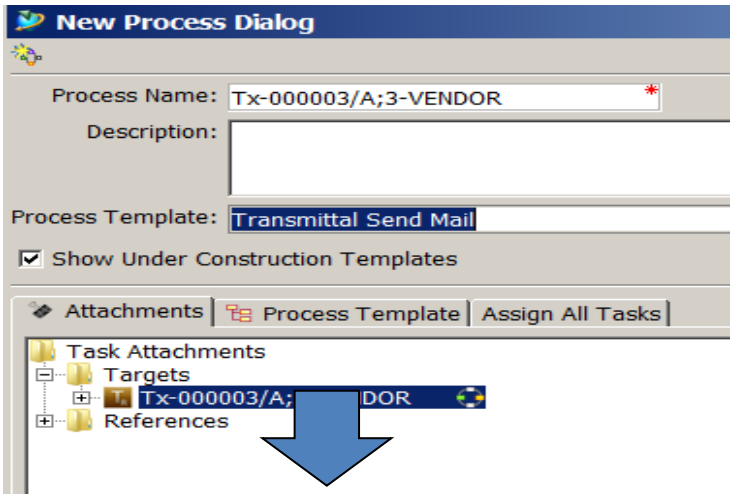
Documents being sent for review

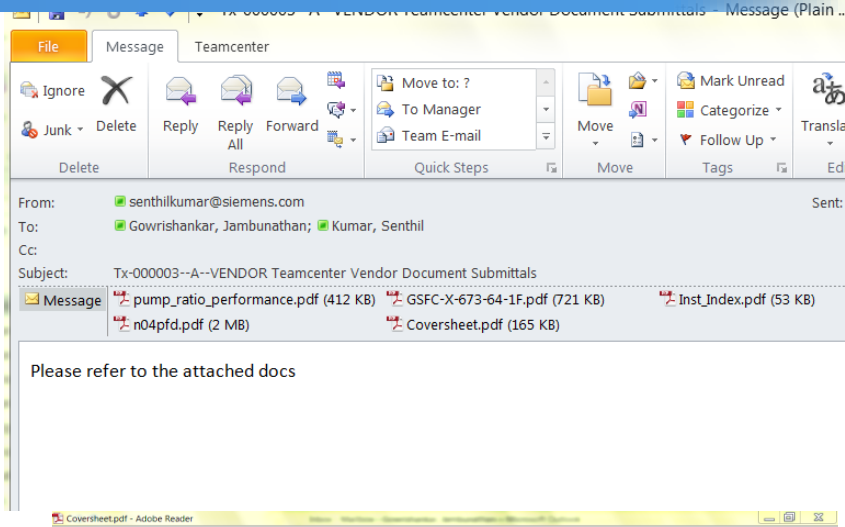


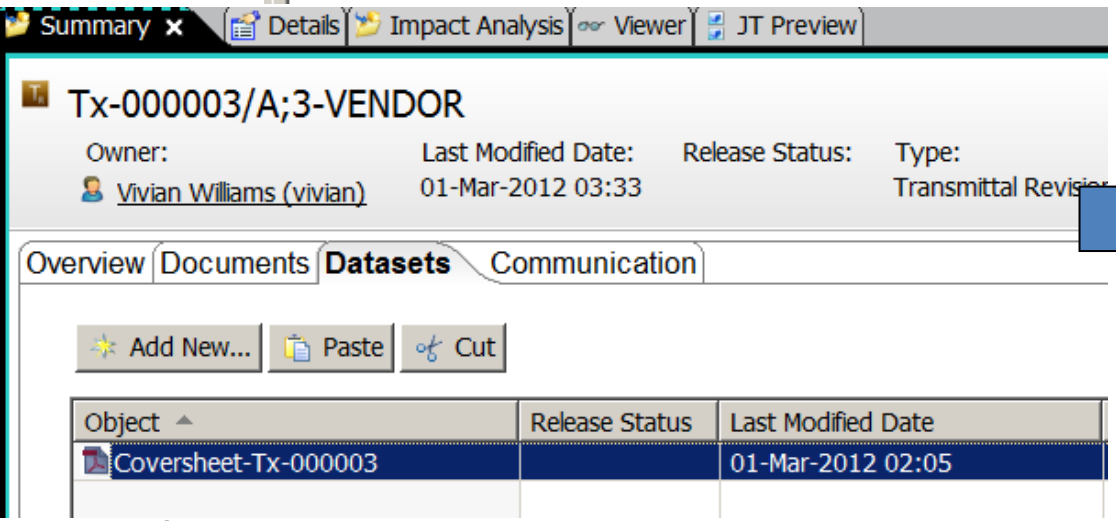
Transmittal Recipients

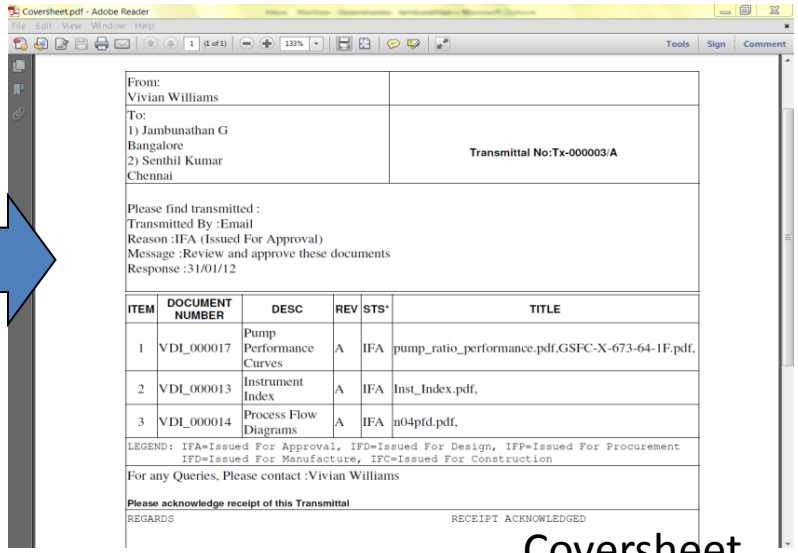


Automatic email & cover sheet



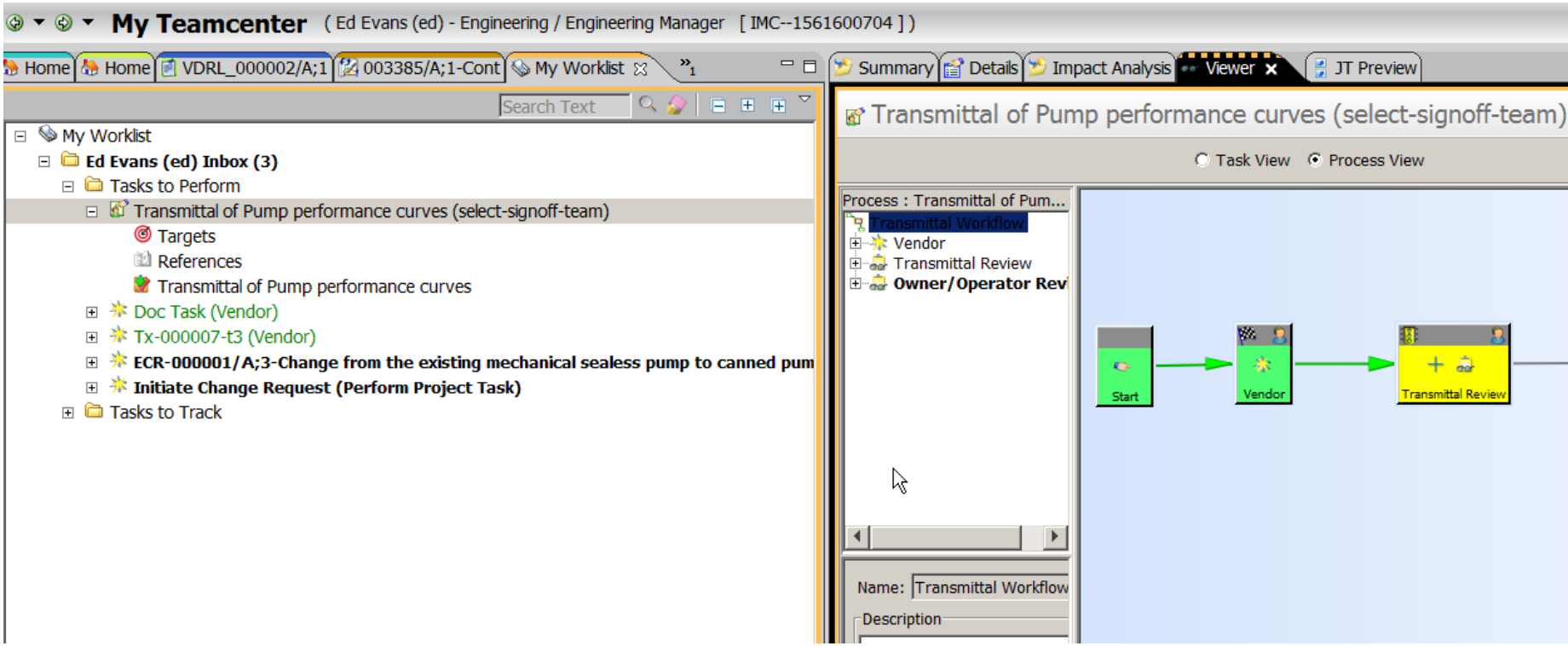




