

<b>SmartPlant Instrumentation Technical User Forum P2C2 (Houston SPI TUF) Meeting</b>	<b>February 23, 2017 8:00 am CB&amp;I</b>
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<b>Attendees</b>	32 Members in attendance 20 Online Connections	<b>Copied To</b>	Houston SPI LTUF Website <a href="http://www.spi-ltuf.org">http://www.spi-ltuf.org</a>
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<b>Called By</b>	John Dressel	<b>Prepared By</b>	John Dressel
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Item	Topic	Notes	Action/Due
1	Welcome 8:00	<b>Welcome &amp; Safety Moment</b> <ul style="list-style-type: none"> <li>• Welcome to CB&amp;I                      Gene Haney, CB&amp;I</li> <li>• Safety Moment                              Gene Haney, CB&amp;I</li> </ul>	
2	Chairman's Notes 8:10	<b>Announcements and Introductions              John Dressel, Fluor</b> <ul style="list-style-type: none"> <li>• Introductions – All attendees</li> <li>• Hexagon 2017 has moved from Anaheim, CA. back to Las Vegas, NV. To be June 13-16 with the GTUF on June 12.</li> <li>• Approval of the Minutes from August 9, 2016</li> <li>• Election of Officers <ul style="list-style-type: none"> <li>○ John Dressel, Chair</li> <li>○ Blake Biernacki, Vice Chair</li> <li>○ John Bolmanski Secretary</li> </ul> </li> </ul>	
3	<b>Presentation 8:20</b>	<b>SPI 2016 Product Update                              Guy Masin, Intergraph David Kaiser, Intergraph Dan Williams, Intergraph</b> <b>SPI 2016 SP1 – Coming May 2017</b> <ul style="list-style-type: none"> <li>• Improving the EDE overall performance</li> <li>• Revamping SPI's explorers- Better Windows 10 Support, Better User Experience: <ul style="list-style-type: none"> <li>○ Domain Explorer</li> <li>○ Reference Explorer</li> <li>○ Binder module explorer</li> <li>○ Wiring explorer</li> </ul> </li> <li>• Improving productivity – Favorites</li> <li>• Improving productivity – Show EDE</li> <li>• Improving productivity – Quick search</li> <li>• Revamping SPI's explorers <ul style="list-style-type: none"> <li>○ Better Windows 10 Support</li> <li>○ Better User Experience : <ul style="list-style-type: none"> <li>▪ Domain Explorer</li> <li>▪ Reference Explorer</li> <li>▪ Binder module explorer</li> <li>▪ Wiring explorer</li> </ul> </li> </ul> </li> <li>• Added Functions to Explorers <ul style="list-style-type: none"> <li>○ Sort</li> <li>○ Search</li> <li>○ Filter</li> </ul> </li> <li>• Improving productivity <ul style="list-style-type: none"> <li>○ New Favorites Tab (replacing my list)</li> </ul> </li> </ul>	

Item	Topic	Notes	Action/Due
		<ul style="list-style-type: none"> <li>○ Customize your Tab – Folders and content <ul style="list-style-type: none"> <li>▪ Documents</li> <li>▪ Macro Definitions</li> <li>▪ Panels</li> <li>▪ Mixed</li> </ul> </li> <li>○ Show EDE <ul style="list-style-type: none"> <li>▪ Create an EDE in your Private folder</li> <li>▪ Show EDE from Domain Explorer – to use Domain explorer filter.</li> <li>▪ Edit your data</li> </ul> </li> <li>○ Filtered Folder in the Domain Explorer</li> <li>○ Choose you EDE (Private Folder)</li> <li>○ EDE is available for the Task at hand</li> <li>• Quick Search <ul style="list-style-type: none"> <li>○ Search as you type</li> <li>○ Search from everywhere</li> <li>○ Search for anything (Documents, Instruments, Queries,...)</li> <li>○ Have a complete Right Click Menu functionality (Open Document)</li> <li>○ Have a Domain Explorer Go-To -Item</li> </ul> </li> </ul>	
4	Presentation 8:45	<p><b>SPI 2016 Issues – Things to Consider</b>                      <b>Blake Biernacki</b></p> <p><b>Overview</b></p> <ul style="list-style-type: none"> <li>• Changes to SPI in Version 2016</li> <li>• SPI 2016 Things to Consider</li> <li>• Group Discussion</li> </ul> <p><b>SPI 2016</b></p> <ul style="list-style-type: none"> <li>• How different is SPI2016?</li> <li>• Will my reports and tools still work?</li> <li>• Will my users need training?</li> <li>• By reviewing the tables and fields within the SPI Database, we can understand where SPI2016 may be different</li> <li>• SPI Database Overview <ul style="list-style-type: none"> <li>○ 629 Tables</li> <li>○ 15,026 Fields</li> <li>○ 25 Additional Tables <ul style="list-style-type: none"> <li>▪ Most for EDE/Query Builder Functions</li> <li>▪ Others for Claim/Merge, TDL</li> </ul> </li> </ul> </li> </ul> <p><b>UDTs and UDFs</b></p> <ul style="list-style-type: none"> <li>• UDTs and UDFs are now handled at the Domain Level <ul style="list-style-type: none"> <li>○ No Longer Handled at the Plant Level</li> </ul> </li> <li>• Things to Consider when moving to SPI 2016 <ul style="list-style-type: none"> <li>○ UDTs and UDFs for each Plant are now combined</li> <li>○ System will allow you to choose a single distinct header for the UDF or UDT</li> </ul> </li> </ul> <p><b>Custom Browsers</b></p>	

