SmartPlant® Instrumentation

Integration of Data in the Supply Chain

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SmartPlant ©

Implementation Team

By John Dressel

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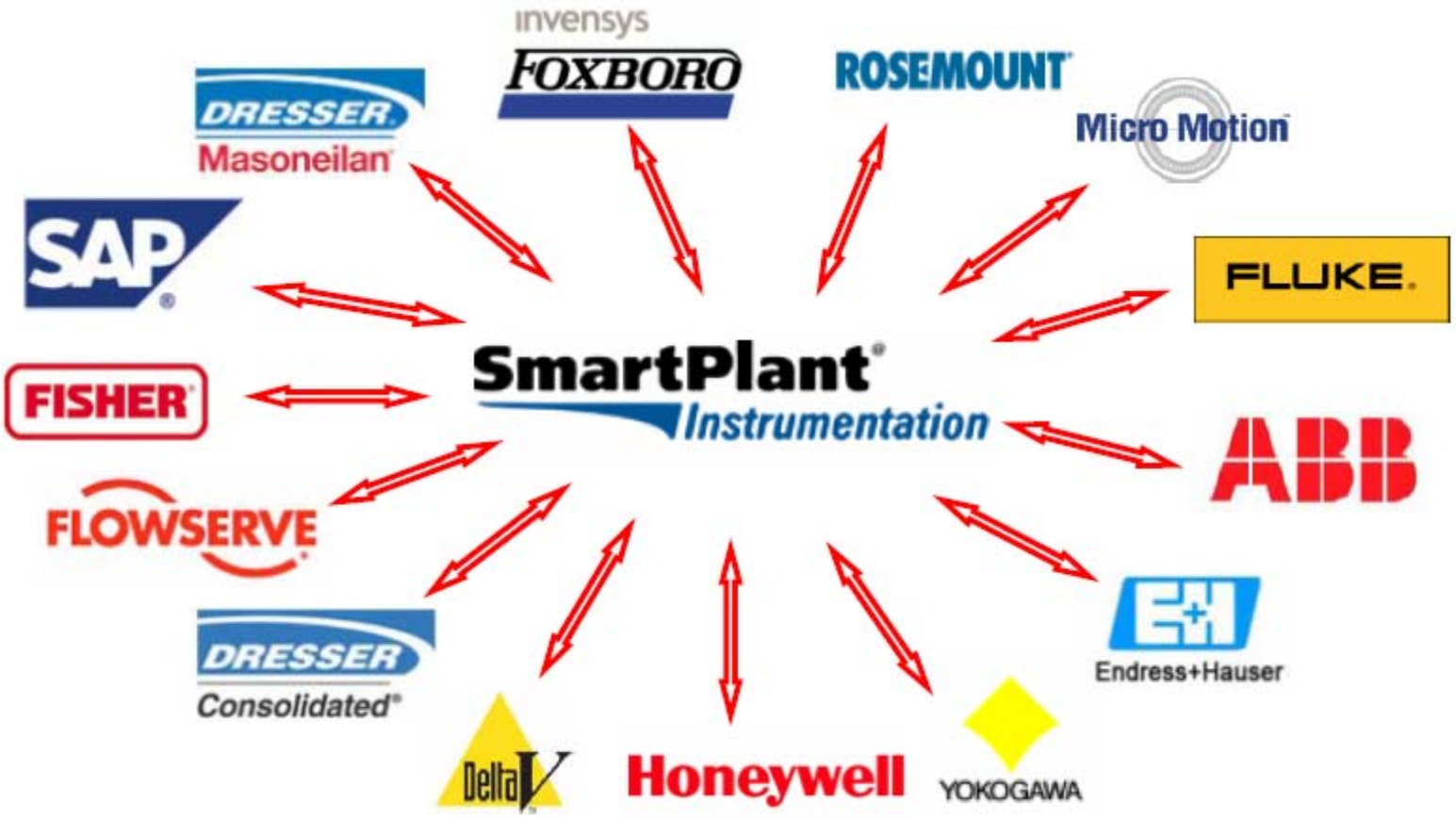
INTERGRAPH