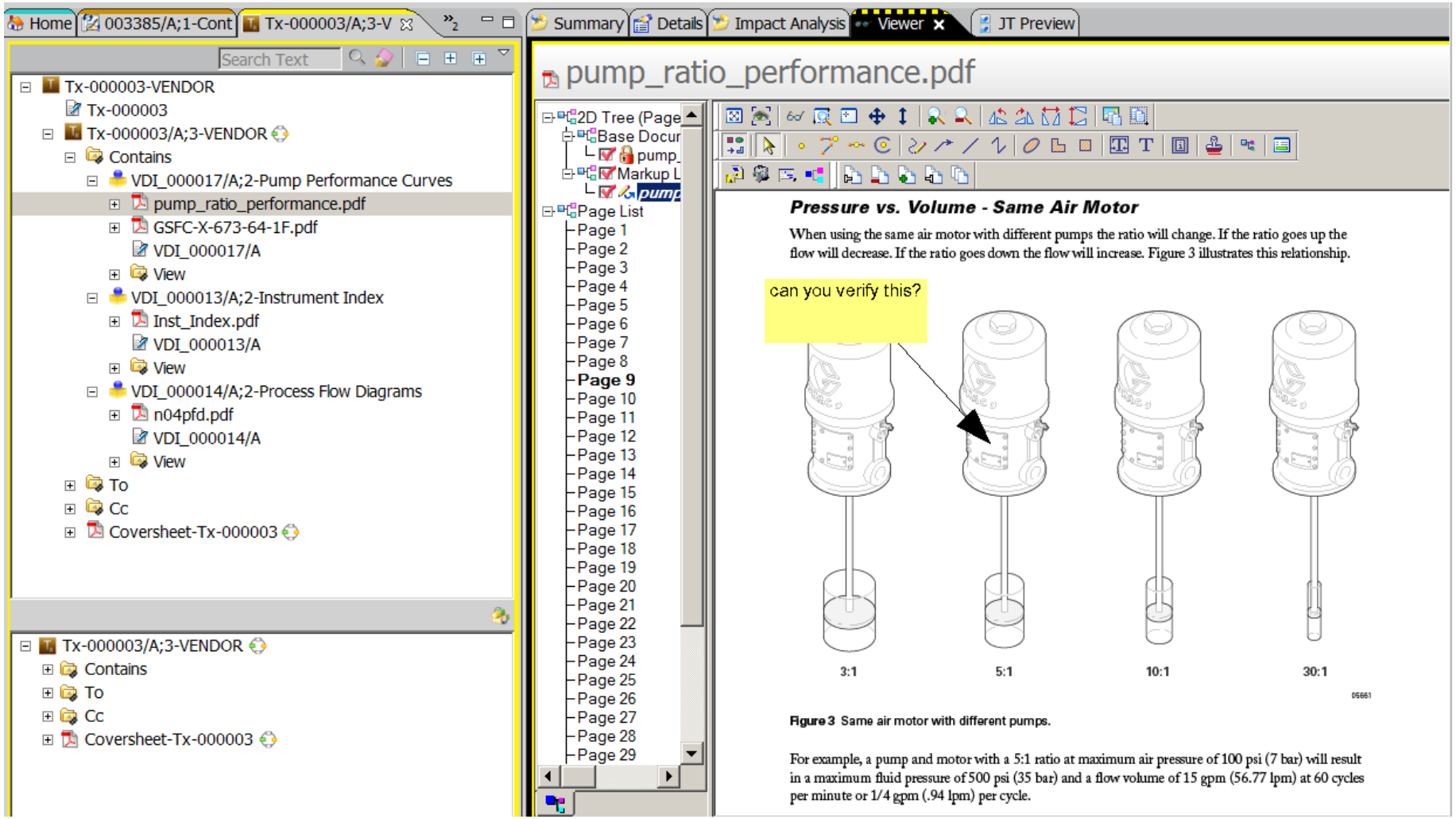


Coversheet

Review & Approval



View & Markup of Documents



Project Handover

Open model for document-based data exchange

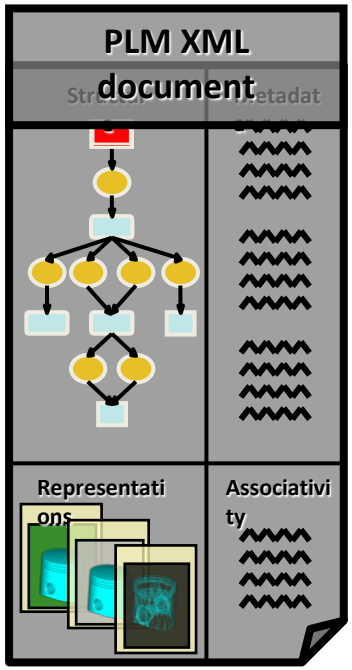
Transfer neutral files using mechanism of choice –
email, ftp etc

