SmartPlant Instrumentation Technical User Forum P2C2 (Houston SPI TUF) Meeting					**November 15, 2016 8:00 am ProLytX**	
Attendees	37 Members in attendance 18 Online Connections		**Copied To**	Houston SPI LTUF Website http://www.spi-ltuf.org		
Called By	John Dressel	**Prepared By**	John Dressel			

Item	Topic	Notes	Action/Due
1	Welcome 8:00	**Welcome & Safety Moment** • Welcome to ProLytX Blake Biernacki, ProLytX • Geo Bistro HSE Moment Blake Biernacki, ProLytX o No fire drills scheduled today o If you hear an alarm or see strobes during today's presentation, it is a legitimate fire alarm. o Follow instructions of certified & trained Floor Monitors. o If you see fire or smell smoke, evacuate immediately – do not wait for an order.	
2	Chairman's Notes 8:10	**Announcements and Introductions John Dressel, Fluor** • Introductions – All attendees • Hexagon 2017 has moved from Anaheim, CA. back to Las Vegas, NV. To be June 13-16 with the GTUF on June 12. • Approval of the Minutes from August 9, 2016	
3	Presentation 8:20	**SPI 2016 and the S3D Connection John Dressel, Fluor** **Topics Covered in this Presentation** • S3D as a Data Destination is needed for a complete integrated environment • Lack of connectivity between SPI and S3D or other SmartPlant products • How SPI DDP works for In-line instrumentation and integration to S3D • Options for On-line and Off-line Data instrumentation integration to S3D • Material management between SPI and S3D for SmartPlant Construction • Cable Management between SPI and S3D available in SPI 2016 **Smart tm 3D as an SPI Data Destination** • S3D is the physical layer for all data from the SmartPlant Enterprise • SPI meta data for Instrument elements in the S3D model include: o In-line, On-line and Off-line instruments o Instrument Cable and Cable routing raceways o Instrument mounting stanchions and hookup details o Location of Instrument Junction Boxes and I/O	

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		Connection Points o Hook-up Assemblies and Material Requirements for Construction Work Packages **SPI to Smart 3D Integration Issues** • SPI Dimensional Data for Piping (DDP) is for In-line Tags only • SPI In-line and Off-line Tags are manually created and placed in S3D • Prior to SPI 2016 Cable data had to be managed through SPEL • Instrument material data has to be exported from SPI for external management • SmartPlant Materials (SPM) has no connection to SPI for Hookups or BOMs • Correlation of Line and Equipment numbers between SPI, SP-P&ID and S3D • S3D Construction Work Packages (CWP) need association to SPI Tags **SPI Dimensional Data for Piping to S3D** • The DDP module of SPI defines the sizing of In-line devices in S3D • The DDP module passes Dimensional Data to S3D via SmartPlant Foundation • Once the DDP data is in S3D Catalog Piping is able to place the instruments in the model • DDP passes Dimensional Data for all In-line instruments • DDP Symbols address dimensions of equipment and Maintenance Zones • Generic DDP Symbols developed by Intergraph for Fisher have added functions • Parameters such as Hand wheel and Operator Requirement and Positioning • Generic DDP Symbols reduce the number of DDP Groups required **Vendor DDP Solutions for SPI data to S3D** • Emerson Fisher has an Interface into Fisher First 2 for DDP SPI Data • The Fisher First 2 – SPI interface workflow is as follows: o Define Spec Sheet format – Fisher or SPI Spec Form o Import proper Link Files from Emerson o Export Valve Spec Sheet data from SPI to Fisher First 2 o Use Fisher First 2 for Sizing, Selection, and Pricing o Export Valve Spec and DDP data from Fisher First 2 to SPI o Run Fisher First 2 Link Files in SPI Import Module o Publish DDP data to SmartPlant Foundation o Retrieve DDP data into S3D Libraries o Place Valve with DDP data in S3D Model • Endress+Hauser works with Thomas Net to create their S3D	