Introduction

- **SmartPlant Instrumentation (SPI) has more Vendor interfaces to than any other Process Controls Engineering Automation tool**



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SmartPlant Instrumentation® (SPI)

- **How interfaces work in a Perfect World**
  - SPI Spec Sheet Generation for Sizing and Selection Control Valves
  - SPI Spec Sheet Generation for Sizing and Selection of instruments
  - SPI Interfaces for Control System wiring I/O
  - SPI Interfaces for DCS Configuration
  - SPI Interfaces for Plant Maintenance and Operation
- **How interfaces work in the Real World**
  - Using SPI in As-Built, work-sharing, multi-contractor environment
  - Issues with the SmartPlant Instrumentation Interfaces
  - Problems with Underutilization of SPI interfaces
- **What can be improved with SPI interfaces and integration**
  - How to manage integration, exchange, and hand-over of Data throughout the Vendor Supply Chain
  - Standardize on minimum Specs and data sets for interoperability
  - Utilization of NE 100 and ISO 15926 Standards for data interoperability

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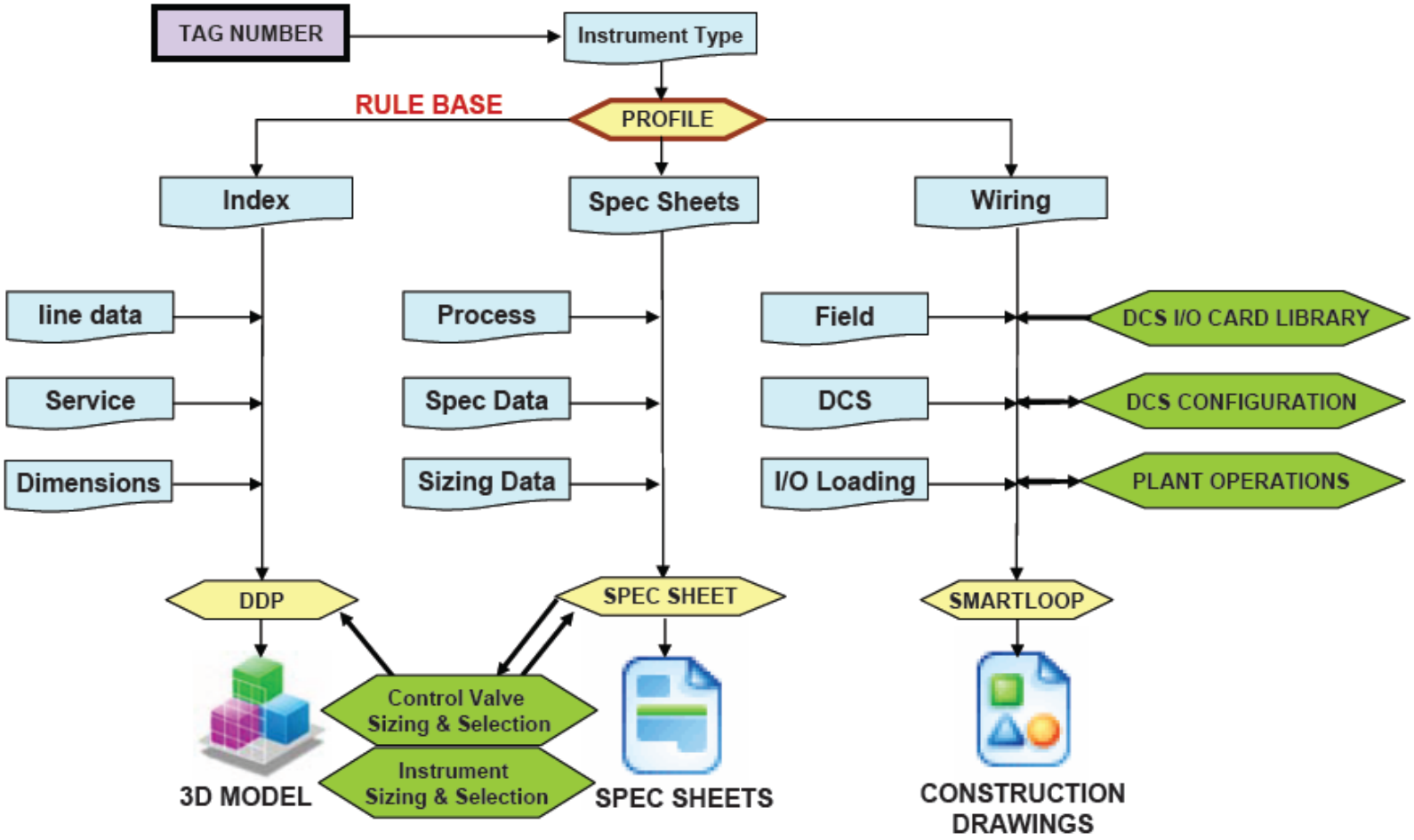
SPI Vendor Interfaces