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

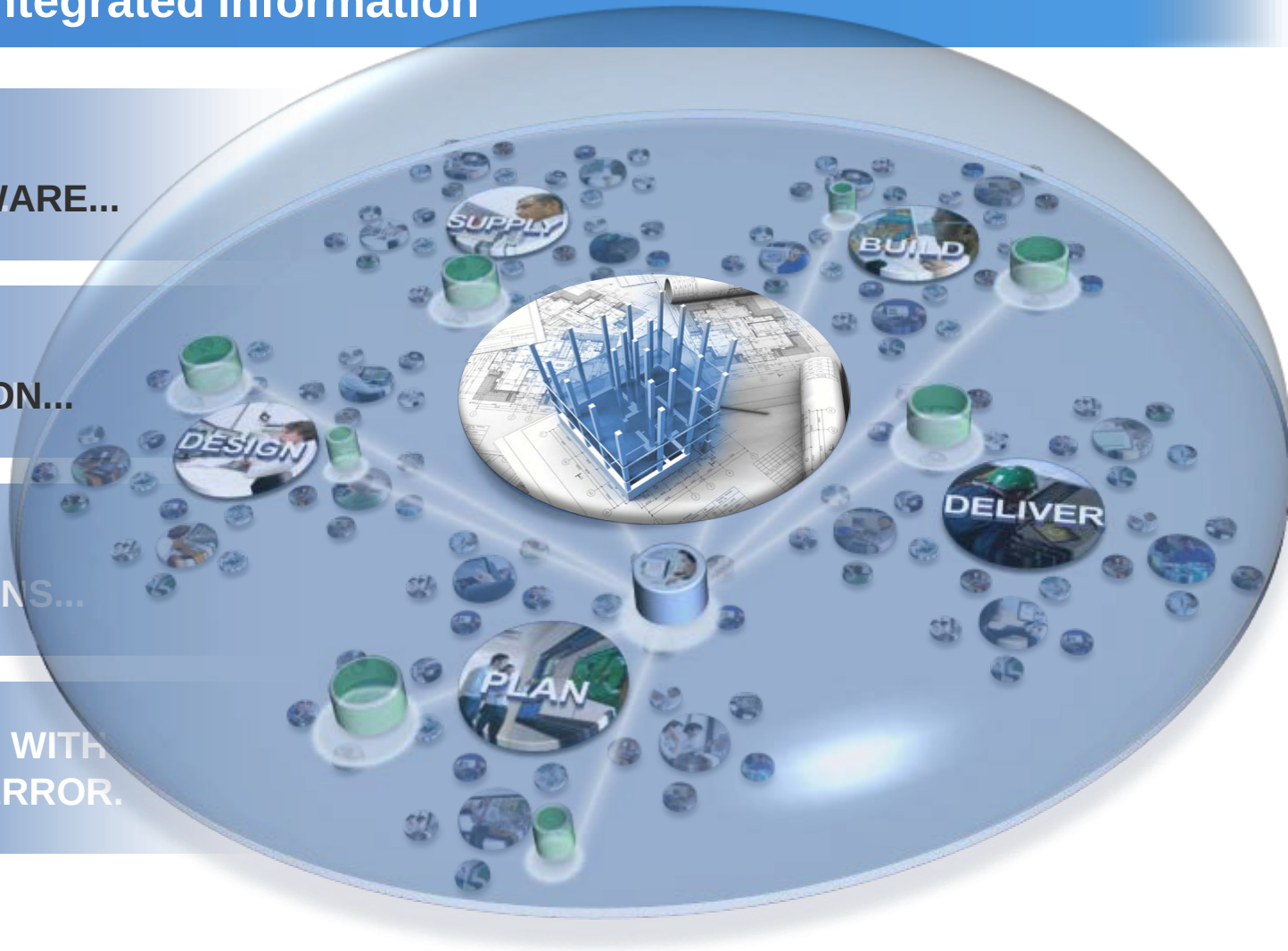
Intelligently integrated information

MORE PEOPLE INTRINSICALLY AWARE...

RECEIVING THE RIGHT INFORMATION...

MAKING COMPLEX PRODUCT DECISIONS...

UNDER PRESSURE WITH LESS ROOM FOR ERROR.



Supported on the platforms that you use in your enterprise

- **Client Operating Systems**
  - On premise

- **Server Operating Systems**
  - On premise

- **Cloud Enabled Server Solutions**
  - On premise or Off-premise

IBM PureSystems

CSC FASTRack™ for Teamcenter®

HP Quickstart PLM

- **Cloud Service Providers**
  - Off-premise only
  - Optional connect to On premise servers

Microsoft Windows Azure

IBM IBMSmartCloud

amazon web services

Business Philosophy

OPEN PLM COMMUNITIES

- Open partners
- Open adopters
- Customers
- Interest groups (GAAG,…)
- Standards (STEP, ISO,…)

OPEN PLM APPLICATIONS

- NX
- Teamcenter
- Tecnomatix

OPEN PLM COMPONENTS

- Parasolid
- D-Cubed
- PLM Vis
- NX Nastran
- PLM XML SDK
- ISO14306 & XT Toolkits
- FMI

OPEN PLM ARCHITECTURE

- Lifecycle data architecture
- Web services
- Knowledge Fusion
- NX automation kernel

