Bentley Plant Update and Directions
BE User Group Vejle, 10.11.08

Carsten Gerke

Senior Sales Director Bentley Plant Europe

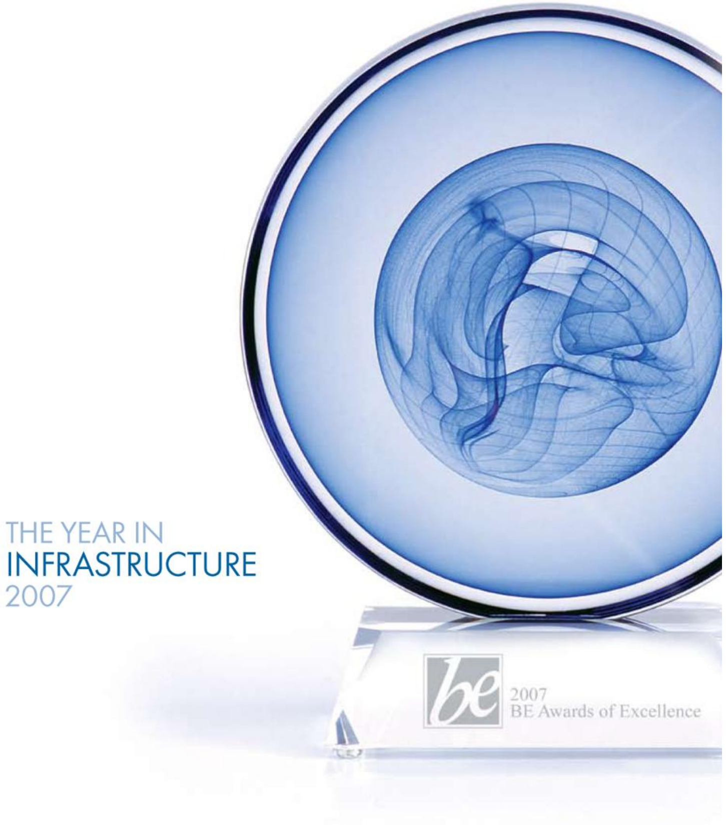
WWW.BENTLEY.COM

Bentley®
Sustaining Infrastructure

Agenda

- Business Update
- News and developments for Plant

The Year in Infrastructure 2007



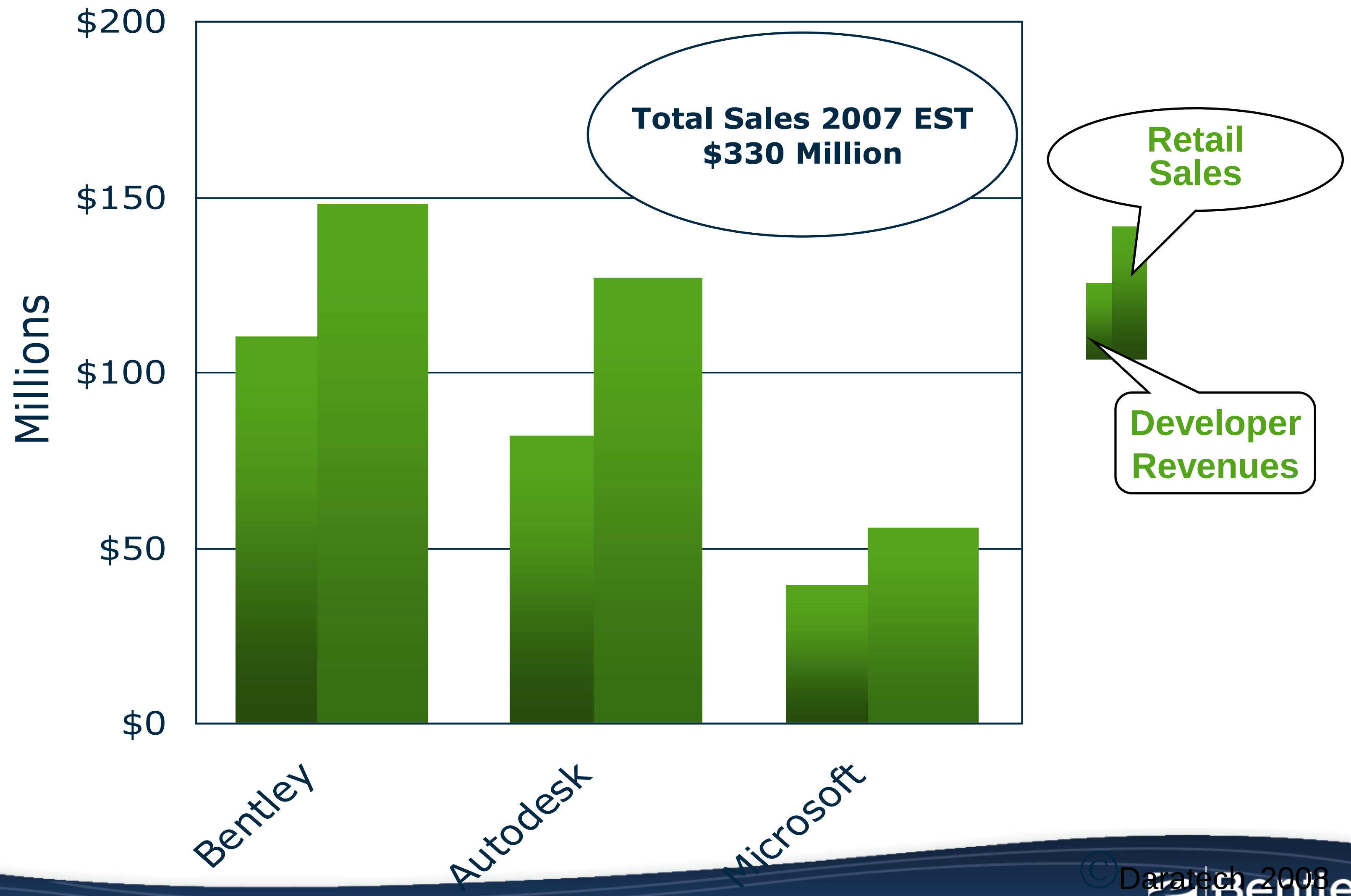