- **Typical interface points for Vendor Data From and To SPI**



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SPI Interfaces in a Perfect World

HOW SPI INTERFACE WORK PROCESSES SHOULD WORK FOR CONTROL VALVES

- Build Control Valve Instrument Tags and input process sizing and selection data in SPI using automation functions
- Create Control Valve Datasheets in SPI
  - Export to Vendor Sizing and Selection Software
  - Use SPI or Vendor valve sizing calculations
  - Use Vendor valve selection software
  - Import Manufacturer and Model Numbers into SPI From Vendor Selection Software
  - Export Dimensional Data to SP3D for model
  - Issue Purchase Orders and Construction Hookup documents from SPI

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SPI Interfaces in a Perfect World

HOW SPI INTERFACE WORK PROCESSES SHOULD WORK FOR INSTRUMENTS

- Build Instrument Tags and input process sizing and selection data in SPI using automation functions
- Create Control Valve Datasheets in SPI
  - Export to Vendor Sizing and Selection Software
  - Use Vendor sizing and selection of instruments
  - Import Manufacturer and Model Numbers into SPI From Vendor Selection Software
  - Export Inline Instrument Dimensional Data to SP3D for model
  - Issue Purchase Orders and Construction Hookup documents from SPI

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SPI Interfaces in a Perfect World

HOW SPI DCS INTERFACE WORK PROCESSES SHOULD WORK

- Create Field Wiring Network with I/O Loading in SPI by EPC
  - Import SPI I/O Card Library for DCS
  - Connect devices and cables in SPI using the SPI Wiring Explorer and Modules
- Export SPI DCS I/O data to DCS Vendor Configuration Programs
- Operation and Maintenance Owner Operator Functions
  - Use DCS Configuration software and SPI Wiring data to Configure and Maintain Process Control System

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How Interfaces work the Real World

Issues with the SmartPlant Instrumentation side of the Interfaces

- Issues when using SPI in As-Built, work-sharing or multi-contractor environment
  - The SPI Database is often remote with limited access via Terminal Services adding complexity to the use of interfaces – *(requires a neutral file for passing data)*
  - Inconsistency of capabilities of different pillars on a work share project affects the quality of data passed through the Interfaces – *(requires project wide standards)*
- Additional cost for Interface licensing results in limited usage of the interfaces
  - *User community is working with Intergraph and the vendors to include the interfaces in the standard licenses together with other add-on features*
- SPI requires that the SmartPlant Foundation Integrator be loaded for the DCS Interface to work – even when only needing to download the I/O libraries
  - *User community has asked Intergraph separate the I/O libraries from the Interfaces*
- Multiple Process Cases do not export properly from SPI to the sizing interfaces
  - *Intergraph is working on a solution to the export problem (May be a moot issue)*
- Use of vendor specific SPI spec forms limits early engineering data development
  - *Utilization of standard SPI Spec Libraries based on ISA S20 Specifications*

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How Interfaces work the Real World