OPEN DATA MODEL

Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right information…

Collaboration

…to the right person…

Project Control

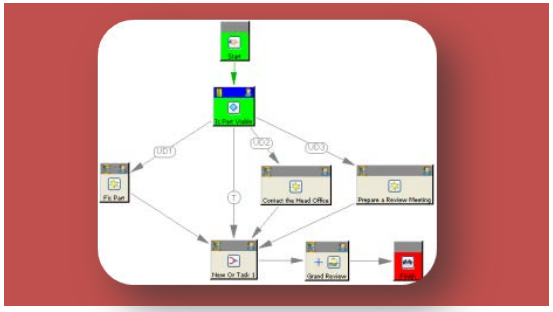
…in the right context

Summary

Teamcenter – Project Management Backbone

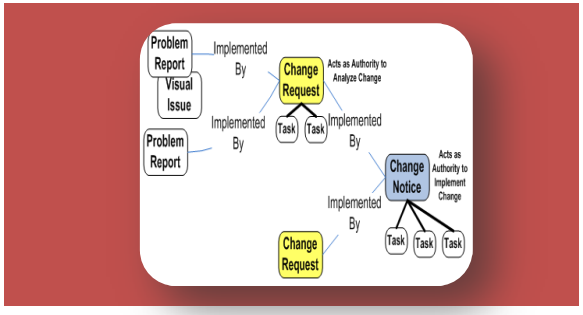
Workflow

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



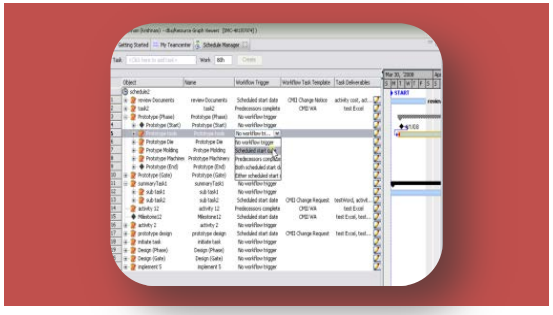
Schedule Manager

- Task Focused User Interface
- Specialized Change Objects
  PR → ECR → ECN
- Work Breakdown Structures tasks

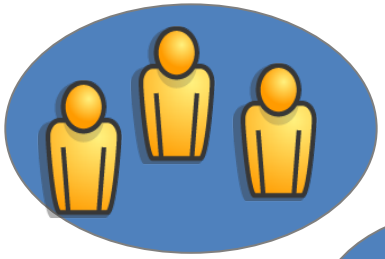


PPM Connector

- Associate Deliverables and Reference Information with tasks
- Master/Sub-Schedule Management
- Extensible scheduling architecture



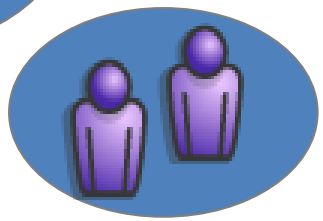
Program Management & Execution - Process Participants & Responsibilities



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

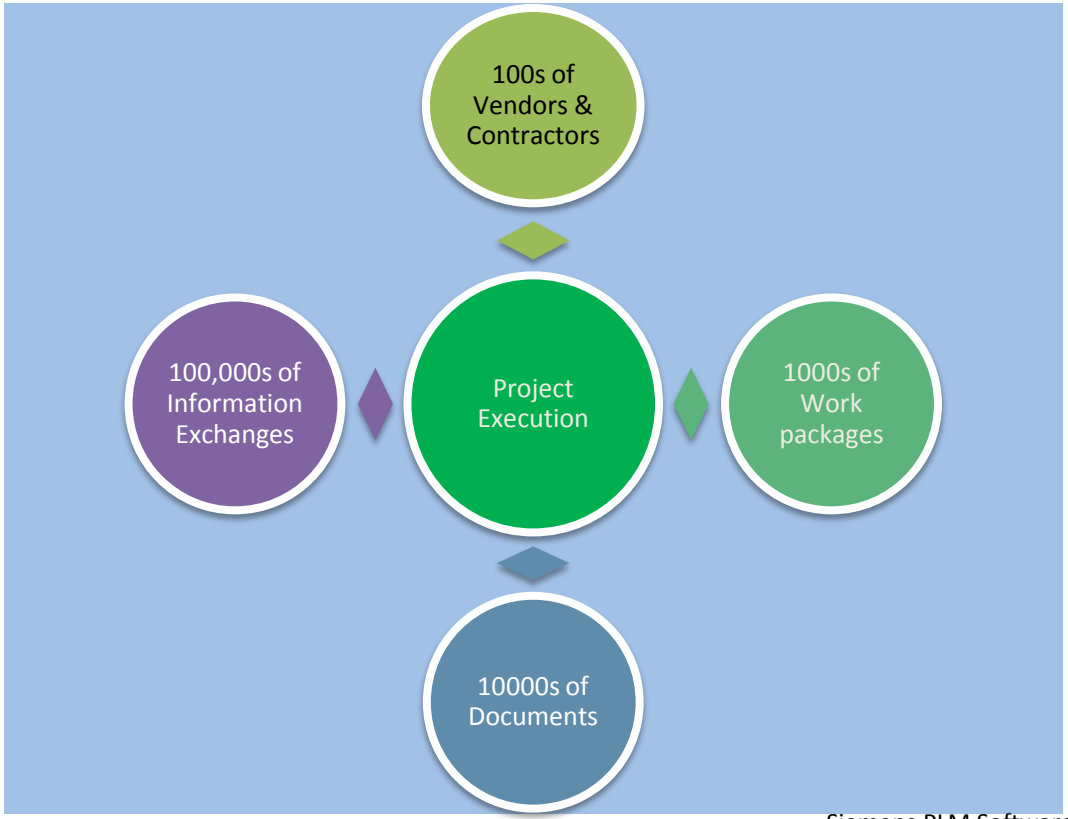
- Managers, team leaders / coordinators, team members

→ *Program execution & delivery*

Project Execution Challenge - Typical Project Complexity

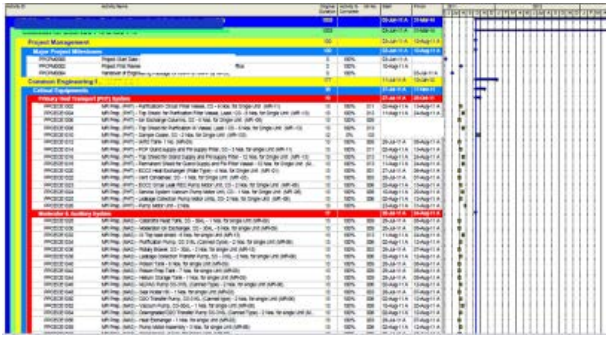
- Concrete – 460,000 cubic yards (not including concrete for site preparation).
- Reinforcing Steel and Embedded Parts – 46,000 tons.
- Structural Steel, Miscellaneous Steel, and Decking – 25,000 tons.
- Large Bore Pipe (> 2½ inch) – 260,000 feet.
- Small Bore Pipe – 430,000 feet.
- Cable Tray – 220,000 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