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		<ul style="list-style-type: none"> <li>• When moving an existing environment to SPI 2016, all Custom Browsers will become view only EDEs. <ul style="list-style-type: none"> <li>○ This is because the Browser Views are handled by the EDE and Query Builder in SPI 2016</li> </ul> </li> <li>• Resolution <ul style="list-style-type: none"> <li>○ Export View Only EDE to PSR, then Import the PSR into the SQL Editor <ul style="list-style-type: none"> <li>▪ You will need to convert the SQL File into a Query Builder File and recreate the relations to make an editable EDE view.</li> </ul> </li> <li>○ Manually rebuild View in Query Builder</li> </ul> </li> </ul> <p><b>Supporting Table Fields in EDE Views</b></p> <ul style="list-style-type: none"> <li>• There are now multiple field available for Standard Supporting Table Fields <ul style="list-style-type: none"> <li>○ Make sure to decide what field is needed when creating an EDE</li> <li>○ Browser Views Default to Standard Field (Ex: Instrument Type)</li> </ul> </li> </ul> <p><b>Browser Filters</b></p> <ul style="list-style-type: none"> <li>• Filtering a View in the EDE has Changed <ul style="list-style-type: none"> <li>○ This is because the Browser Views are handled by the EDE and Query Builder in SPI 2016.</li> <li>○ The use of special characters are no longer needed.</li> <li>○ When moving to SPI 2016 from an existing environment, the filter will need to be rebuilt.</li> <li>○ Filters: <ul style="list-style-type: none"> <li>▪ Is Equal To</li> <li>▪ Is Not Equal To</li> <li>▪ Starts With</li> <li>▪ Ends With</li> <li>▪ Contains</li> <li>▪ Does Not Contain</li> <li>▪ Is Less Than</li> <li>▪ Is Less Then Or Equal To</li> <li>▪ Is Greater Than</li> <li>▪ Is Greater Than Or Equal To</li> <li>▪ Is Null</li> <li>▪ Is Not Null</li> </ul> </li> </ul> </li> </ul> <p><b>SQL Editor</b></p> <ul style="list-style-type: none"> <li>• Allows user to query all tables within the domain schema</li> <li>• Admin schema tables are not able to be queried</li> <li>• Invalid Characters: ?, @, --, ??, ], [, /*,*/,XP_, EXEC, EXECUTE, SP_EXECUTESQL</li> <li>• No "Update", "Insert" commands allowed</li> <li>• Cannot query custom tables</li> <li>• Many SQL functions are allowed (GROUP BY, COUNT, UNION, etc)</li> </ul> <p><b>Domain Explorer</b></p>	

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		<ul style="list-style-type: none"> <li>• Domain Explorer slowness when expanding Entity Folders               <ul style="list-style-type: none"> <li>○ Below Query looped 61 times before expanding Entity Folder</li> <li>○ Confirmed with Intergraph that this has been resolved in SPI 2016 R1</li> <li>○ R1 release date: Near the end of the Q2 2017</li> </ul> </li> </ul> <p><i>“select COUNT ('X') as ref_id from object_registry ab_or, object_registry proj_or where ab_or.object_internal_id1 = X and ab_or.object_uid = proj_or.object_uid and ab_or.eng_proj_id = 0 and proj_or.eng_proj_id &gt; 0 and proj_or.object_is_terminated_flg = 0”</i></p> <p><b>Q&amp;A / Discussion</b></p>	

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5	Presentation 9:20	<p><b>SPI 2016 Vendor Interfaces</b> <span style="float: right;"><b>John Dressel, Fluor</b></span></p> <p><b>Vendor Data Integration Introduction</b></p> <ul style="list-style-type: none"> <li>• SmartPlant Instrumentation (SPI) has more Vendor interfaces than any other Process Controls Engineering Automation tool</li> </ul> <p><b>How Vendor Interfaces work in SPI</b></p> <ul style="list-style-type: none"> <li>• Build Instrument Tags and sizing data in SPI using automation functions</li> <li>• Create Control Valve Datasheets <ul style="list-style-type: none"> <li>○ Export to Specification to Sizing software</li> <li>○ Use Vendor software for valve sizing calculations