THE YEAR IN
INFRASTRUCTURE
2007

be
2007
BE Awards of Excellence

www.be.org/projectyearbook

Software and Services Sales
Plant-Specific Platforms

2007 EST



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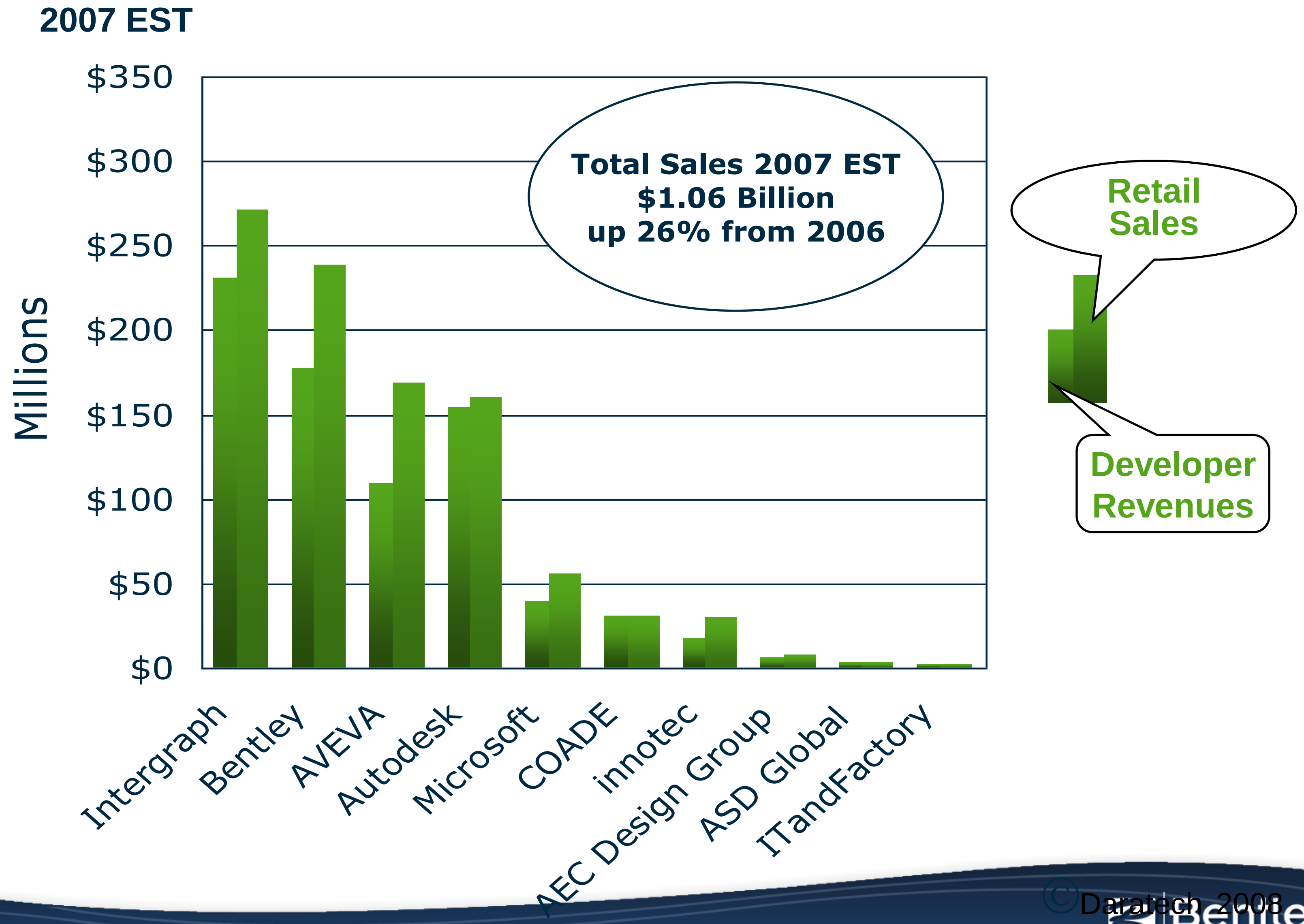
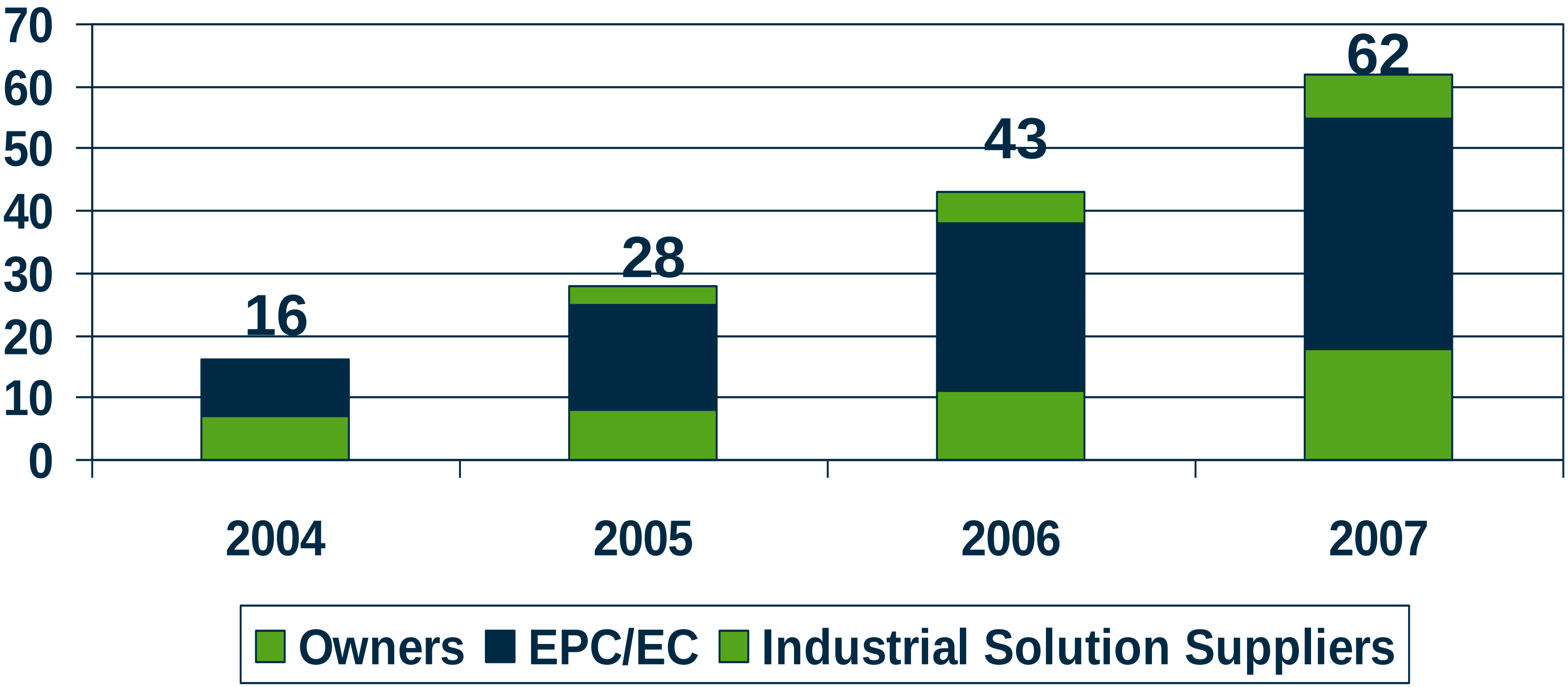
Software Sales
Overall Plant Creation