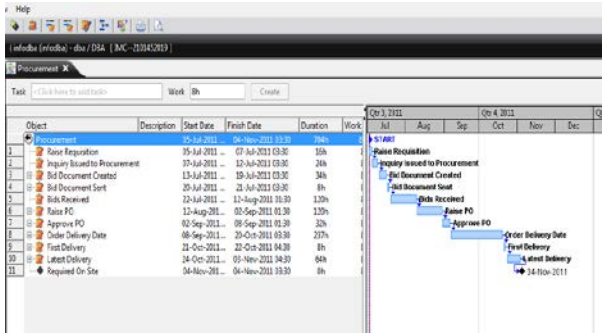


Source : IAEA (Gen III+ Plant)

Teamcenter delivers Project Execution



Master Schedule Management in Primavera

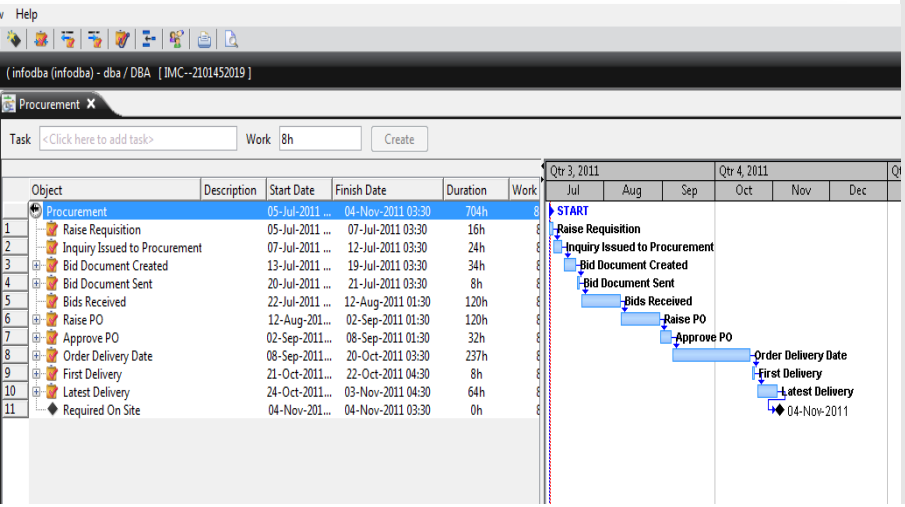


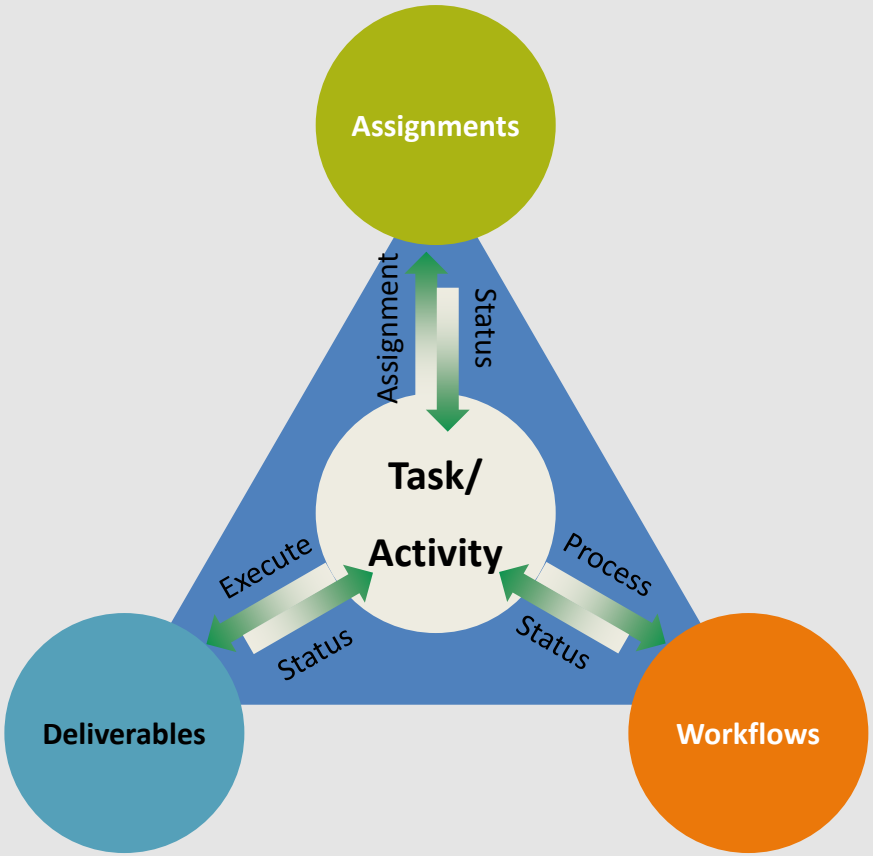
Project Execution Management in Teamcenter

- Drawings
- Documents
- Requirements
- CAD
- Specifications
- Processes

Project Execution Management in Teamcenter

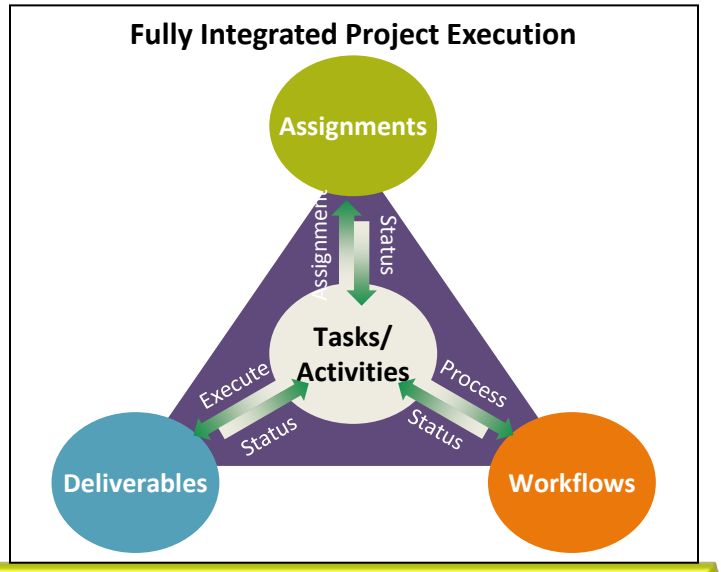
- Reduce time delays
- Reduce Costs
- Increase productivity





Drive Operational Execution Excellence Consistent with Strategy

Linking Master Schedule and Project Execution



P6 Master Schedule

Define L2

Define L3

Define L4

Send Sch/ Activities to Teamcenter

Update Schedule

Teamcenter (Project Execution)