and selection</li> </ul> </li> <li>• Create Field Instrument Datasheets <ul style="list-style-type: none"> <li>○ Export to Instrument Selection software</li> <li>○ Use Vendor software for sizing and selection of instruments</li> </ul> </li> <li>• Create Field Wiring Network with I/O <ul style="list-style-type: none"> <li>○ Import SPI I/O Card Library for DCS</li> <li>○ Export SPI DCS I/O data to DCS software</li> <li>○ Use DCS Configuration tools and SPI to Configure and Maintain DCS Process Control System</li> </ul> </li> </ul> <p><b>SPI Control Valve Vendor Interfaces</b></p> <ul style="list-style-type: none"> <li>• Build Control Valve Instrument Tags and input process sizing and selection data in SPI using automation functions</li> <li>• Create Control Valve Datasheets in SPI</li> <li>• Export to Vendor Sizing and Selection Software</li> <li>• Use Vendor sizing and selection of instruments</li> <li>• Import Manufacturer and Model Numbers into SPI From Vendor Selection Software</li> <li>• Issue Purchase Orders and Construction Hookup documents from SPI</li> <li>• Export Inline Instrument Dimensional Data for Piping (DDP) to S3D model for valve placement</li> </ul> <p><b>Emerson Process Management - Fisher FIRST 2</b></p> <ul style="list-style-type: none"> <li>• Fisher First 2 is the new sizing and selection software from Emerson that features the best functions of Fisher FirstVue and Fisher Specification Manager</li> <li>• Fisher First 2 can use either a Fisher standard SPI 2016 Spec form 90 or any SPI custom Valve spec sheet to transfer sizing data to Fisher First 2</li> <li>• Fisher will provide Link files to Import the Sizing data and DDP data back into SPI</li> <li>• The SmartPlant Instrumentation - FIRST 2 interface, coupled with the joint initiative of Intergraph and Emerson Process Management, is a complete utility that allows you to exchange control valve data with Fisher's FIRST 2 software.</li> </ul> <p><b>Flowserve Performance!Nxt Software Interface</b></p> <ul style="list-style-type: none"> <li>• Flowserve <b>Performance!Nxt</b> like most other Control Valve Vendor Sizing and Selection software has Import Export capabilities for interfacing with SPI</li> <li>• Performance! Sizing Program helps you identify the control</li> </ul>	

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		<p>valve package best suited to each set of service conditions.</p> <ul style="list-style-type: none"> <li>• It provides a fast, user-friendly and flexible means for: <ul style="list-style-type: none"> <li>○ Sizing, selecting and generating valve and actuator specifications</li> <li>○ Data entry and verification</li> <li>○ Importing and Exporting all spec sheet fields</li> </ul> </li> <li>• It does not provide Dimensional Data for Piping (DDP)</li> </ul> <p><b>GE Masoneilan™ ValSpeQ 4.0.5.0 Interface</b></p> <ul style="list-style-type: none"> <li>• Masoneilan™ ValSpeQ is a full function valve sizing, selection and specification tool used to validate technical suitability of selected valve configurations for Masoneilan, Mooney &amp; Becker valves</li> <li>• It has very limited Import Export capabilities for interfacing with SPI so it may be necessary to use Cut and Paste to move data from SPI to a Project template.</li> <li>• Reports from ValSpeQ can be saved as Excel or Word files.</li> <li>• It does not provide Dimensional Data for Piping (DDP)</li> </ul> <p><b>GE Consolidated SRVS Relief Valve Sizing</b></p> <ul style="list-style-type: none"> <li>• GE Dresser Consolidated SRVS6.2 software for sizing and selection of Safety Relief Valves</li> <li>• They have created a unique interface by building an SPI Spec Sheet form specifically for their Relief Valves that is pre mapped to the SRVS program</li> <li>• PSV Sizing data is exported and Imported between SPI and SRVS as a coma delimited file</li> <li>• The SRVS Relief Valve sizing program is more accurate with more options then the internal SPI 2016 Relief Valve Sizing program</li> </ul> <p><b>Other Valve Selection SPI Software</b></p> <ul style="list-style-type: none"> <li>• F.I.R.S.T. CONVAL 9 instrument sizing software is a leader in generic valve sizing and selection software using calculations based on key performance indicators to prioritize the valve that matches needed process and condition criteria</li> <li>• Other