SPI – SPEL – SP-P&ID USING SMARTPLANT FOUNDATION

John Dressel, FLUOR Applications Specialist
Fluor’s Investment in the “NEXTGENERATION℠ Initiative”
Fluor’s Global Certified Environment
Fluor’s Execution & Work Processes
Fluor’s NEXTGENERATION℠ Training Programs
Fluor’s Global Deployment / Office Readiness Program
Fluor’s Global Sustaining Organization
Fluor’s Implementation of SP-P&ID Integration
Fluor’s Implementation of SPI Integration
Fluor’s Implementation of SPEL Integration
Fluor’s Implementation of SP3D Integration
Fluor’s Legacy Integration Programs
Fluor’s SmartPlant 3D Design Reuse Tools
Fluor’s NEXTGENERATION℠ “THINKING FORWARD”
  – SmartPlant P&ID Data Validation and Editor
  – SmartPlant Instrumentation Data Integration
  – SmartPlant Electrical Cable Management Tools
Fluor’s SmartPlant Implementation

- Fluor’s Investment in the “NEXTGENERATIONsm Initiative”
  - Work Process Review; began mid 2004
  - Office Readiness, Training & Deployment; 2010 – 2011
  - Global Project Execution Directive; 2012

**Mission Statement:**
Fluor’s investment supporting the NEXTGENERATIONsm Initiative is a proactive approach to successfully deploy the Intergraph SmartPlant Suite of technologies within Fluor in advance of production projects;
- Implementation of the SmartPlant software suite and SmartPlant Foundation in an Integrated project execution environment
- Work processes and Organizational changes that position Fluor for a “Next Generation” of project execution
Fluor’s Global Certified Environment

- Fluor “Global Certified – *Production Ready*” Environment
  - Integrated Project Execution Environment with a Defined Set of Automation Tools & Compatible Versions
  - Implementation of Intergraph SmartPlant Enterprise Suite with "Certified - Production Ready" Environment
  - Benefits - Global Execution Consistency, Cost Effective and Streamlined Project Start-up, Reduce Risk to Projects by "Pro-Actively" Testing & Certifying Automation Tools

Fluor NGEP Certified Environment Compatibility Matrix

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<th>Version</th>
<th>SmartPlant P&amp;M</th>
<th>SmartPlant Engineering Manager</th>
<th>SmartPlant Instrumentation (Intools)</th>
<th>SmartPlant 3D</th>
<th>SmartPlant Electrical</th>
<th>SmartPlant Markup</th>
<th>SmartPlant Foundation</th>
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Fluor’s Global Execution & Work Processes

- Global Work Process Driven Execution ...
  - Development of SmartPlant Global Execution Work Processes and Procedures
    - NEXTGENERATION™ Execution Guidelines (Volumes 1, 2, & 3)
  - Integrated Execution Work Processes using SmartPlant Foundation
    - Data Consistency, Centralized Integration Layer via SmartPlant Foundation
  - Multi-Functional Design Work Processes
    - Design Reuse; eliminate re-modeling and re-building between functions and projects
  - Material Management, Weight & COG Management, SmartPlant Interfaces (external & internal)
    - Material Management, MTO Extraction Utilities (Material Download Utility), Weight & COG Management Processes, Systems & Tool Interfaces, etc.

- Work Processes by SmartPlant Application …
  - Cross Discipline SmartPlant 3D Work Processes
  - SmartPlant P&ID Process Graphics Work Processes
  - SmartPlant Instrumentation Integration Practice
  - SmartPlant Electrical Implementation Practice
Fluor’s NEXTGENERATION℠ Training

- Role Base Curriculums
  - Leveraging the "Full" Advantage SP3D User Friendly Interface - Enabling "Multi Function Design"

- On-line SmartPlant 3D Virtual Training
  - High Quality, Effective, and Flexible Delivery
  - Enabled Fluor to Train Designers in Advance of Production Projects.