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		DDP data • Endress+Hauser– SPI interface workflow is as follows: o Build Instrument Tags in the SPI Index and create Instrument Specs o Send Spec Sheets with Process and Selection Data to E+H o E+H retrieves data directly from SPI via Vendor API into their Spec o E+H uses their Software to Select Instrument Catalog Numbers o E+H sends Catalog Numbers with link to Thomas.Net for EPC for review o EPC retrieves Vendor data, DDP data and S3D Group Shape from Thomas Net o EPC Publishes Dimensional Data from SPI to S3D or directly to the S3D Model **SPI DDP without SmartPlant Foundation** • Activities for Importing data from a DDP Conversion Tool into S3D 1. Set the Dimensional Data Status in an SPI UDF (Preliminary - Design – Certified) 2. Additional UDF for MOC (Revision and Remarks) 3. Using a predefined SPI Browser View Export to a DDPDump.XLS 4. Run the DDP – S3D conversion program to create a S3D Master Catalog File 5. Place the Dump and Master file in the proper folder for the DDP Conversion Tool • DDP Conversion Tool Activities and Functions o The macro for Instrument Type and Geometry Type are set o The macro for Process Connection (End Preparation) o The macro for End Standard, Pressure Rating, and Status are set o The macro for Requisition Type and Fabrication Category are hard coded in the program o Validate all DDP data prior to creating the S3D Master Catalog Export • Load the S3D Master Catalog Export into the S3D Library Catalog • Once the DDP data is in S3D Catalog Piping is able to place the instruments in the model with proper Status and End Prep. • Instruments can be selected from the Instrumentation Stock list in S3D • DDP without SPF only passes Dimensional Data for In-line instruments • We still need to model the On-line and Off-line instruments in S3D **S3D Instrument Placement Tool** • Stanchions and On-line or Off-line instruments can be manually created in S3D OR • Using methods similar to integration without SPF to load the	

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		S3D Catalog • Exporting Off-line and On-Line Tag and Assembly or Hook-Up data from SPI • Condition the Off-line and On-Line data for placement in the S3D • Using an Instrument Loading Program in S3D (like one developed by Fluor) • Place the Instrument Stanchions in the S3D model • Place Instruments on the Stanchions with Hook-up assemblies **SPI Material Management for S3D** • SmartPlant Materials and SP Construction need the Material in S3D • Material Management software also relies on S3D for CWP associations • SPI has Material Management built-in but SPM and S3D do not connect • Bulk assembly material is defined in SPI as either UDFs or Hook-ups • Tags with Assemblies or Hook-ups with CWP may be exported from SPI • SPI Tags with Material Requirements may then be placed in S3D **Cable Management between SPI and S3D** • Work Process for Cable management before SPI 2016 o Cable schedule could only be retrieved from SmartPlant Electrical through SmartPlant Foundation in order for Smart3D to retrieve it. o SmartPlant Instrumentation cable schedule had to go through SmartPlant Electrical before being able to be retrieved from Smart3D o Cable routing in Smart3D then had to be published back through SmartPlant Foundation and the Cable Schedules produced from SmartPlant Electrical • Work Process for Cable management After SPI 2016 o Cable schedule can now be retrieved from SmartPlant Electrical or SmartPlant Instrumentation through SmartPlant Foundation for Smart3D to retrieve it. o Cable routing in Smart3D then be published back through SmartPlant Foundation and the Cable Schedules produced from SmartPlant Electrical or SmartPlant Instrumentation • Things to keep in mind… o SPI "Electrical Equipment" must exist in S3D Model o SPI and S3D Equipment Names Must Match Exactly o Cable Tags in SPI Catalog Must Match S3D Cable Part Numbers • Publishing Cable Schedule From SPI o Create Matching Equipment and Cables Types in SPI and S3D o Add Cables with “To - From” in SPI o Publish SPI Cable Schedule to SmartPlant Foundation from SPI	