Control or Relief Valve Sizing software supports SPI by import / export of data but do not have interfaces are: Pentair Pri2Size, Samson, Mallstream and metso Nelprof 6 <ul style="list-style-type: none"> <li>○ Note: The built-in Valve Sizing software in SPI 2016 works very well</li> </ul> </li> </ul> <p><b>SPI Instrument Interfaces</b></p> <p><b>Steps for selecting Vendor Model Numbers:</b></p> <ul style="list-style-type: none"> <li>• Build Instrument Tags and input process sizing and selection data in SPI using automation functions</li> <li>• Create Instrument Datasheets in SPI</li> <li>• Export to Vendor Sizing and Selection Software</li> <li>• Use Instrument Vendor Selection software</li> <li>• Import Manufacturer and Model Numbers into SPI From Vendor Selection Software</li> <li>• Issue Purchase Orders and Construction Hookup documents from SPI</li> </ul>	

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		<ul style="list-style-type: none"> <li>• Export Dimensional Data to SP3D for model</li> </ul> <p><b>Endress+Hauser W@M Instrument SPI Interface</b></p> <ul style="list-style-type: none"> <li>• Endress+Hauser works with Thomas Net to create their S3D DDP data</li> <li>• Endress+Hauser– SPI interface workflow is as follows: <ul style="list-style-type: none"> <li>○ Build Instrument Tags in the SPI Index and create Instrument Specs</li> <li>○ Send Spec Sheets with Process and Selection Data to E+H</li> <li>○ E+H retrieves data directly from SPI via W@M Cloud Interface into their Spec</li> <li>○ E+H uses their Software to Select Instrument Catalog Numbers</li> <li>○ E+H sends Catalog Numbers with link to Thomas Net to EPC for review</li> <li>○ EPC retrieves Vendor data, DDP data and S3D Group Shape from Thomas Net</li> <li>○ EPC Publishes Dimensional Data from SPI to S3D or directly to the S3D Model</li> </ul> </li> </ul> <p><b>Emerson Rosemount – Micro Motion Interfaces</b></p> <ul style="list-style-type: none"> <li>• Issues with the Rosemount – Micro Motion Instrument Toolkit <ul style="list-style-type: none"> <li>○ Each Type of SPI Spec Form must be mapped to the Toolkit</li> <li>○ It is necessary to send a copy of the spec to determine the required options and materials</li> <li>○ In Toolkit, the selection process requires a long step by step process</li> <li>○ Moving to the next tag requires a start-over and you must go through the step by step process again</li> </ul> </li> <li>• Issue Mitigation <ul style="list-style-type: none"> <li>○ Group Like instrument types together and send one of each type through the interface then apply the model number to all tags</li> </ul> </li> <li>• Rosemount is developing a SPI 2016 DDP interface similar to Fisher First2</li> </ul> <p><b>Other SPI 2016 Instrument Interfaces</b></p> <ul style="list-style-type: none"> <li>• Issues with SmartPlant Instrumentation Vendor Interfaces <ul style="list-style-type: none"> <li>○ SPI requires a different Spec Form for each Instrument Type</li> <li>○ Smart Instruments (HART Protocol) carry process conditions, ranges and set points as part of the digital data set so process data needs to be assigned to both element and transmitter for most instruments</li> <li>○ Most Vendor model selection tools have Import / Export capabilities but will require unique data mapping for each vendor</li> <li>○ Information in Spec Sheet Notes will not come over as mapped data</li> </ul> </li> <li>• Issue Mitigation <ul style="list-style-type: none"> <li>○ More Compliance with PIP IDTC, ISO 15926 and NE-100 Standards needed for data exchange</li> </ul> </li> </ul>	

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		<p style="text-align: center;">consistency</p> <p><b>SPI DCS &amp; PLC Interfaces</b></p> <p><b>Steps for DCS &amp; PLC Configuration:</b></p> <ul style="list-style-type: none"> <li>• Download SPI I/O Card Library for DCS</li> <li>• Create Field Wiring Network with I/O Cabinets in SPI Wiring Modules by EPC</li> <li>• Connect field devices and cables in SPI using the SPI Wiring Explorer and Modules</li> <li>• Export SPI DCS I/O data to DCS Vendor Configuration Programs</li> <li>• Use DCS Configuration software and SPI Wiring data to Configure and Maintain Process Control System</li> <li>• Perform Owner Operator Functions for Calibration and Loop Maintenance</li> </ul> <p><b>Emerson DeltaV