2007 EST

Total Sales 2007 EST
$1.06 Billion
up 26% from 2006

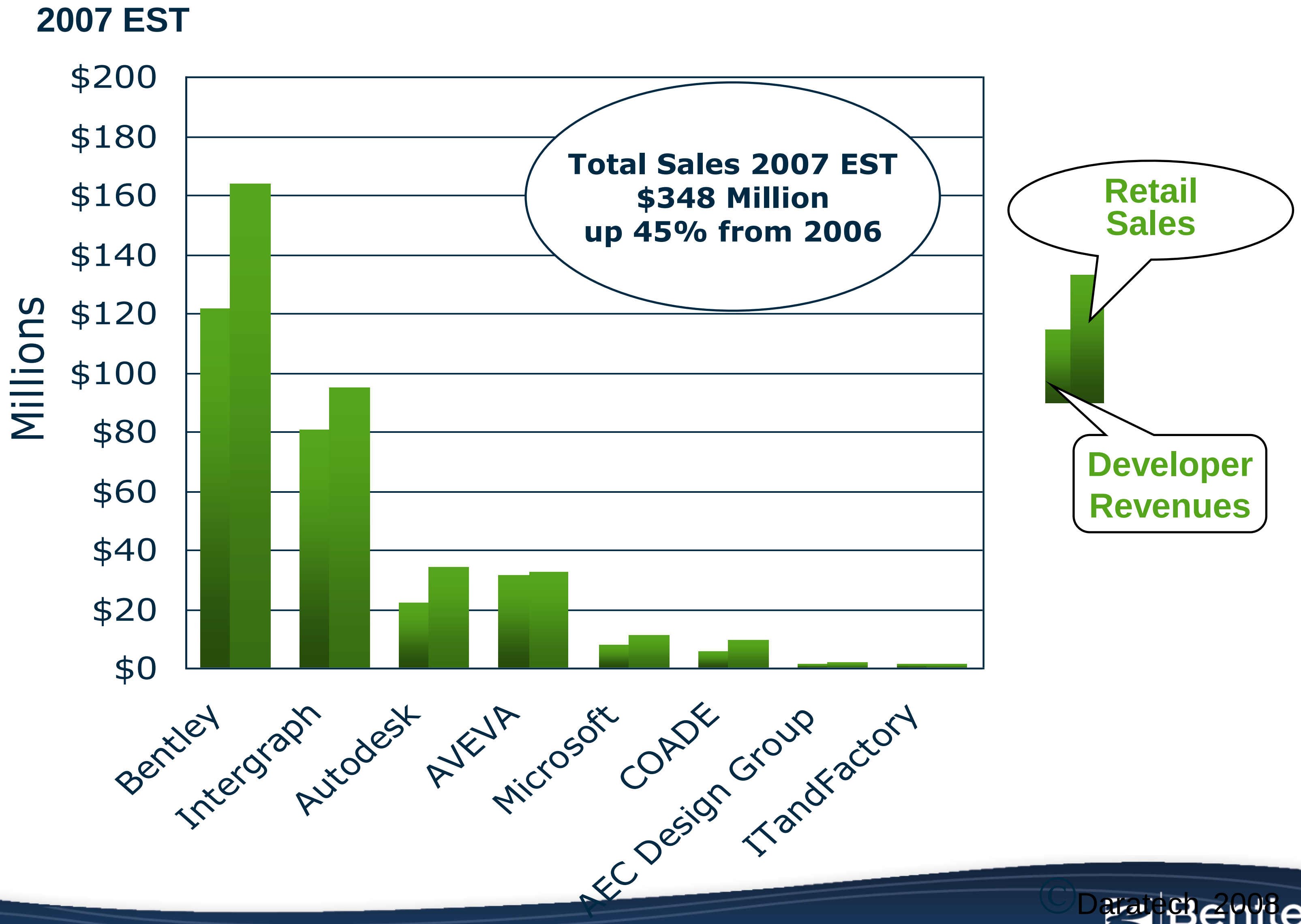
Plant Enterprise License Subscribers



Plant ELS "Class of 2007"

- Aibel a/s*
- Azerbaijan International
- Bateman
- BP Amoco
- Burns & McDonnell*
- Fluor
- Gronmij Carl Bro
- Guangdong Electric
- Intel
- KBR
- Linde AG*
- Metplant Engineering
- NLI*
- NNE a/s*
- PetroCanada/Fort Hills
- PT Saipem Indonesia
- Rio Tinto shared
- Saipem Energy
- SK Engineering & Construction
- Snamprogetti
- Stantec
- TCE Consulting Engineers
- TyumenNIIgiprogaz*

Software and Services Sales to the OO End-User Overall Plant Creation



Total Sales 2007 EST
$348 Million
up 45% from 2006

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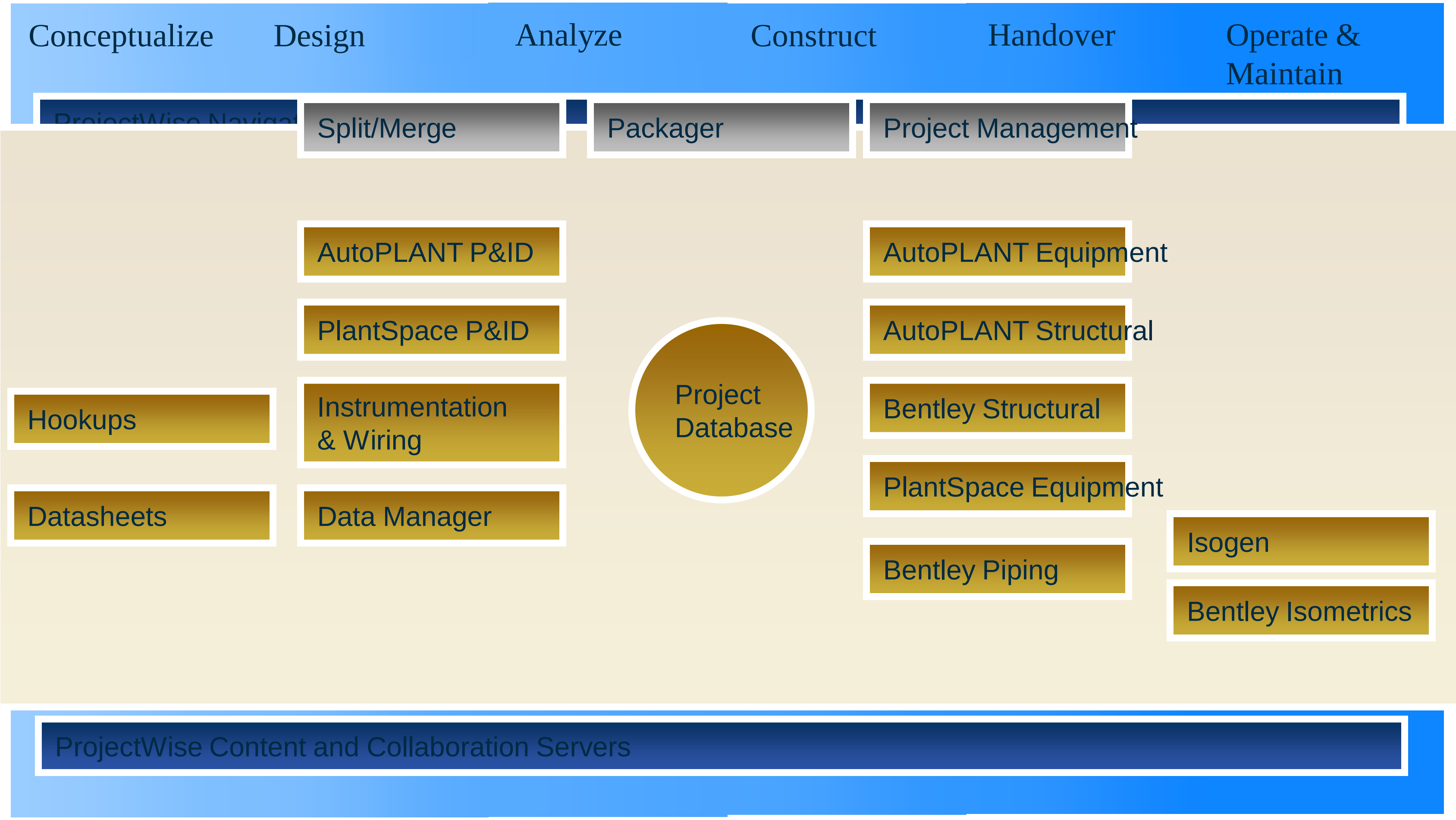
Plant Solutions in the Lifecycle



Conceptualize

Design

Analyze

Construct

Handover

Operate & Maintain

ProjectWise Naviga

Split/Merge

Packager

Project Management

AutoPLANT P&ID

PlantSpace P&ID

Instrumentation & Wiring

Data Manager

Hookups

Datasheets

Project Database

AutoPLANT Equipment

AutoPLANT Structural

Bentley Structural

PlantSpace Equipment

Bentley Piping

Isogen

Bentley Isometrics

ProjectWise Content and Collaboration Servers

News and Developments

News and Developments

- Other vendors
  - Autodesk
  - Intergraph, aveva, Innotec
- Bentley Plant
  - OpenPlant
  - ConstructSim
  - Promis.e

News and Developments

- Bentley Plant
  - OpenPlant

What is OpenPlant?

- OpenPlant is open software designed for the distributed world
- OpenPlant lets engineers quickly access and share data, facilitating collaboration in an open environment
- OpenPlant provides complete, consistent and correct data throughout the plant lifecycle
- OpenPlant stimulates innovation by delivering greater flexibility, adaptability and productivity
- OpenPlant software uses ISO 15926 as the native storage format for application content

What is ISO 15926?