Receive Schedule/ Activities

Link Activities to Workflow

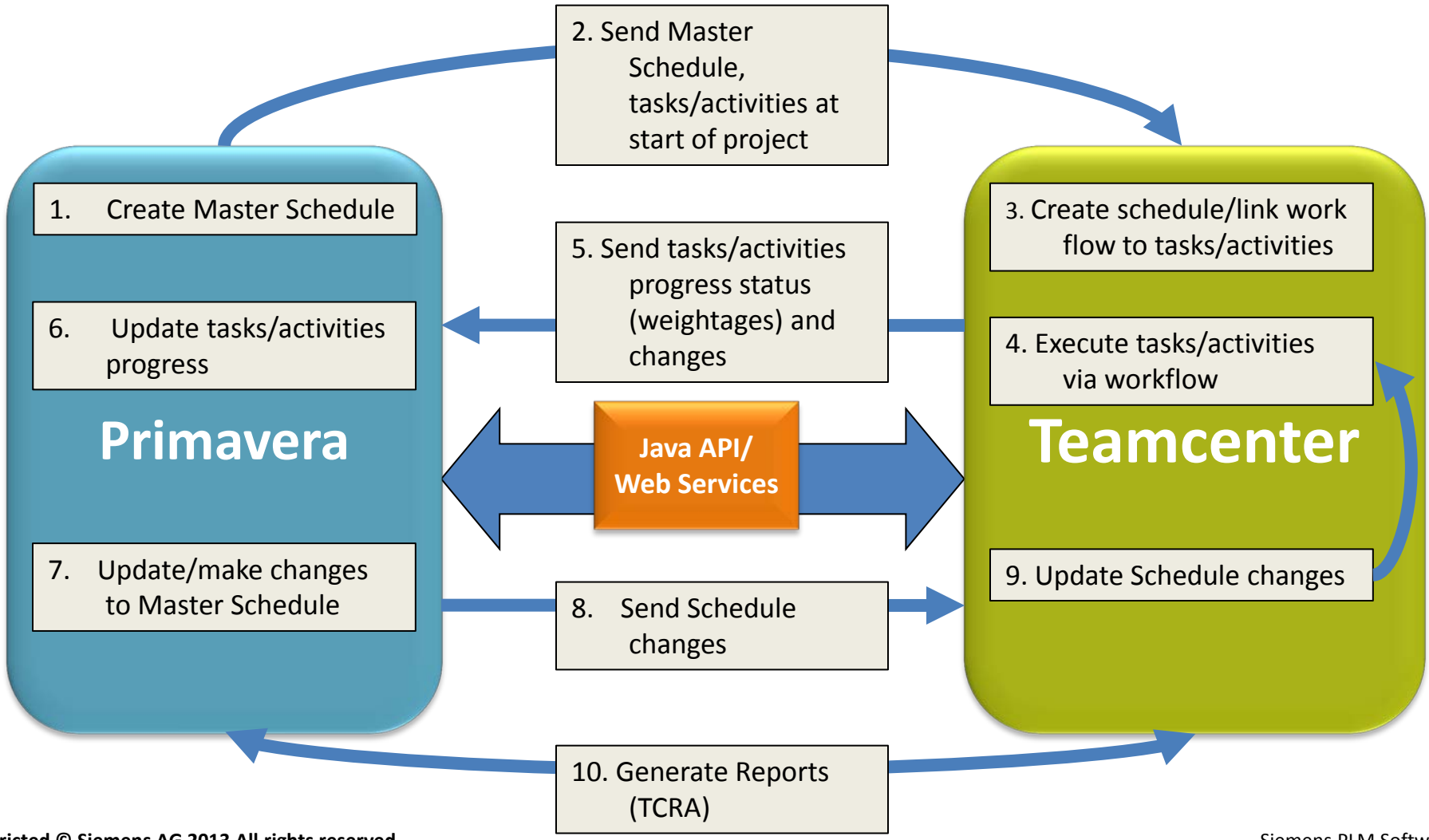
Trigger Execution/ Assign Work

Complete Deliverables & Workflows

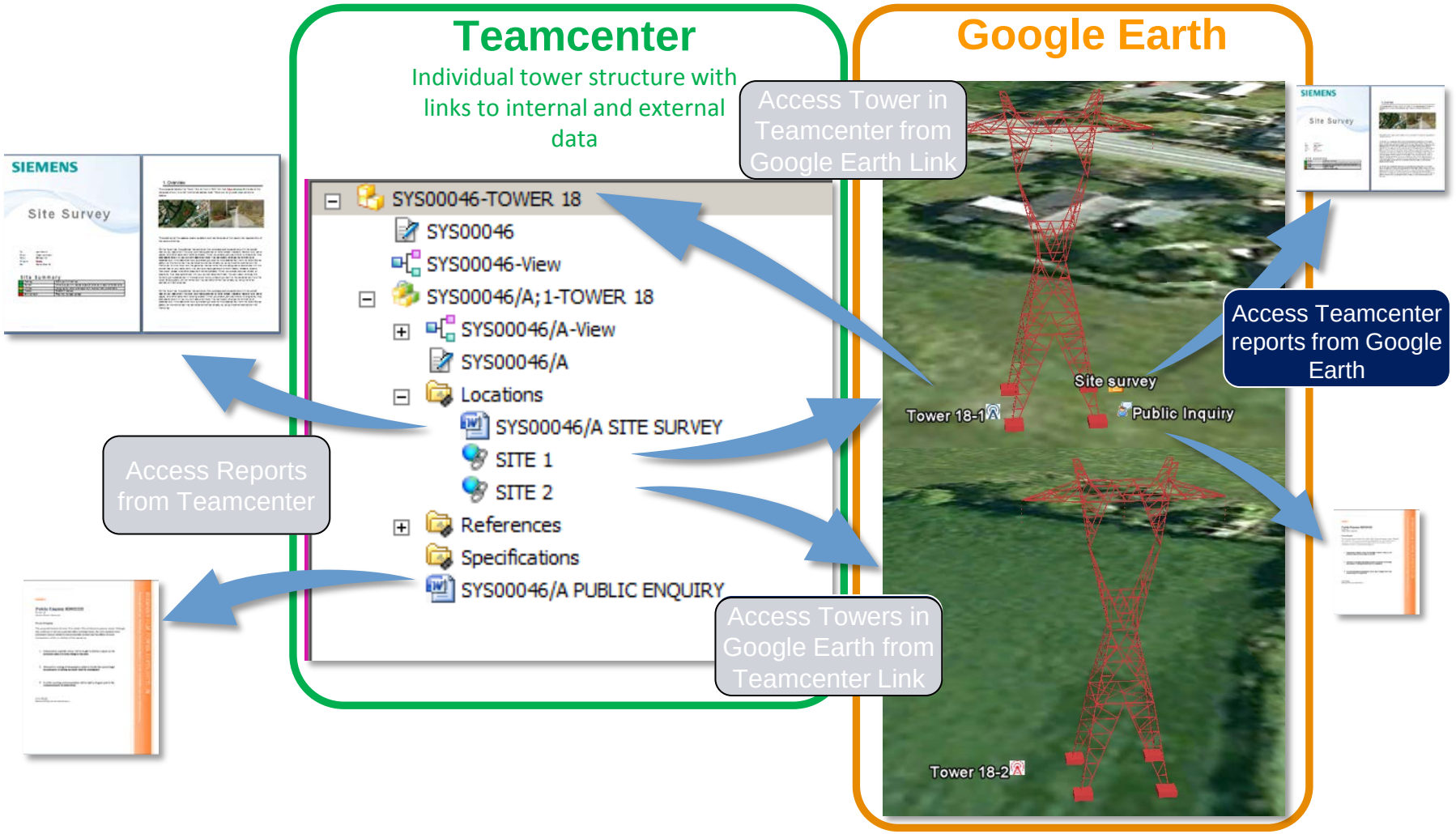
Update Weightage

Monitor Progress

Integration Approach



Google Earth Integration



Strategic Collaboration – Bentley Systems

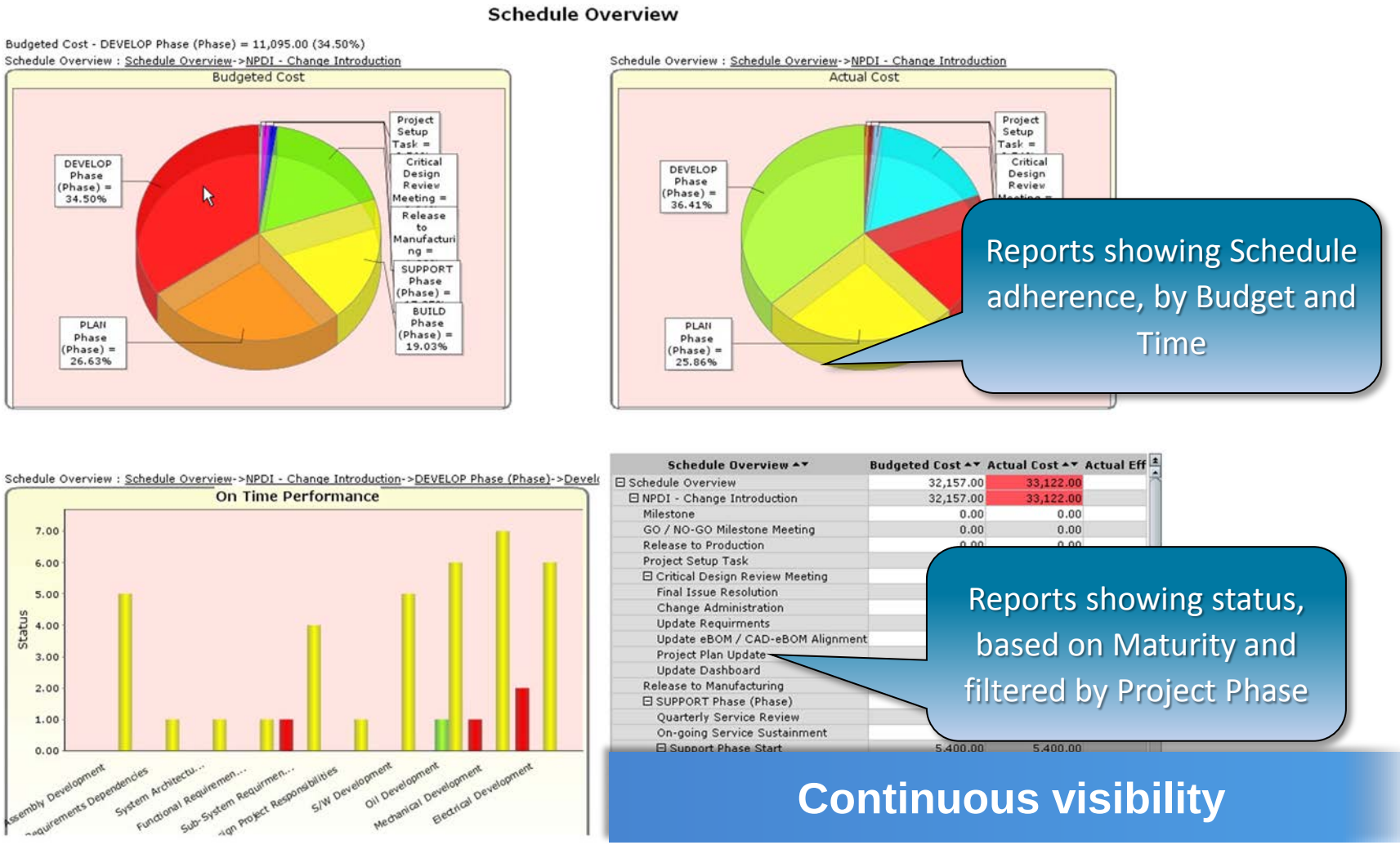
SIEMENS

Bentley Sustaining Infrastructure

- 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



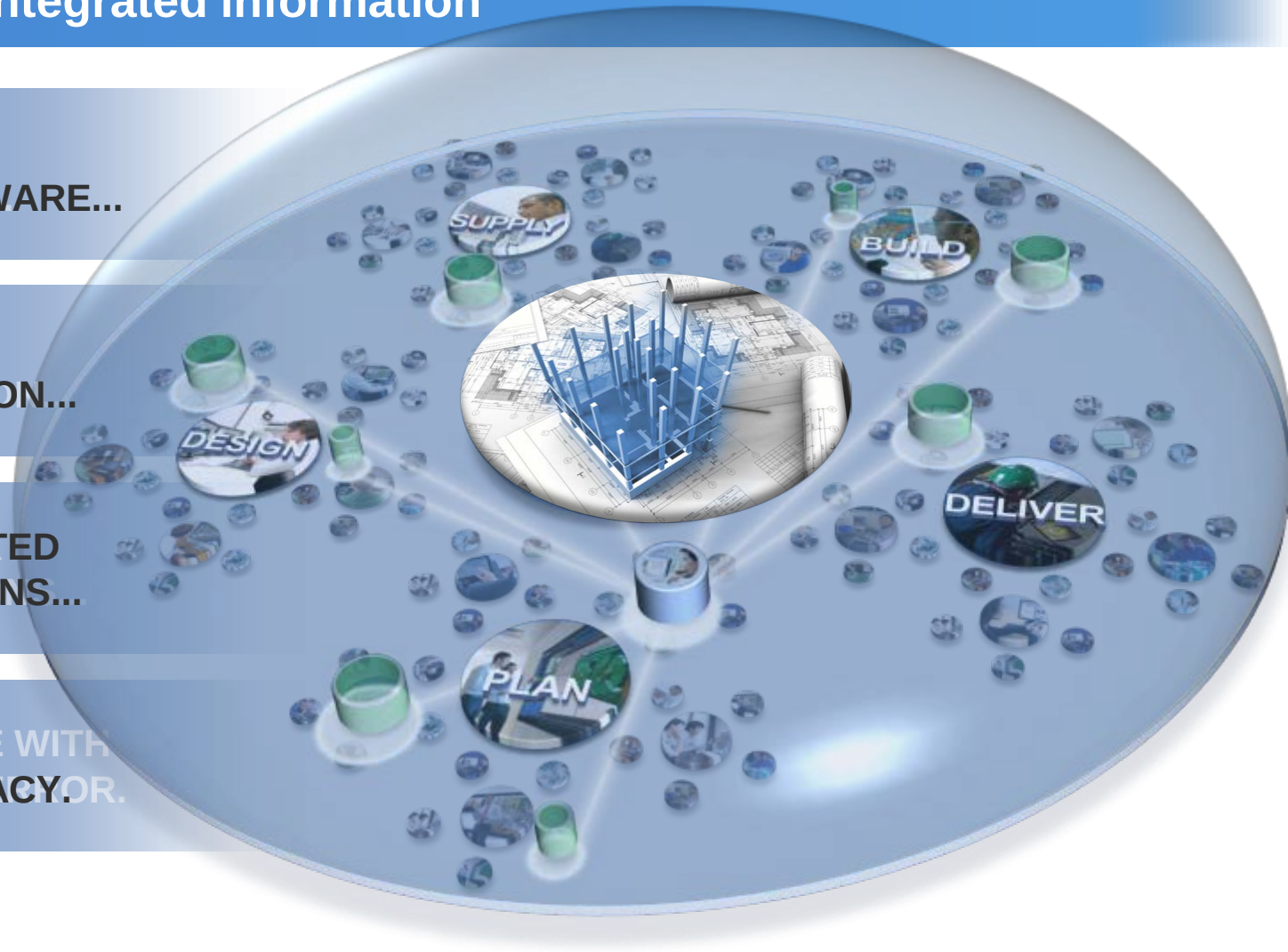
Intelligently integrated information

MORE PEOPLE INTRINSICALLY AWARE...

RECEIVING THE RIGHT INFORMATION...

MAKING INTEGRATED SYSTEMS DECISIONS...

ON TIME WITH GREATER ACCURACY.



Lake Constance 5D-Conference 2013

Challenges & Trends

Information Quality

The right data…