DCS SPI Interface</b></p> <ul style="list-style-type: none"> <li>• Provides I/O Libraries for all systems including HART and CHARMS</li> <li>• Uses a pre-mapped negative file format (Excel) for interface export</li> <li>• Interface is bidirectional for Owner Operator maintenance and control</li> <li>• The interface is well supported by both Intergraph and Emerson</li> <li>• Interface supports both DeltaV DCS and DeltaV SIS hardware</li> </ul> <p><b>Yokogawa DCS SPI Interface</b></p> <ul style="list-style-type: none"> <li>• Provides I/O Definition files for CENTUM CS 3000 R3</li> <li>• Uses Excel add-ins to the CENTUM software for import and export</li> <li>• Interface is bidirectional for Owner Operator maintenance and control</li> <li>• The interface is well supported by both Intergraph and Yokogawa</li> <li>• Interface supports both Publish and Retrieve functions in SPI</li> </ul> <p><b>Honeywell Experion PKS - SPI Interface</b></p> <ul style="list-style-type: none"> <li>• Pre defined I/O module and termination assemblies for all Experion I/O</li> <li>• Uses XML SPI Adaptor to publish data to Experion Control Builder</li> <li>• Interface is bidirectional for Owner Operator maintenance and control</li> <li>• Supports configuration of virtual tags and device resident functions blocks within Experion and SPI</li> <li>• Interface supports both Publish and Retrieve functions in SPI</li> </ul> <p><b>ABB's Process Engineering Tool Integration (PETI), SmartPlant Instrumentation integrates with ABB 800xA Control System</b></p> <ul style="list-style-type: none"> <li>• ABB I/O Catalog Manager uploaded into SPI</li> <li>• Bi-Directional data Integration uses database to database</li> </ul>	



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		<p>synchronization between SPI and 800xA</p> <ul style="list-style-type: none"> <li>• Wizard driven SPI and 800xA system integrator</li> <li>• Enforced step-by-step procedure for Express-Sync and Transactions</li> </ul> <p><b>Other DCS and PLC SPI Interfaces</b></p> <ul style="list-style-type: none"> <li>• Schneider Electric's Flexible, Lean EXecution (FLEX) program for Foxboro DCS and Triconex PLC - SPI Interface offers import and export of SPI data with their Engineering Workbench</li> <li>• Other DCS and PLC Manufactures that support SPI but do not have interfaces are: Siemens SPPA-T3000, Simatic PCS-7, Mitsubishi Electric's PMSX, metsDNA, Azbil and Harmonas</li> </ul> <p><b>SPI 2016 Vendor Interfaces for the Owner Operator</b></p> <ul style="list-style-type: none"> <li>• Calibration Module Interface                             <ul style="list-style-type: none"> <li>○ Maintenance personnel can upload or download calibration data to and from the SPI, including as-found, as-left, and other key instrument information for Fluke 740 Series Calibrators</li> </ul> </li> <li>• Asset Management Interfaces                             <ul style="list-style-type: none"> <li>○ The SPI interface with SAP NetWeaver is commonly used for Plant Service and Asset Management Systems</li> </ul> </li> </ul> <p><b>Emerging Technology &amp; Vendor Interfaces</b></p> <ul style="list-style-type: none"> <li>• Most Projects today use a combination of Conventional, Bus wiring and Wireless Instrument types and Measurement or Control technologies that are selected for best fit to project requirements</li> <li>• Vendors of these emerging technologies need to provide electronic vendor data integration to SPI 2016 as this has become a major factor in the Vendor selection process on data centric engineering projects</li> </ul>	
6	SIG Update 10:10	<p><b>PIP IDTC SIG Update</b></p> <p style="text-align: right;"><b>Gene Haney, CB&amp;I</b></p> <ul style="list-style-type: none"> <li>• Instrument Design Tools Configuration (IDTC)</li> <li>• PIP DMDIM001 Instrumentation Metadata Requirements</li> </ul>	

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		<p>Practice</p> <ul style="list-style-type: none"> <li>• SIG Members: <ul style="list-style-type: none"> <li>○ Gene Haney, CB&amp;I (SIG Chair)</li> <li>○ Bob Zerda, PIP</li> <li>○ Alex Koifman, F.I.R.S.T. CONVAL</li> <li>○ Betty Alexander, JGC</li> <li>○ Chris Cordes, Covestro</li> <li>○ Guillermo Vigna, Endress+Hauser</li> <li>○ John Dressel, Fluor</li> <li>○ Kory Johnson, Marathon</li> <li>○ Nezar Faitouri, Mangan, Inc.</li> </ul> </li> <li>• Agenda <ul style="list-style-type: none"> <li>○ Encourage software providers, such as Intergraph, to include more 'defined' data elements in the out-of-the-box schema.</li> <li>○ Agree on data elements that we share in common and would like to have Intergraph add to the SPI schema</li> <li>○ Participate on the IDTC Task Force team and help shape the future of this Practice</li> </ul> </li> </ul>	