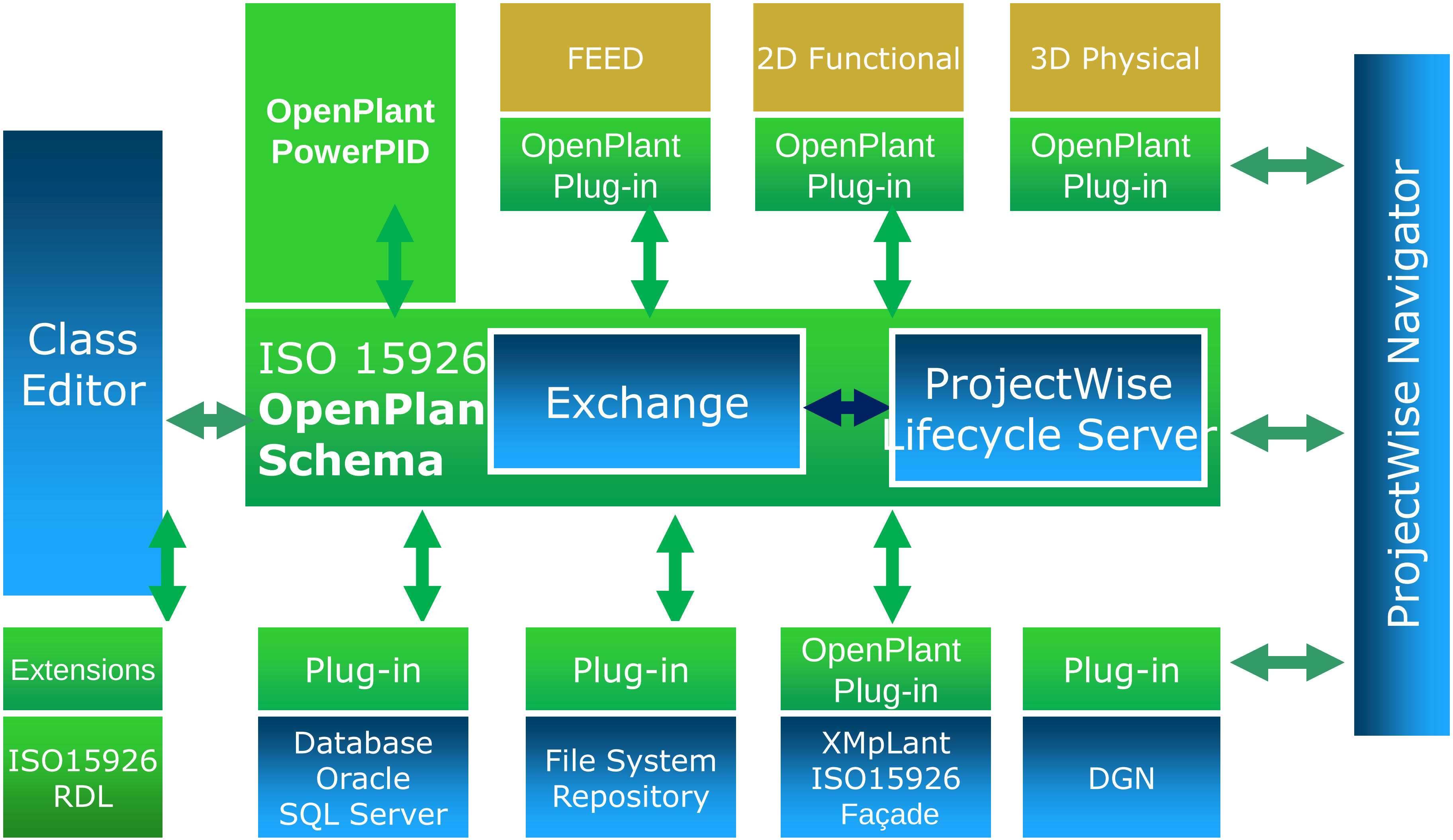
- ISO 15926 is an International Standard for the exchange of process plant life-cycle information.

- It is also an excellent data model for *persistence* of plant data

Who develops ISO 15926?

- FIATECH Members – including owners, contractors, equipment suppliers, and software providers are working together with the POSC Caesar Association and DNV, to create ISO 15926 online reference data library.
- FIATECH is an industry consortium that provides global leadership in identifying and accelerating the development, demonstration, and deployment of fully integrated and automated technologies to deliver the highest business value throughout the lifecycle of all types of capital projects. www.fiatech.org.
- POSC Caesar is a global, nonprofit organization that promotes the development of open specifications to be used as standards for enabling the interoperability of data, software, and related matters. www.posccaesar.com