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		• Retrieving SPI Cable Schedule Into S3D
		  o Retrieve SPI Cable Schedule From SmartPlant Foundation in S3D
		  o Validate Cable Schedule in S3D
		  o Create Cable Device Modeling Report
		• Cable Device Modeling Report
		  o Lists all cables in the S3D model
		  o Report shows:
		  ▪ Device Equipment Names and status in model
		  ▪ Number of connected cables
		  ▪ Cable Names and Part Descriptions
		  ▪ Signal types and status in model
		  o Identifies which cables need to be processed
		• Modeling Equipment in S3D
		  o SPI Junction Boxes and Marshalling Racks or DCS I/O are modeled as Electrical Components
		  o Tray system is modeled for routing usually by the Electrical group
		  o Cable Ports need to be defined on all Instrument equipment
		• Instrument Cable Routing in S3D
		  o Either Electrical or Instrument designers may route Instrument Cables in S3D
		• Things to keep in mind…
		  o Auto-Routing Option Available
		  ▪ Cable Signal Type Must Match Cableway Signal Type for AutoRoute
		  o Use Contiguous Cableways
		  ▪ Route Zero-Spec Cableway
		  ▪ Use Auto-Connect Command
		
		“Errors using inadequate data are much less than those using no data at all.”
		~ Charles Babbage	

4	Presentation
	8:45
		ProLytX Presentations **Blake Biernacki**
		Mike Antosh
		
		ProLytX Overview
		• Intergraph Service Provider
		  o Data Migrations
		  o Administration
		  o Hosting
		  o Training
		• Enterprise Application Integration
		• Quality Control/Assurance
		• Functional Safety Services
		
		SPI 2016 Implementation
		
		• How different is SPI2016?
		• Will my reports and tools still work?
		• Will my users need training?	

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		• By reviewing the tables and fields within the SPI Database, we can understand where SPI2016 may be different • SPI Database Overview o 629 Tables o 15,026 Fields • Table Additions/Deletions o 0 Tables Deleted o 25 Tables Added o 3 Tables for Claim/Merge o 19 Tables for EDE/Query Builder • Field Additions/Deletions/Changes o 0 Fields Deleted o 29 Fields Added (0.19 %) o 2 existing field name changes (0.01%) o 5 existing field datatype changes (0.03%) o 3 existing field length changes (0.02%) • SPI Data Structure Summary o The SPI data structure changes are minimal o Existing tools, reports, and work practices should work well with SPI 2016 • User Interface Changes o EDE / Query Builder / SQL Editor o Project / As-Built Claiming and Merging • EDE o Limited browser use is available to allow for spec form browsers o Grouping, sorting, and filtering allowed o User interface looks and feels similar to Excel o EDE Filtering o EDE Expression Builder • Query Builder o Configuration Tools for EDE o Similar to Microsoft Access functionality o Link tables o Select fields • SQL Editor o Allows user to query all tables within the domain schema o Admin schema tables are not able to be queried o Invalid Characters o No “Update”, “Insert” commands allowed o Cannot query custom tables o Many SQL functions are allowed (GROUP BY, COUNT, UNION, etc) o SQL Editor – Grouping Queries o SQL Editor – Data from Multiple Modules o SQL Editor – Progress Reporting o SQL Editor Editor is powerful. At this time, ProLytX regards it as an admin feature	

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		• Claim/Merge
		  o Functionality moved from the Admin Module to the SPI Interface
		  o User interface enhancements
		
		• SPI 2016 Project Implementation
		  o Challenges
		  ▪ Learning to use the EDE
		  ▪ Learning the syntax for the SQL Editor
		  o Positives
		  ▪ EDE is more user-friendly than browsers
		  ▪ Spec browsers were still used because automated EDE's are not available
		  ▪ Users picked up the tool quickly with little training
		  ▪ Queries and tools built for previous versions worked well
		
		Thin Client Security
		
		• Associated Documents (intools.ini)
		• Associated Documents (Main.exe)
		• Associated Documents (Regedit.exe)
		• Associated Documents (VBA)
		