	<p>Presentation 10:30</p>	<p><b>New Technologies affecting SPI</b> <span style="float: right;"><b>Alex Koifman</b></span></p> <p><b>New technologies, trends and challenges</b></p> <ul style="list-style-type: none"> <li>• Impact of new technologies and trends on SPI</li> </ul> <p><b>The contributor</b></p> <ul style="list-style-type: none"> <li>• Alex Koifman <ul style="list-style-type: none"> <li>○ Implementation and work process independent consultant</li> <li>○ Instrumentation design and design of instrumentation design systems since 1991</li> <li>○ SPI consulting, training, support, functional design and product management between 1997 and 2016</li> <li>○ Representative for the CONVAL instrument calculation, sizing and selection software for F.I.R.S.T. (Germany)</li> </ul> </li> <li>• <a href="mailto:alex.koifman@instrumentdata.org">alex.koifman@instrumentdata.org</a> , 256-226-1567</li> </ul> <p><b>Times of change</b></p> <ul style="list-style-type: none"> <li>• Petrochemical boom initiated by cheap shale gas followed by</li> <li>• Prolonged oil &amp; gas downturn</li> <li>• Driving cost cutting and search for efficiencies</li> <li>• Increased competition in engineering and</li> <li>• Reduced investments in design solutions development</li> </ul> <p><b>Design and Integration trends</b></p> <ul style="list-style-type: none"> <li>• Continuation and extension of data-centric approach creating "big engineering data"</li> <li>• Expansion of the data exchange through maximum mapping of the attributes of the individual design solutions and disciplines</li> <li>• Alternative , simplified integration solutions</li> <li>• Multi-vendor approach to the design solution, owner will get whatever he specifies, yet preferred vendor remains –</li> </ul>	

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		<p>Intergraph, Aveva, Bentley, etc.</p> <ul style="list-style-type: none"> <li>• Use Intergraph's SPF, other vendors data warehouse (DW) and development of own proprietary data storage with ability to export in the format desired by the client.</li> <li>• Automating secondary tasks (equipment lists, pipe list, ISO drawing management, etc.) not sufficiently handled by the primary design solutions.</li> <li>• Lack of factual progress with the ISO 15926 (latest news date back to 2014) – everybody went BIM ☺. And Fiotech appears to be re-integrating with Construction Industry Institute (CII)</li> </ul> <p><b>What is happening</b></p> <ul style="list-style-type: none"> <li>• Over the last 20 years CAD/CAE tools and IM solutions matured and reached base level satisfaction, large initial savings are achieved, business operations are optimized (e.g. off shoring)</li> <li>• Platform replacement (like PDS 3D to SP3D) are not on the horizon, in part because of the energy crisis and associated budget constrains</li> <li>• Bigger focus on downstream functional tasks, for example material management based on the 3D model, design progress within overall project management, leading to 5D or 6D models</li> <li>• New software development is slowing down (overall R&amp;D reduction) due to the industry downturn</li> <li>• High external and internal cost of software and general technology upgrades</li> <li>• Capitalizing on proprietary design automation and construction and intellectual property protection</li> </ul> <p><b>New modular construction</b></p> <ul style="list-style-type: none"> <li>• Modular construction - 3'rd Generation Modular Execution – allows to reduce Total Installed Cost (TIC) by reducing construction and start-up costs including reduced construction space and, mostly, reducing the field construction labor costs, moving “field-work” to manufacturing site, reducing and simplifying the quality control procedures (using stationary equipment for weld checks, for example) and related field work.