Digital Plant Framework



OpenPlant PowerPID

FEED

OpenPlant Plug-in

2D Functional

OpenPlant Plug-in

3D Physical

OpenPlant Plug-in

Class Editor

ISO 15926 OpenPlan Schema

Exchange

ProjectWise Lifecycle Server

ProjectWise Navigator

Extensions

ISO15926 RDL

Plug-in

Database Oracle SQL Server

Plug-in

File System Repository

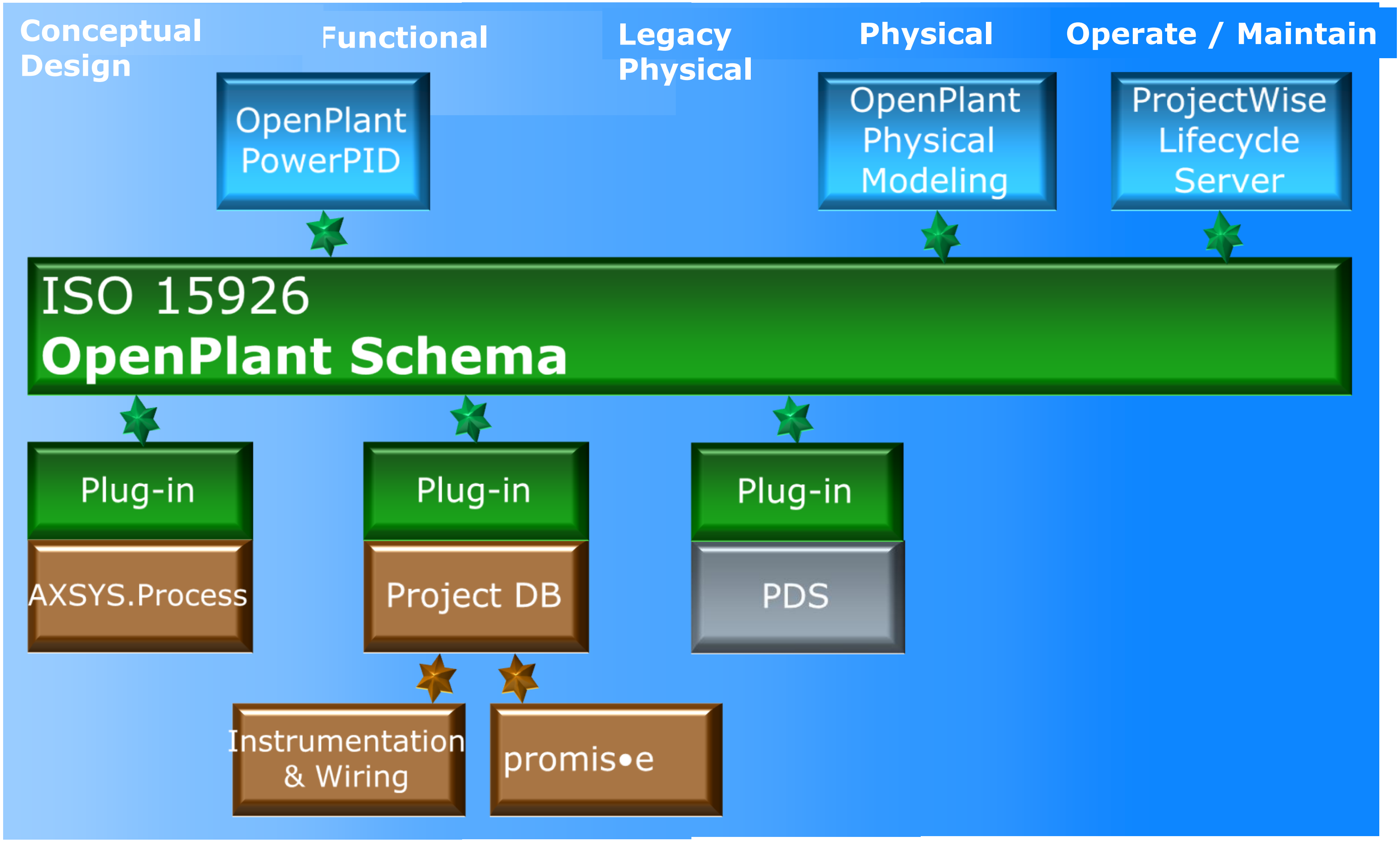
OpenPlant Plug-in

XMpLant ISO15926 Façade

Plug-in

DGN

OpenPlant Workflow



Conceptual Design

Functional

Legacy Physical

Physical

Operate / Maintain

OpenPlant PowerPID

OpenPlant Physical Modeling

ProjectWise Lifecycle Server

ISO 15926

OpenPlant Schema

Plug-in

AXSYS.Process

Plug-in

Project DB

Plug-in

PDS

Instrumentation & Wiring

promis•e

What does that mean in detail…

AutoPlant V8 XM → AutoPlant V8i

PlantSpace V8 XM → OpenPlant V8i

News and Developments

- Bentley Plant
  - OpenPlant
  - ConstructSim

What is ConstructSim?

- A true “construction simulation” tool
  - Brings together all data used for construction execution and project controls into a single “Virtual Plant Model” (VPM)
  - “Work packaging” – allows users to automate a detailed execution plan, broken down week by week for
    - Fabrication
    - Erection
    - Testing
    - Turnover
    - Commissioning
  - “Work facing” – reorganises design information into multiple construction views covering the work breakdown of tasks, materials, resources, construction planning and phasing
- This is what we mean by “construction simulation”

What ConstructSim is NOT…

- Not a design visualization tool
  - Utilizes visualization engines as a presentation layer
  - Visualization tools only aggregate design geometry
  - ConstructSim adds geometry from non-geometric design systems and provides a graphic representation (e.g. welds from piping isometrics)
- Not simply a schedule simulation tool
  - Schedule simulation tools are mostly time-based (e.g. 4D)
  - ConstructSim provides construction simulations along a number of axes (e.g. time, tasks, materials, resources, costs)
- Not limited to just the design information
  - Supports construction resources and sequencing of items like scaffolding, onsite material management and crane utilization
- It is a mistake to even compare ConstructSim to Navisworks or even Bentley Navigator

Current Major Issues in Construction

- Poor communication between crafts and functions
- Concurrent engineering
  - Design and construction going on in parallel
- Availability of drawings from engineering
- Materials availability
- Allocation of materials
- Spool delivery from fabrication
- Short time between IFC / AFC and construction

Current Major Issues in Construction

- Fast track projects – pressure on schedule
- Limited resources
- Ageing skilled workforce
  - Younger – less experienced craft people
- Many revisions during the project
- Schedule by area – turnover by systems
- Tendency to work with whatever is available
- Operating in “Scramble mode” to try and achieve schedule.

ConstructSim Overview

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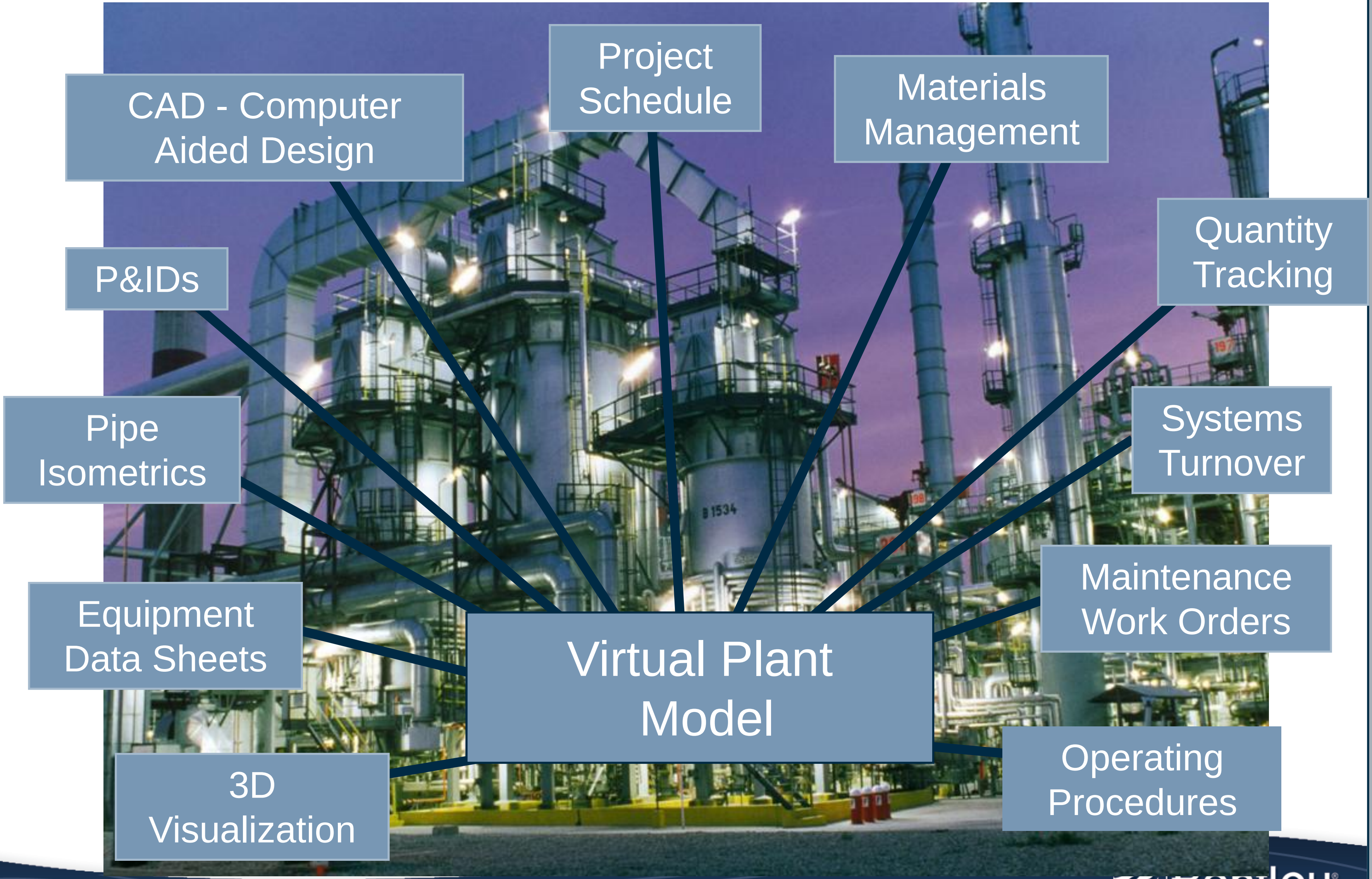
Virtual Plant Model



