Cyberinfrastructure in Chemical and Biological Systems

Jim Porter
Chief Engineer & Vice President
Engineering and Operations

NSF Workshop
Arlington, VA
September 25-26, 2006
Our Core Values

- Safety and Health
- Environmental Stewardship
- Highest Ethical Standards
- Respect for People

Our Goal is "Zero"
Our Vision is.....

To be the world’s most dynamic science company, creating sustainable solutions essential to a better, safer, healthier life for people everywhere.
Transforming For Our Third Century

Birth  Growth  Maturity

Explosives  Chemistry, Energy

Chemistry, Biology... Knowledge-Intensive Solutions

Birth  Growth  Maturity

1802  1830  1850  1900  1925  1945  1990  2000  2050  2090

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Industry Trends…..

• Growth in Asia Pacific and Eastern Europe
• Growth by Mergers, Acquisitions and Joint Ventures
• Toll Manufacturers, Distributors and Commissioned Sales
• Global Full Service Design/Construction Firms
• Government Regulations: SHE; Design; Construct; Ops
• Information flows between Customers and Suppliers
• Technologies: RFID; Bar Coding; Telemetry; XML Messages; Ops Automation; ERP; S&OP; CRM; SRM……
• Business Process Outsourcing
• Public Infrastructure… connectivity where ever you are
Organizational Frameworks

• Work Processes:  
  Creating Demand  
  Fulfilling Demand

• Systems:  
  Technical Support  
  Business Support

• Structures:  
  Businesses  
  Regions  
  Competencies
Process View - Typical Enterprise

The Company

Business Leadership and Performance Management (Incl M&A)

Enabling Processes

Human Resources

Finance

Knowledge Management

Core Processes

Develop New Products & Services

Acquire New Customers/Markets

Retain & Grow Existing Customers/Markets

Supply Chain (Procurement, Make, Order Fulfillment/Processing...to Cash)

Other Key Stakeholders

Suppliers and Alliance Partners

Customers
Value Creation Frameworks

• R&D..............................Technical Knowledge

• Marketing.......................Customer Knowledge

• Engineering....................Facilities & Capabilities

• Manufacturing...............Products & Services
Facilities Engineering Process

1. Global Customer Needs & Requirements
2. Business Objectives, Capital Forecasts
3. Project Basis, Capital Budget
4. Production Des Basis, CAC, Project Auth
5. Competitive Facility That Meets Business Needs

Front-End Loading
- Owner Leads
- Contractor Involved

Execution/Operation
- Owner Audits
- Owner Leads
- Contractor Leads
- Contractor Supports

Operate Maintain Improve
- Products That Continuously Meet Global Customer Needs & Requirements Better Than All Competitive Products
The Interoperation Vision

“The vision of the future is of a highly automated and seamlessly integrated environment across all phases and processes of the capital project/facility life cycle.

All information is available to whomever needs it, whenever it is needed, and wherever it is needed.”
The Vision of an Integrated and Automated Capital Projects Industry

Real Time Project and Facility Management, Coordination and Control

Client/ Customer Needs/ Wants

Technical Approach
ROM Budget and Schedule

Technical Plan, Target Cost and Schedule

Resources, Schedules, Cost

Plan Updates

Detailed Work Pkgs Command/ Control Instructions

Real-Time Status
• Technical Schedule
• Cost
• Issues

Real-Time Operational Status
• Systems
• Processes
• Infrastructure

Command/ Control Instructions

Scenario Based Project Planning

Requirements and Conceptual Design

Automated Design

Schedule Info.
Drawings and Models

Instructions
Budget
Specs and Contracts

Integrated Automated Procurement and Supply Network

Materials, Equipment, Labor, Tools, Fabricated Products, etc.

Supplier Designs/Capabilities/Products and Services

Feedback of O&M Knowledge and Experience

Intelligent Job Site

Electronic As-Builds

Facility Sim Model w/ Processes, Materials, etc.