</li> <li>• Shell Quest Project (Carbon Capture and Storage – CCS) total costs were reduced by 30% compared to the previous pre-crisis estimates, peak construction staffing reduced from 1,000 to 450 people and construction site size reduced by 20%</li> <li>• <i>15 of the 30% cost reduction were directly attributed to the modular construction.</i></li> </ul> <p><b>Modular construction design impact</b></p> <ul style="list-style-type: none"> <li>• Modular construction is not new – Jacobs and others used it from 60's but for compact and expensive projects (semiconductors and pharmaceutical), in space constrained projects (off-shore platform integration) and in remote construction sites, so challenges are know.</li> <li>• Modularization will impact design costs from the current 8-15% average (varies by industry)</li> <li>• Increased design quality requirements – no more “by field”</li> </ul>	

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		<p>or “by field contractor” clauses</p> <p><b>Modular construction impact on SPI</b></p> <ul style="list-style-type: none"> <li>• More requirements for the physical design: <ul style="list-style-type: none"> <li>○ Hook-ups and associated small bore process connection tubing</li> <li>○ Extended use of DDP and modeling instrumentation in the 3D model</li> <li>○ Closer SPI to SP3D Integration (SP3D is uniquely fit for modular design)</li> <li>○ Possible feedback of the XYZ instrument coordinates along 3D cable routing into SPI wiring</li> </ul> </li> <li>• Possibly less requirements on the material estimates like cable lists, etc. – these will be accounted for in the manufacturing site.</li> <li>• Work process chain – addition of the manufacturing facility link</li> <li>• Wiring may require changes and can be a challenge, requiring quick connectors for cross-module wiring</li> </ul> <p><b>“Cloudification”</b></p> <ul style="list-style-type: none"> <li>• Market initially dominated by original vendor solutions – Intergraph, Aveva, Autodesk</li> <li>• Moving into general purpose hosting platforms – Azure, Amazon, Microsoft, IBM</li> <li>• Separation of the infrastructure (platform) and service providers</li> <li>• Increase of the managed services – original SPI providers (EPC, SPI service companies, etc) as well as general purpose business application managed services (TechSurge/Intergraph);</li> <li>• Some vendors, like Endress+Hauser are betting on entirely cloud-based integration</li> <li>• Conclusion: With hosting knowledge available and product ready fit for hosting, hosting generally and SPI hosting specifically will evolve around a combination of price competition and managed services Service Level Agreements (SLA)</li> </ul> <p><b>Industrial Internet of Things (IIoT) – Is it serious?</b></p> <ul style="list-style-type: none"> <li>• General Electric - 124-year old company with US\$130 bln revenue, US\$6 bln software revenue with 20% growth now position itself as a “Digital Company”</li> <li>• Siemens, Honeywell, Emerson, Microsoft, Apple, ....</li> </ul> <p><b>IIoT impact on engineering and plants</b></p> <ul style="list-style-type: none"> <li>• Many questions remain: <ul style="list-style-type: none"> <li>○ Who will be responsible for these IIoT - mesh wireless networks and devices – instrumentation or IT? This will determine the impact on the instrumentation community and SPI.</li> </ul> </li> <li>• NB: Western model separated business engineering applications from the automation and control systems departments, some places they are still historically combined. <ul style="list-style-type: none"> <li>○ Will separation of the process control, SIS and auxiliary networks (F&amp;G, physical monitoring and</li> </ul> </li> </ul>	

Item	Topic	Notes	Action/Due