Virtual Plant Model

CAD - Computer Aided Design

Project Schedule

Materials Management

Quantity Tracking

Systems Turnover

Maintenance Work Orders

Operating Procedures

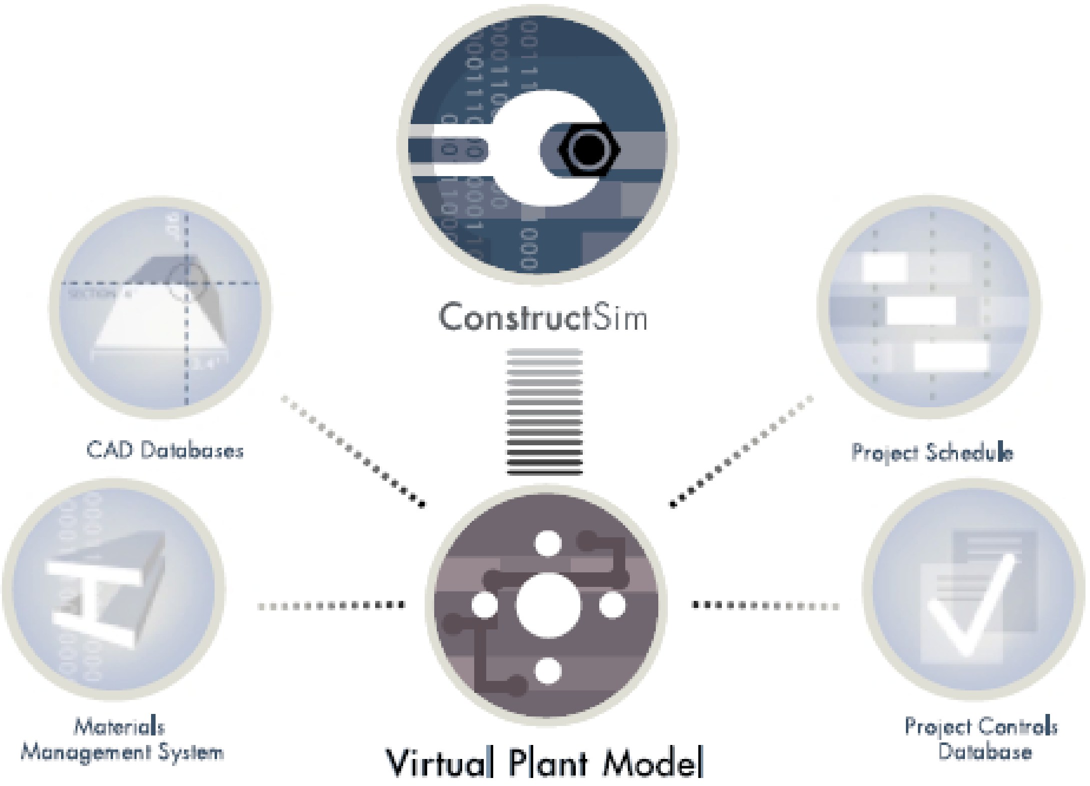
3D Visualization

Equipment Data Sheets

Pipe Isometrics

P&IDs

ConstructSim - Überblick


ConstructSim
CAD Databases
Project Schedule
Materials Management System
Virtual Plant Model
Project Controls Database