- Fluor Work Process Training
  - Re-enforcing Fluor's Work Processes Described in NEXTGENERATION Guidelines

- Office Readiness - "On-site" Coaching
  - Coaching of "Key" Subject Matter Experts
  - Leverage "existing" SmartPlant tool Experienced Resources
    - SmartPlant 3D Subject Matter Experts
    - SmartPlant P&ID Subject Matter Experts
    - SmartPlant Instrumentation Subject Matter Experts
    - SmartPlant Electrical Subject Matter Experts
  - Establish SmartPlant Foundation Experts in all Fluor Offices
Global Deployment / Office Readiness

- Fluor’s Global NEXTGENERATION\textsuperscript{sm} Deployment / Office Readiness Program

**Phase 1**
- IT Infrastructure
- Subject Matter Expert Identification
- Develop Project Deployment Plan
- Training Environment Setup
- Office Readiness Checklist
Global Deployment / Office Readiness

- Fluor’s Global NEXTGENERATION℠ Deployment / Office Readiness Program

Phase 1
- IT Infrastructure
- Subject Matter Expert Identification
- Develop Project Deployment Plan
- Training Environment Setup
- Office Readiness Checklist

Phase 2
- "On-site" Coaching by Core Team
- "Train the Trainer" Program
- Project Environment Setup & Configuration
- Initiate "Project Task Force" Training Program
Global Deployment / Office Readiness

- Fluor’s Global NEXTGENERATION™ Deployment / Office Readiness Program

**Phase 1**
- IT Infrastructure
- Subject Matter Expert Identification
- Develop Project Deployment Plan
- Training Environment Setup
- Office Readiness Checklist

**Phase 2**
- "On-site" Coaching by Core Team
- "Train the Trainer" Program
- Project Environment Setup & Configuration
- Initiate "Project Task Force" Training Program

**Phase 3**
- "On-site" Project Start-up Coaching by Core Team
- Begin Project Execution
- Office Subject Matter Experts - "point of contact" for project / office & as part of Fluor Global Sustaining Organization
Fluor’s Global Sustaining Organization

- Fluor’s SmartPlant - Global Sustaining Organization
  - Global Core Team
  - Regional Support Teams
  - Office Support Teams

- Global Change Management I Governance Process
  - Certified Environment Change Request Process
  - Governance Process; Evaluation, Resources, Design, & Implement

- Build a Community of Subject Matter Experts
  - Establish Subject Matter Experts thru Office Readiness Program
  - Global Subject Matter Expert Telecoms & Forums
  - Leverage Fluor’s Knowledge On-Line
Fluor's Global NEXTGENERATION℠ Project Execution Directive:

“All Fluor Projects worldwide shall be implemented using the SmartPlant software suite and SmartPlant Foundation in an Integrated project execution environment”
Implementation of SP-P&ID Integration

- SmartPlant P&ID “Publish” P&ID Diagram Numbers, Instrument Numbers, Line Numbers, Equipment Numbers and Associated Data to SmartPlant Foundation
- Other SmartPlant tools “Retrieve” the P&ID Data from the SmartPlant Foundation
Implementation of SPI Integration

- SmartPlant Instrumentation correlates Instrument tag Numbers with SP-P&ID for MOC
- Instrument Power requirements and Signal cross reference is Published to SPEL
- Dimensional Data for Piping and Inline Instrument tags are published to SP-3D
Implementation of SPEL Integration

- SmartPlant Electrical Retrieves Instrument Power Requirements and Signals from SPI and Electrical Equipment Numbers from SP-P&ID and Tray Data from SP-3D
- SmartPlant Electrical Publishes Cables requirements to SP-3D and Instrument circuiting with Electrical Signals to SPI
Implementation of SP-3D Integration

- SmartPlant 3D Retrieves Equipment and Line Numbers from SP-P&ID – Dimensional Data for In-lines from SPI – Cable Data from SPEL
- SmartPlant 3D Publishes 2D Location drawings and Model Material Requirements for Cable and Cable Tray System to SPEL
Fluor’s Legacy Integration Programs