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

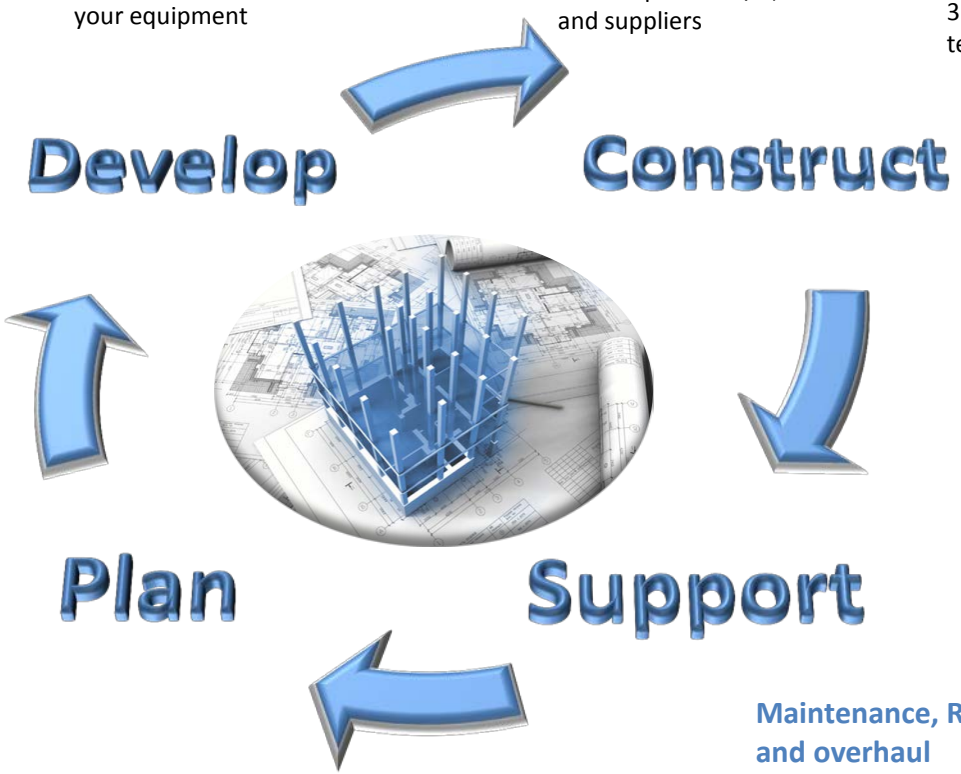
Lake Constance 5D-Conference 2013

Integrated RFP, contract and specification management
Manage the entire contracting and specification process

Integrated design and construction
Visually and collaboratively manage the process for developing and producing your equipment

Capital project management
Collaboratively manage your innovation projects with respect to O/O, EPC and suppliers

3D Simulation
Provide a fully interactive 3D environment for testing and analysis



Governance and compliance reporting
Ensure compliance and trace decisions and actions end to end

Supplier relationship management
Identify and validate suppliers around the world

Portfolio management
Gain full visibility into your operational risks and rewards

Integrated Construction
Link Virtual development with physical construction

Asset lifecycle management
Maintain lifecycle information from design to decommissioning

Sustainability
Execute responsible business practices

Commission/ decommissioning
Fully leverage all information required at the start-of-life or end-of-life

Maintenance, Repair and overhaul
Manage the service-related aspects of mission critical equipment

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

Delivering the Vision

TEAMCENTER DEVELOPMENT

Intelligently Integrated Information	Future-proof Architecture	High-definition User Experience
ENTERPRISE FOUNDATION	**PERFORMANCE, QUALITY AND DEPLOYMENT**	**PERSONALIZED AND PROACTIVE**
The backbone for intelligently integrated information	**The underpinnings of our architecture**	**Teamcenter is made for you!**