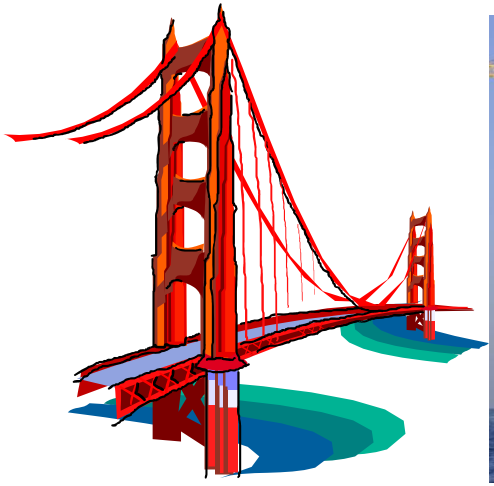
Products

ConstructSim

OpSim

Virtual Plant Model

ConstructSim

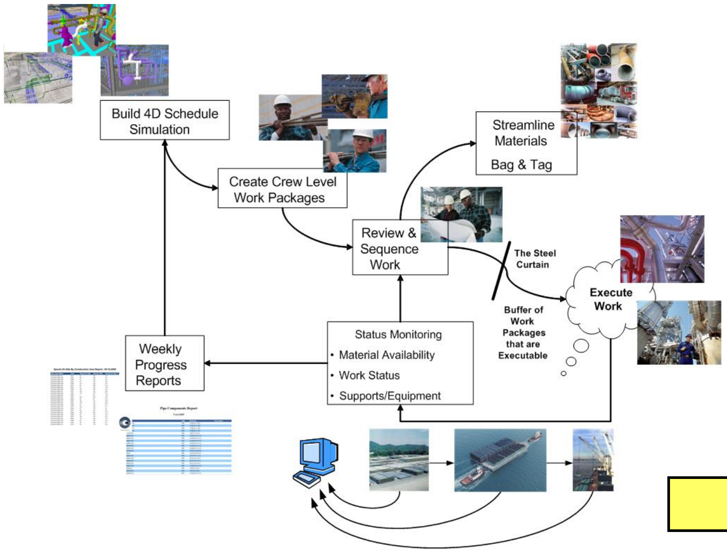


Engineering

Construction

- Define priorities
- Plan & sequence
- Track status
- Track progress

Overview



Build 4D Schedule Simulation

Create Crew Level Work Packages

Streamline Materials

Bag & Tag

Review & Sequence Work

The Steel Curtain

Execute Work

Buffer of Work Packages that are Executable

Weekly Progress Reports

Status Monitoring

- Material Availability
- Work Status
- Supports/Equipment

Work Process Methodology

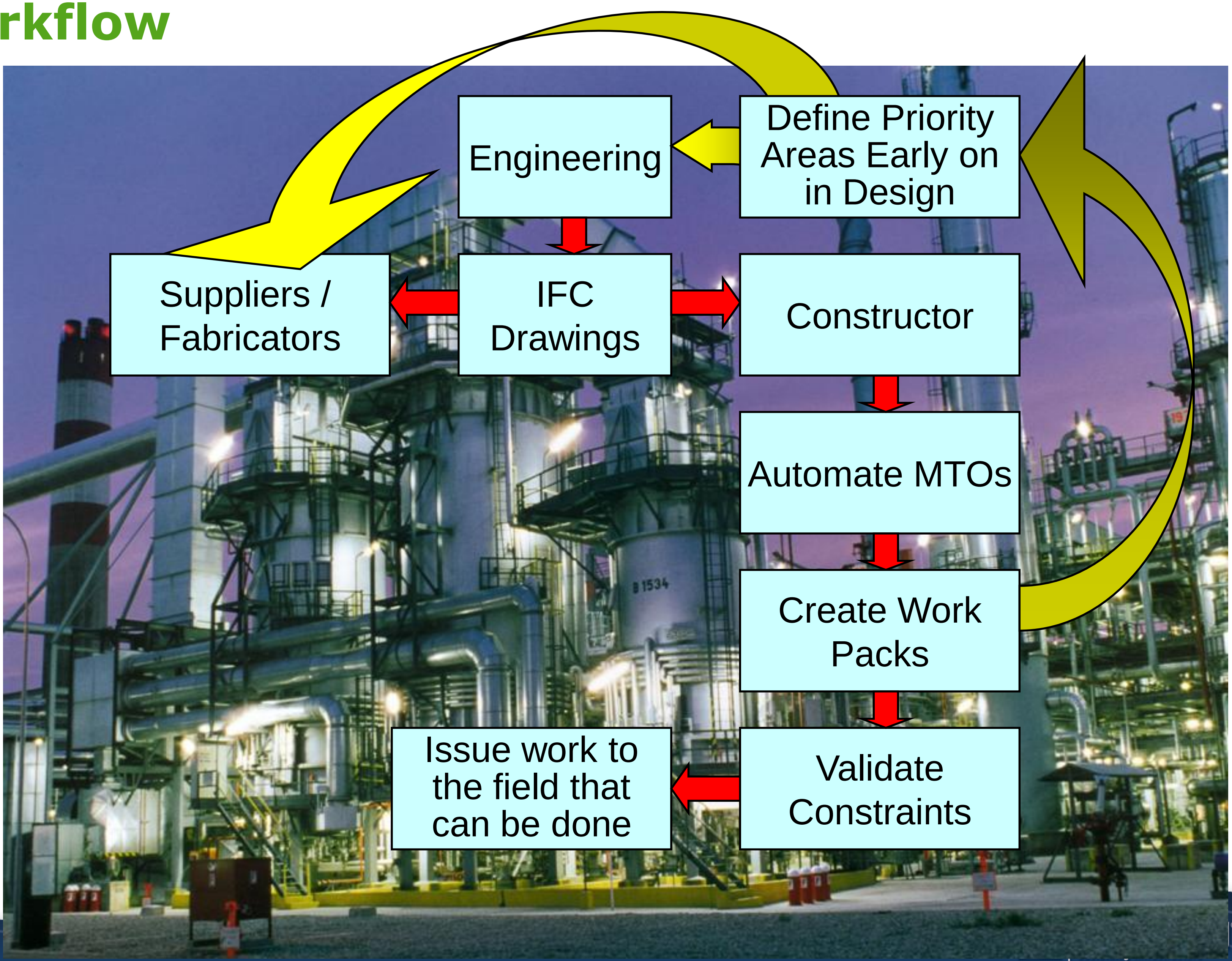
Software Technology

ConstructSim

OpSim

Virtual Plant Model

Workflow



Define Priority Areas Early on in Design

Engineering

Suppliers / Fabricators

IFC Drawings

Constructor

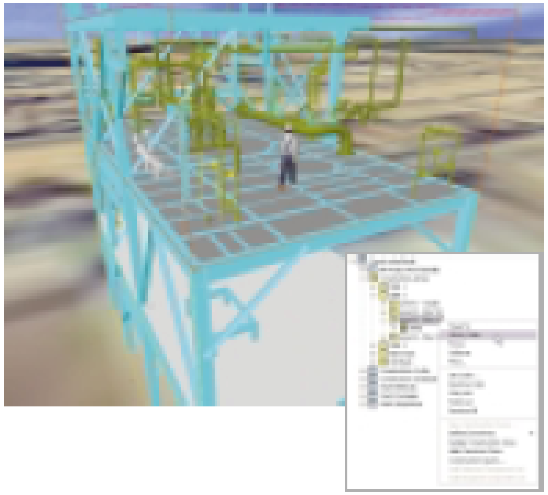
Automate MTOs

Create Work Packs

Validate Constraints

Issue work to the field that can be done

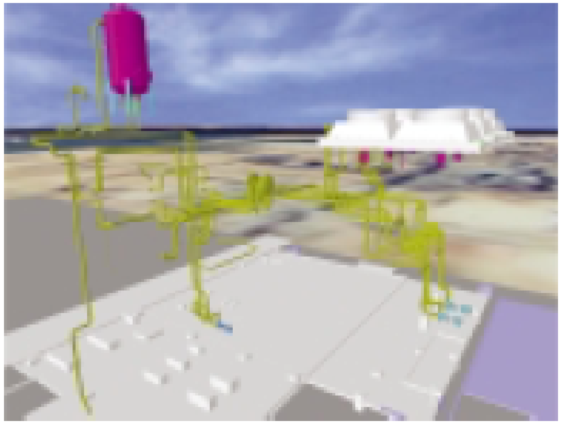
ConstructSim in Action (1)



Organization By Project Areas

Automatically synchronize ConstructSim with the project schedule. Re-organize materials components by craft disciplines, material specifications, as well as construction areas. Explicitly model the "parade of trades" through construction areas. Develop priority lists for scheduling and tracking materials procurement and engineering design by construction area.

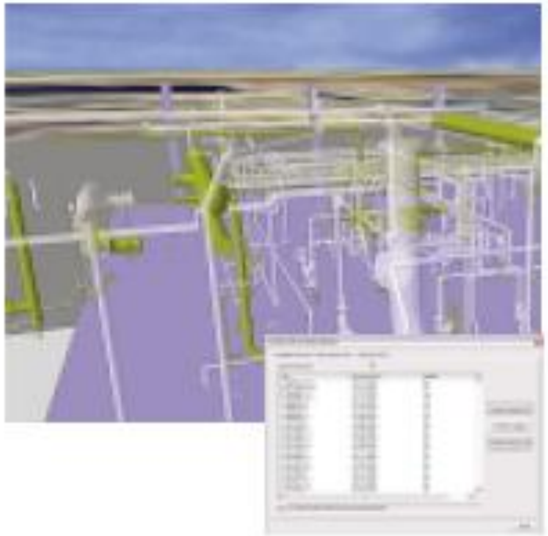
ConstructSim in Action (2)



Organization By Systems

Re-organize the engineering model by "systems" for testing and turnover. Visually monitor installation progress and remaining installation tasks system-by-system. As the project transitions from "installation by areas" to "testing of systems", re-prioritize and focus the daily installation activities of your team to prepare systems for testing in the required sequence and timing.

ConstructSim in Action (3)



Material Availability

Monitor and track the procurement and fabrication process for project materials released for construction. Visualize the arrival of pipe spools on a daily basis, directing crew resources to target installations in the areas where materials are available.

ConstructSim in Action (4)

Automated Task Planning

Group pipe systems into isometric sheets and spools as delivered from the fabrication shop or procured as field materials. Import a library of task "typicals" from the project controls estimating database with associated unit rate and cost codes. Generate a Level-4 database of project steps from a Level-1 project schedule by automatically performing material "take-offs" and matching every material component with an associated set of task "typicals".

ConstructSim in Action (5)

Work Package Creation

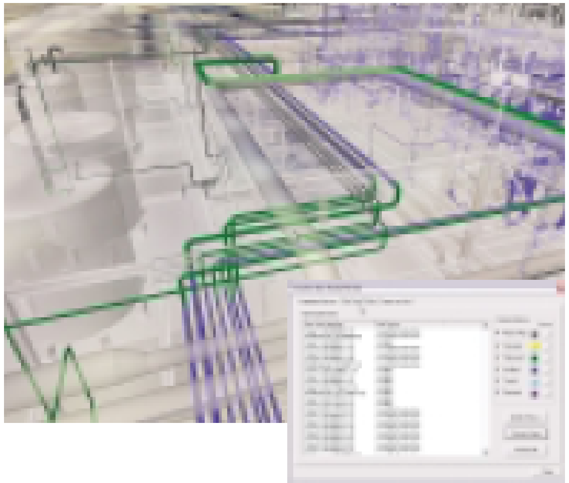
Interactively plan in detail the ideal "grouping" of materials into work packages weeks before needing to mobilize for these activities in the field. Monitor the estimated hours for a work package and evenly distribute workload across crews. Virtually build a buffer of "optimal" work packages and control the release of "quality" work sequences to the field.

ConstructSim in Action (6)

Work Package Sequencing

Assign work packages interactively to crews and review weekly sequences of work. Validate resource constraints as well as site and equipment availability. Match material availability against work packages through trial allocations, ensuring work is not released to the field unless it can be installed.