- Fluor Feed Database (FFD)
  - Acquires data from Smart P&ID and Process Simulators and inputs Mechanical, Process and Line data into SmartPlant Instrumentation and SmartPlant 3D

- Fluor Material Manager (MatMan)
  - Retrieves Material Requirements from SmartPlant Instrumentation, SmartPlant 3D and SmartPlant Electrical and Produces Purchase Orders, Bills of Material and Field Material Control & Warehousing Reports
Fluor’s SmartPlant 3D Design Reuse Tools

- Fluor “Global” SmartPlant 3D Drawing Templates
  - Piping Templates
  - Civil / Structural Templates
  - Electrical and Control Systems Templates
  - Material Handling Templates
  - HVAC Templates

- Design Reuse Benefits
  - “Fully” Automated Drawings
    - Minimize Manual Annotations
  - “Pre-Configured” & “Standardized” Global Templates
    - Project Configuration Savings
  - Operational Consistency for Distributed Execution
    - Provide multi-office Project deliverables
Fluor’s NEXTGENERATION℠ “THINKING FORWARD”

- As New Intergraph SmartPlant Tools are developed Fluor’s NEXTGENERATION℠ Team will create new Global Work Processes and Practices

- Optimize Fluor’s NEXTGENERATION℠ Work Processes and Practices to leverage the SmartPlant Foundation Integration and Global Project execution

- Establish Fluor’s NEXTGENERATION℠ Team as a beta test facility for Intergraph SmartPlant suite Tool and Feature development

- Fluor’s NEXTGENERATION℠ Team will continue to work with vendors in the supply chain to facilitate SmartPlant suite integration with vendor sizing, selection and procurement software
Fluor’s NEXTGENERATION™ "THINKING FORWARD"

- SmartPlant P&ID Engineering Integrity
  - Rule Based Graphics and Data Validation
  - Avoid making costly changes late in a project cycle
  - Ensure the quality and dependability of P&ID data
  - Capture Fluor's Best Practices

- SmartPlant P&ID Engineering - Data Editor
  - Allows Engineering Access to P&ID Data and Properties without affecting Process Graphics
  - Cross Discipline SmartPlant P&ID Work Processes
  - Establishes Discipline Data Ownership in P&ID
  - Improves Quality of Data Integration
SPI and SP-PID Integration

Fluor’s NEXTGENERATIONsm “THINKING FORWARD”

- **SmartPlant P&ID Engineering - Data Editor**
  - Allows Control Systems Access to P&ID Tag and Loop Data without affecting Process Graphics
  - Adds the Ability to normalize the Instrument Types and Descriptions between SP-P&ID and SPI
  - Improves Quality of Instrumentation Data so additional Data can be Published and Retrieved to SPI

- **SmartPlant Instrumentation Macro Expansion**
  - Allows Control Systems Access to P&ID Tag and Loop Data without affecting Process Graphics
  - Adds the Ability to normalize the Instrument Types and Descriptions between SP-P&ID and SPI
  - Improves Quality of Instrumentation Data so additional Data can be Published and Retrieved to SPI
Fluor’s NEXTGENERATION™ “THINKING FORWARD”

- New SmartPlant Instrumentation Cable Browser View
  - Allows SPI to export the instrument cable requirements to SPEL
  - SPEL can then Publish both Electrical and Instrument Cable requirements to SP3D for Tray Loading
  - Cable Tray Routing and Loading done in SP3D will Provide Lengths and Routing Data
  - The SP3D Cable Lengths and Routing is Published Back to SPEL
  - Cable Schedules can be Published from SPEL for Electrical and Instrument Cables
    or
  - Instrument Cable Data may be Exported from SPEL and Imported into SPI for Instrument Cable Schedules
QUESTIONS

SPI – SPEL – SP-P&ID USING SMARTPLANT FOUNDATION