Decision/Design Support
• Capacity Mgmt.,
• Upgrades, Renovations
• Conversions
• D&D, Recycle, etc.

Intelligent Self-Maintaining Repairing Operational Facility

New Materials, Methods, Products and Equipment

Technology and Knowledge Enabled Workforce

Integrated Data and Information Management

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Creating Sustainable Business Value

- Information…..f (Data)

- Knowledge……f (Information)

- Sustainable Business Value…f (Knowledge)
“Knowledge Management”

The **Right Information**

at the **Right Place**

at the **Right Time**

at the **Right Price**

enables rapid, effective **Decision Making**

and **Problem Solving** delivering **Sustainable Business Results**
What is Enterprise Data?

- All Design data & information
- Design data & information used by other functions
- New data
- Procurement
- Construction
- New data
- Operations
- New data
- Maintenance
- Supplier Equipment Information
- Reference Data Library
Facility Data Management

Facility Planning

Operations & Maintenance

Construction

Design

Engineered Equipment Procurement

Field Material Procurement

MRO Procurement

Increased speed of execution

Increased UPtime

Improved Productivity

Interoperability

PDMS

Meridium

SAP

Icarus

Aspen+

MicroStation

Automated data flow

Accessible data for everybody

Eliminate redundant input of data

Increased data flow

Increased data for everybody

Eliminate redundant input of data

Increased speed of execution
The Industry Stake

A Report sponsored by NIST titled “Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry” estimates “the cost of inadequate interoperability in the U.S. capital facilities industry to be $15.8 billion per year.”
Current State—Application Centric

Islands of Automation

Manual Input of data
Little Connectivity
Hard to find data
Many User Interfaces

Online Access

Offline Access

Global User Community
DuPont Engineering
DuPont Operations
DuPont Maintenance
Suppliers

Pro-E
Setcim
MicroStation
PDMS
Documentum
InfoPlus
Meridium
KBase
Aspen+
SAP

Vantage
Aspect P&ID
Icarus

Equipment Data
P&ID Data
Engineering Documents & Plant Drawings
Maintenance Data
Operating Data

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What are the problems???

- Multiple industry integration strategies.
- Many non-interoperable applications.
- No industry consensus data standards.
Future State—Information Centric

Common User Interface

Automated Data Flow

Faster Cycle Time

Higher Productivity

Increased Uptime

Global User Community

- DuPont Engineering
- DuPont Operations
- DuPont Maintenance
- Suppliers

Online Access

Offline Access

Standardized configuration processes

Shared content & data repository

Applications: repository of shared and business specific

Backend: Transaction/SAP, Business content/data, Internal collaboration/Lotus Notes

- Reliability Information
- Cost Information
- Simulation Models
- 3-D plant models
- Operating Conditions
- Equipment Specs
- P&ID data
- Drawings
- Spare Parts List
- Process Control
- Schedules
- Contracts
- Equipment List
- Drawings
- Operating Conditions
- Equipment Specs
- Cost Information
- Simulation Models

Increased Uptime

- Faster Cycle Time
- Higher Productivity

Common User Interface

Automated Data Flow

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Cyber Security Exposures

DNUR = Domain Name Unauthorized Registration
FA = Fraudulent Access
FAA = Fraudulent Access Attempt
IAU = Improper Asset Usage
IAE = Information Assets Exposed
IPDF = Information Processing Facility Destruction
SD = Service Disruption
SE = Social Engineering
SLV = Software License Violation
T = Theft of Assets
V = Virus
Cyberinfrastructure Needs

Functioning Capability

• Model: reactions; processes; controls; supply chains…..
• Decide: production model; investment; location………
• Design: business plans; products; plants; training……
• Build: permit; procure; construct……………
• Make: start-up, optimize; maintain……………………
• Deliver: scheduling; logistics; security…………
• Collect: accounting; tax; ……………

Integration

• Interoperability
• FIAttech
• Knowledge Management
• Security

Supporting Today….Enabling Tomorrow