ConstructSim in Action (7)



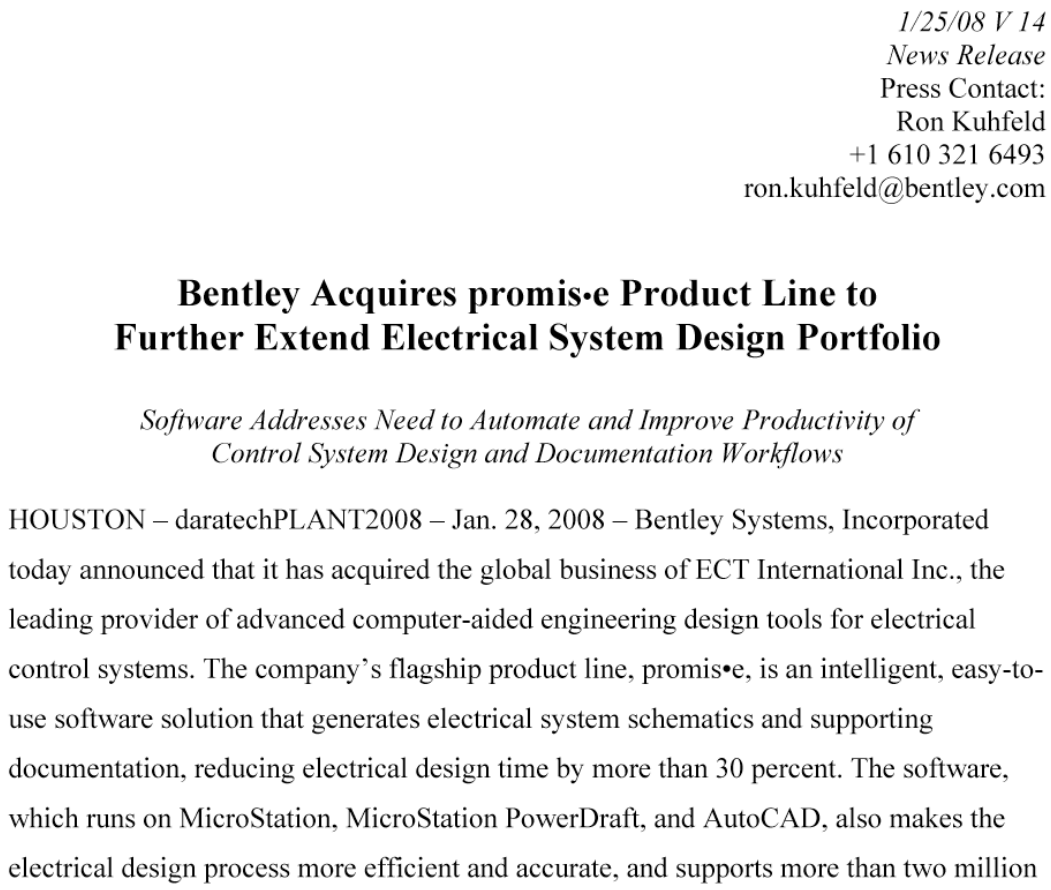
Construction Status Review

Visually monitor the status of construction execution and colorize the model based upon work "completed-to-date" as well as remaining work "to-be-completed". Synchronize activities within and across craft divisions, and identify dependencies not readily observable in traditional project management tools such as Gant charts and network diagrams. Readily compare planned progress vs. actual completion using a flexible time-based 4D schedule replay.

News and Developments

- Bentley Plant
  - OpenPlant
  - ConstructSim
  - Promis.e

ECT Acquisition



1/25/08 V 14
News Release
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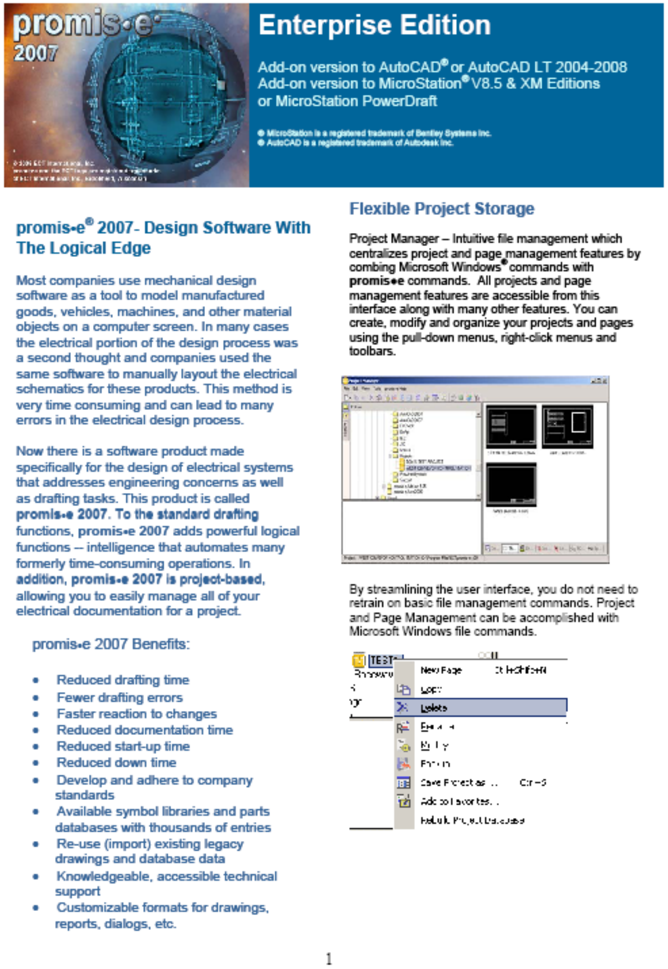
Bentley Acquires promis•e Product Line to Further Extend Electrical System Design Portfolio

Software Addresses Need to Automate and Improve Productivity of Control System Design and Documentation Workflows

HOUSTON – daratechPLANT2008 – Jan. 28, 2008 – Bentley Systems, Incorporated today announced that it has acquired the global business of ECT International Inc., the leading provider of advanced computer-aided engineering design tools for electrical control systems. The company's flagship product line, promis•e, is an intelligent, easy-to-use software solution that generates electrical system schematics and supporting documentation, reducing electrical design time by more than 30 percent. The software, which runs on MicroStation, MicroStation PowerDraft, and AutoCAD, also makes the electrical design process more efficient and accurate, and supports more than two million

promis•e – Completing our Portfolio

- Power and control schematic diagrams (ladder wiring diagrams)
- Electrical elevation diagrams (MCC and switchgear line-ups/layouts)
- Cable and conduit schedules
- Single line diagrams for electrical and fluid power
- Raceway diagrams and shortest-distance analysis.
- Marshalling, cable, and raceway diagrams (graphical)
- Control panel layout drawings with bills of material (i.e., all the components required to physically construct the control panel)
- Programmable logic controller I/O configuration and layouts with reports
- Device nameplate and wire label reports



promis•e
2007

Enterprise Edition

Add-on version to AutoCAD® or AutoCAD LT 2004-2008
Add-on version to MicroStation® V8.5 & XM Editions
or MicroStation PowerDraft

● MicroStation is a registered trademark of Bentley Systems Inc.
● AutoCAD is a registered trademark of Autodesk Inc.

promis•e® 2007- Design Software With The Logical Edge

Most companies use mechanical design software as a tool to model manufactured goods, vehicles, machines, and other material objects on a computer screen. In many cases the electrical portion of the design process was a second thought and companies used the same software to manually layout the electrical schematics for these products. This method is very time consuming and can lead to many errors in the electrical design process.

Now there is a software product made specifically for the design of electrical systems that addresses engineering concerns as well as drafting tasks. This product is called **promis•e 2007. To the standard drafting** functions, **promis•e 2007** adds powerful logical functions -- intelligence that automates many formerly time-consuming operations. In **addition, promis•e 2007 is project-based,** allowing you to easily manage all of your electrical documentation for a project.

promis•e 2007 Benefits:

- Reduced drafting time
- Fewer drafting errors
- Faster reaction to changes
- Reduced documentation time
- Reduced start-up time
- Reduced down time
- Develop and adhere to company standards
- Available symbol libraries and parts databases with thousands of entries
- Re-use (import) existing legacy drawings and database data
- Knowledgeable, accessible technical support
- Customizable formats for drawings, reports, dialogs, etc.

Flexible Project Storage

Project Manager – Intuitive file management which centralizes project and page management features by combing Microsoft Windows® commands with **promis•e** commands. All projects and page management features are accessible from this interface along with many other features. You can create, modify and organize your projects and pages using the pull-down menus, right-click menus and toolbars.

By streamlining the user interface, you do not need to retrain on basic file management commands. Project and Page Management can be accomplished with Microsoft Windows file commands.

Making IT Strategic to Your Business

Questions?