		<p style="text-align: center;">security, etc) remain or will they merge?</p> <p><b>IIoT impact on SPI</b></p> <ul style="list-style-type: none"> <li>• Task is similar to the Fieldbus: <ul style="list-style-type: none"> <li>○ Special development in SPI in cooperation with Fieldbus industry experts (Meir Stein);</li> <li>○ Initial assumptions were challenged and adjusted - Segment diagram vs. Fieldbus loop;</li> <li>○ Partial implementation – SPI Fieldbus stops at S-1.</li> </ul> </li> <li>• Similar challenges are expected for main SPI tasks – identify, buy, install and manage the change: <ul style="list-style-type: none"> <li>○ Identification (tagging) – partial, wireless infrastructure is not likely to have instrument tagging.</li> <li>○ Procurement – partial, tagged items can be procured, but most equipment is likely to be ordered in bulk, untagged;</li> <li>○ Installation and wiring – hook-ups can be done (for tagged items), but wireless wiring reporting is lacking (see N.Faitouri presentation at Hexagon 2016)</li> <li>○ Plant management of change – dependent on the above.</li> </ul> </li> <li>• Recommendation to Intergraph: Work with the members of the Industrial Internet Consortium who are current SPI users to identify requirements for design and documentation. Otherwise there is a risk of multi-year gap between technology requirements and SPI capabilities.</li> </ul> <p><b>New control system architecture</b></p> <p><b>Open Automation Initiative</b></p> <ul style="list-style-type: none"> <li>• New initiative by ExxonMobil (4<sup>th</sup> largest vertical O&amp;G company with \$400 bln revenue) to introduce new open control system architecture <ul style="list-style-type: none"> <li>○ 2013 – began R&amp;D reviewing aviation experience, real-time virtualization, software defined networking in telecoms, IT/OT cybersecurity, IIoT, wireless and cloud services;</li> <li>○ 2014 – developed Functional Characteristics to engage industry;</li> <li>○ 2015 – <a href="#">Contracted Lockheed Martin</a> (world's #1 defense contractor with \$40 bln revenue) as system integrator to define requirements and build a prototype;</li> <li>○ 2016 – formed an Open Process Automation Forum™ to develop standards.</li> </ul> </li> </ul> <p><b>Open Systems Architecture Vision</b></p> <p><b>Open architecture impact</b></p> <ul style="list-style-type: none"> <li>• Main idea – military experience in system integration without associated costs</li> <li>• Over 140 companies including large owner operators already signed up behind this initiative;</li> <li>• ExxonMobil, Shell and Dow are industry leaders in effectiveness, innovation and safety in the industry;</li> <li>• ExxonMobil has unprecedented influence on the market and need competitive field for imminent upgrade of all downstream DCS systems (refining and chemicals);</li> </ul>	

Item	Topic	Notes	Action/Due
		<ul style="list-style-type: none"> <li>• Raise competition for parts of the business previously dominated by a single DCS vendor, a path likely to be repeated by many owners held “hostage” by proprietary nature of control systems;</li> <li>• A possible domino effect on all production support systems – from design, to ERP, to reliability and safety lifecycle management – over time.</li> </ul> <p><b>Impact on design and tools</b></p> <ul style="list-style-type: none"> <li>• Design tools will not have any influence on the architecture (too small economically and too much downstream) but will bear the downstream pressure to document design;</li> <li>• Established project practices will be shaken up - it will be harder to outsource MIC role to a single control system vendor, providing opportunity for multi-vendor system integrators, more responsibility and liability for EPCM;</li> <li>• For EPC’s – new technology will change previous cost estimation process increasing fixed price contracts risks;</li> <li>• Plants may find themselves in the environment when they cannot outsource control system [hardware and software] support to a single vendor and thus will need to increase staffing and in-house expertise or grow multi-vendor support service companies.</li> </ul>	
7	LTUF Forum 11:00	<p><b>Forum Discussion Topics</b> <span style="float: right;"><b>All Attendees</b></span></p> <ul style="list-style-type: none"> <li>• Open Automation Initiative impact on SPI</li> <li>• The Industrial Internet of Things (IIoT) and Instrumentation</li> <li>• Crowded Clouding effects on Instrumentation software</li> <li>• Modular construction and possible effects on design</li> <li>• Mobility of data on the plant floor</li> <li>• Facility information management</li> <li>• SPI CR Ranking Website</li> </ul>	
8	Close 11:55	<ul style="list-style-type: none"> <li>• Next meeting was tentatively scheduled May 16, 2017 (<i>After the meeting Jacobs agreed to host the meeting on May 25, 2017</i>)</li> <li>• John Dressel closed meeting with thanks to CB&amp;I for hosting and everyone for attending</li> </ul>	