		• Citrix Implementation
		  o 80% of companies tested exposed sensitive data.
		  o Most were vulnerable to arbitrary code execution.
		  o All issues lied on a poor implementation of Citrix and Applications.
		  o Some people believe that providing access only to a single application provides some measure of security. Remember, this is not the case.
		  o **"Using the access rules we had acquired at the time, we were able to read the information, including passwords, which gave us system administrator access to every server [several hundred] in the organization. That level of access not only gave us complete control of their systems, but we could have deleted any audit trail we might have left."**
		• Advise Citrix Administrators of these issues
		• Ensure the system is locked down through penetration testing
		• Confirm access to specific roles for users
		• Use dual layer authentication
		• Do not use restriction policies as a replacement for antivirus
		• Have a thorough and complete understanding of your network environment	

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5	Presentation 10:00	**Instrument Design Tools Configuration (IDTC)** **Gene Haney, CB&I** **Bob Zerda – PIP Consultant** **Current Issues in the Industry** 1 DATA HANDOVER • More Owner/Operators are requiring the handover of instrument databases from the EPC or other contractors. 2 USER DEFINED FIELDS • No consistent configuration of user defined fields (UDFs) in the industry. 3 MULTIPLE DATA CONTRIBUTORS • Many projects are executed with multiple EPCs and suppliers contributing data creating data consolidation issues. 4 INCONSITENT DATA ORGANIZATION • Inconsistent data organization can cause extended safety audits and delay startup. **PIP IDTC Task Team Goal and Objectives** 1 FACILITATE DATA SHARING 2 CREATE GENERIC PRACTICE • The PIP Practice must not require the Owner/Operator, EPC, vendor, or any other data contributor or recipient to use a specific application or setup. 3 DEFINE A 'HARMONIZED' MAPPING • The Practice should provide a method of 'harmonizing' or mapping instrument data fields and user definable data fields between different data management systems. 4 PROVIDE AUTONOMY TO EACH DATA CONTRIBUTOR • Provide each contributor (company) the ability to use their own application and configuration during the project phase by providing a standard format for data handover. **PIP-IDTC PRACTICE DEVELOPMENT** • First Meeting May 8th, 2012 • Consultation with PIP Process Controls Function Team. • Reviewed industry (e.g., ISA, OSI) and corporate instrument datasheets. • Began to create list of data elements. • Decided to concentrate on data elements for flow, level, pressure, and temperature instruments. • Practice completed and approved for use 2016 **DMDIM001 "Instrumentation Metadata Requirements"** • Table of Contents 1.Scope 2.Definitions 3.General 1. Scope This Practice provides a data modeling framework and defined field identifiers for establishing structured electronic information for process instruments. This Practice provides standardized instrumentation data element labels and associated field identifiers based on common usage, such that instrumentation data can be	

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		readily uploaded into various electronic data bases. This Practice promotes accurate, timely input of instrument requirements as instrumentation is specified for purchase. Leveraging electronic data management capabilities, the standardized data can be mapped to smart design and maintenance management data base systems for ready retrieval and visualization of instrumentation data. This Practice enables single source input which provides the following benefits: a. Eliminates duplication of effort for operations and project teams b. Reduces the cycle time for operations readiness during equipment commissioning c. Enhances the use of instrument information in daily facility operations, maintenance, and other administration uses 2. Definitions *data element label:* A word or phrase associated with an instrument attribute based on common usage in the process industry. *field identifier:* A unique data base field name for establishing structured electronic information for process instruments. A specific field identifier is associated with each data element label. *user:* A system administrator responsible for developing and managing databases and/or applications. 3. General 3.1 A listing of data elements for describing requirements of various types and categories of instruments is provided in Appendix A. 3.2 The descriptors in the first column of Appendix A divides the data elements into categories relating to the classification of instruments (e.g., Gauges, Thermowell, Transmitter), or for general use (e.g., General Data, Purchase Data). 3.3 The second column lists the labels given to each data element. 3.4 The third column lists field identifiers associated with the data element labels. 3.5 The Flow, Level, Temperature, and Pressure columns associate the data elements with instrument type. 3.6 The “User” columns are provided for those users who may wish to map data element labels and/or field identifiers from an existing system to the PIP labels and identifiers. • Appendix A - Instrumentation Data Elements List Instrumentation Data Elements List with SPI Mapping **Where do we go from here?** 1 ADD MORE PROCESS FUNCTION TYPES • Control Valves • Analyzers 2 WORK WITH SOFTWARE PROVIDERS • Encourage software providers, such as Intergraph, to include more ‘defined’ data elements in the out-of-the-box	

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		schema. **Is this an opportunity for our LTUF?** 1 Would this Practice offer any benefit for data handover on any of you projects? • Vendor to EPC • EPC to EPC • EPC to Owner/Operator 2 Can we agree on data elements that we share in common and would like to have Intergraph add to the SPI schema? 3 Are there members of this organization that could participate on the IDTC Task Force team and help shape the future of this Practice?	
6	Presentation 10:45	**SPI 2016 Product Update** **David Kaiser, Intergraph** **Dan Williams,** **Intergraph**	

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		SPI 2016 SP1 – Coming Q1 2017 - What is it all about?
		• Improving the EDE overall performance
		• Revamping SPI's explorers- Better Windows 10 Support, Better User Experence:
		  o Domain Explorer
		  o Reference Explorer
		  o Binder module explorer
		  o Wiring explorer
		• Improving productivity – Favorites
		• Improving productivity – Show EDE
		• Improving productivity – Quick search
		
		• Revamping SPI's explorers
		  o Better Windows 10 Support
		  o Better User Experience :
		  ▪ Domain Explorer
		  ▪ Reference Explorer
		  ▪ Binder module explorer
		  ▪ Wiring explorer
		• Added Functions to Explorers
		  o Sort
		  o Search
		  o Filter
		
		• Improving productivity
		  o New Favorites Tab (replacing my list)
		  o Customize your Tab – Folders and content
		  ▪ Documents
		  ▪ Macro Definitions
		  ▪ Panels
		  ▪ Mixed
		  o Show EDE
		  ▪ Create an EDE in your Private folder
		  ▪ Show EDE from Domain Explorer – to use Domain explorer filter.
		  ▪ Edit your data
		  o Filtered Folder in the Domain Explorer
		  o Choose you EDE (Private Folder)
		  o EDE is available for the Task at hand
		
		• Quick Search
		  o Search as you type
		  o Search from everywhere
		  o Search for anything (Documents, Instruments, Queries,…)
		  o Have a complete Right Click Menu functionality (Open Document)
		  o Have a Domain Explorer Go-To -Item	

		CONVAL and SPI **Andreas Vogt, F.I.R.S.T.** **The presenter: Andreas Vogt** • President of F.I.R.S.T. GmbH • Founder and managing partner • Active in software development since 1979 • Developing instrumentation and process design software	

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		since 1985 • Doing engineering services since 2001 **CONVAL9 Overview** • Common risks on problems in control valve sizing and selection o Capex projects o Turnarounds • Solution by predictive reliability analysis • Lessons learned Applying reliability index “Ri” in real life together with SPI **Control Valve Cost Distribution** • Small Number of valves o 94% Standard Control Valves o 6% Critical / High Performance Control Valves • Big impact on purchase cost - Proportional purchase cost o 62% Standard Control Valves o 38% Critical / High Performance Control Valves **Scenario: Capex projects** • High performance valves are not fit for the application • Risk of valves failing during commissioning and startup • Real example of a Petrochemical plant o Major problems with high performance valves o >2,5 million $ reengineering and replacement cost o Startup delay > 30 days **Scenario: Turnarounds** • Detection of unexpected damages on High Performance Control Valves • Spare part lead time several month • Workarounds are introducing further cost • Risk off project and startup delays **Common to both scenario**s • Root cause analysis necessary o Based on the “real” process data (hard to get) • Reengineering o Depending on vendor recommendations for the solution o Risk of repeatedly selecting a poor solution • Replacement o Long lead times may impact operation o Risk of operation loss **What if…** • you could predict if a Control Valve is “fit for the application” at all? • you could predict reliability problems (e.g. due process data changes) to preorder spare parts for turnarounds. • you get rating for how good a valve fits to the process conditions to select the best available solution • you could apply “Ri” on large control valve populations • you could therefore minimize the risk of capital losses	

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		CONVAL9 Control Valve sizing and selection
		• Select a valve that
		  o works stable in the required range of control
		  o give you some reserve on control
		  o fulfills its job reliable
		• Verify that the selection meets all the requirements
		• Don't rely on a vendors recommendation only
		
		Why do we need a Key Performance Indicator (KPI)
		• Are you a valve nerd? Some, maybe most of us will answer "For sure not"
		• "How can I reproducible decide if a valve matches the given process conditions so that it performs reliable in any mode of operation?"
		  o Gut instinct?
		  o Rules of thumb?
		  o Applying best practices?
		• Ensure that independent from the individual doing the analysis the given rating is reproducible identical
		• Allow analyzing valve cases by "non-nerds" having "only" the process conditions
		• Quickly detect the severe cases in big number of cases
		• To predict the impact of changing process conditions
		• …
		
		Why do we need a Reliability Index (RI) KPI?
		• To review the full range of operating conditions: (Min, Norm, Max, Start-up, … 0% to 100% of valve opening)
		• To ensure that you don't miss something
		
		Quick definition of "Ri"
		• A single number for each operating / process condition
		• The range of the value is defined
		• 0 to 0.1 No reliability problems expected
		• 0.1 to 0.5 Possible reliability problems
		• 0.5 to 1 Limited reliability
		• >1 Possible mechanical damage
		• Additional info on the root cause and options to improve
		
		Building the "Ri" in brief
		• To calculate the "Ri", all major reliability influencing factors need to be taken into account.
		• General parameters like
		  o Δp
		  o Energy conversion
		  o Noise level
		  o Outlet flow velocity
		  o Valve type
		• Flow conditions
		  o Cavitation
		  o Flashing
		  o Choked flow
		• Fluid properties
		• Process conditions
		  o Normal operation
		  o Start-up	

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		o Special operation • … **How to apply a "Ri" in projects?** • Import latest data from SPI and vendor tools • Determine the "Ri" with final operating conditions for all modes of operation for all control valves • Follow the hints, discuss and select more suitable solutions • Ensure that finally no valve will be selected with a "Ri" > 0.1 • Sounds easy, isn't it? **Challenges applying the "Ri"** • Process data / specification o Tools involved ▪ Process simulators ▪ SPI ▪ Vendor tools o One time handover ▪ Process Data Sheet ▪ Instrument Data Sheet o Bulk processing • Interfaces involved o Import from Process Simulator Software o Import from SPI ▪ Process Datasheet ▪ Instrument Datasheet o Import from Vendor tool ▪ Fisher First 2 ▪ Fisher Specification Manager **CONVAL Adapter Tool - CΛT** • CΛT General processing • CΛT Reporting • CΛT Verification issues statistics • CΛT issues pareto chart **Challenges applying the "Ri"** • Data contend o Data not complete o Data not correct o Data changing last minute o Data not covering all modes of operation (e.g. Start-up) • Data format o Data structure specification not consistent o Data not structured (e.g. Notes) o Flashing / Outgassing data in SPI process datasheet o Lots of relevant data un UDFs **Special challenges in projects** • Communication o The biggest challenge at all o 3+ parties involved o Project workflow is not yet designed to use a "Ri" as	

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		a central quality control element o There is no common data language for cycling specification and selection data o No common practice established yet • Collaboration **Does that all make sense?** • What is the benefit cost ratio? • A BCR of 30 to 100 is realistic • Verified in recent projects • Confirmed by recalculating past projects • EPCs, Owner operators and Valve Vendors want to apply it in future projects and continue to evolve the approach • Can also be applied for further instrument types	
7	LTUF Forum 11:15	**Forum Discussion Topics** **All Attendees** • SPI CR Ranking Website • SPI & S3D Cable Management • SPI 2016 External Interfaces	
8	Close 11:55	• Next meeting was tentatively scheduled February 14, 2017 *(After the meeting we could not find a host for that day so CB&I agreed to host the meeting on February 23, 2017)* • John Dressel closed meeting and thanked everyone for attendance	