Problems with Underutilization of SPI interfaces

- Cost of license keys for interfaces limits availability
  - *Reduce or remove the required special license key for all DCS interfaces and make the Interfaces part of the standard add-ons for all licenses*
- Different I/O Data requirements from different Vendors makes interface too complex
  - *Develop a standard DCS data exchange library that will work across multiple DCS Vendors to import and export SPI data*
- The I/O Card Library used by EPC and DCS Configuration, Ranges and Set Points used by Owner Operators are part of the same interface
  - *The I/O Card Library import needs to be separated from the DCS Interface*
- Lack of trained SPI and Vendor Users results in Manual or Paper transfer of data
  - *Standardize the interfaces and data transfer so interfaces work the same from vendor to vendor makes user training simpler*
- The magnitude of data fields on Spec forms are confusing use more man hours to properly populate Specs.
  - *Indicate Interface Required fields on the Standard SPI Spec forms*

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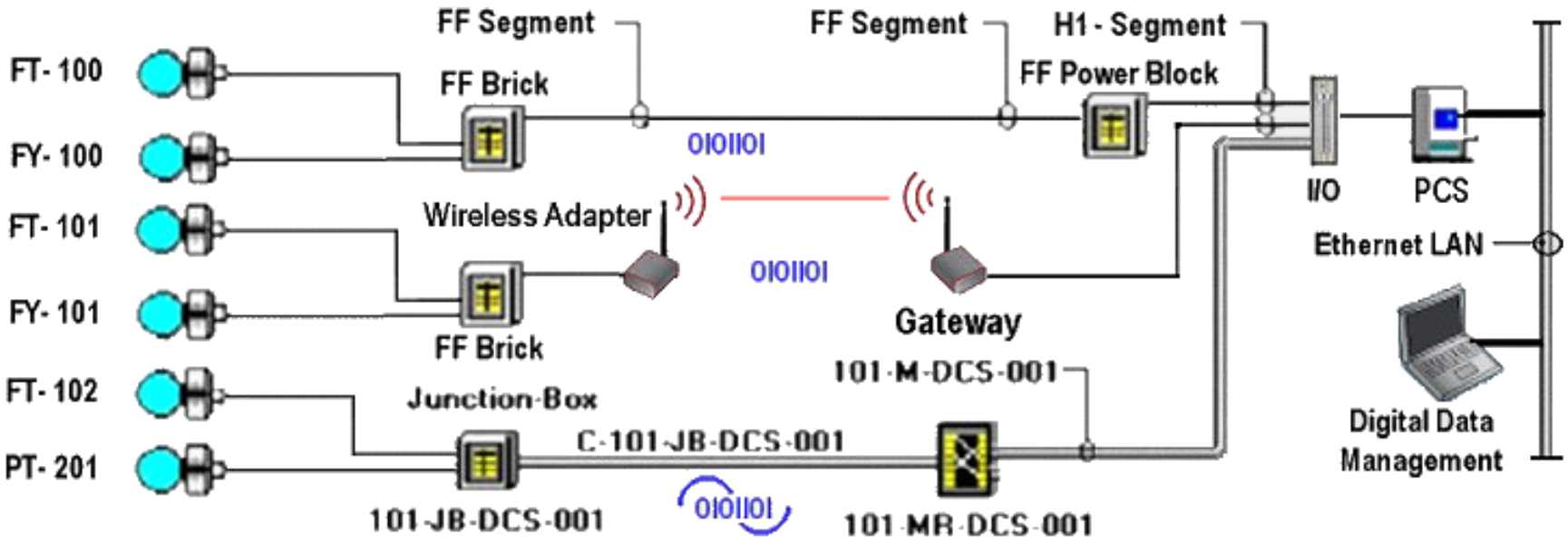
Emerging Technology & Vendor Interfaces

- Most Projects today use a combination of Conventional, Bus wiring and Wireless Instrument types and technologies selected for best fit to project and system requirements
- Finding the right balance between system requirements and applied technology are day-to-day choices facing engineers working in both large and small engineering companies
- Electronic Vendor data integration is becoming a factor in the Vendor selection process



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Improving the SPI Vendor Interfaces

- The Vendor Interfaces are unique for each product line with separate user interfaces and integration mechanisms. As the interfaces mature they will assume a more standardized look and feel as well as a unified integration method
- The Intergraph SmartPlant Foundation integration component of SmartPlant Enterprise will allow supplier data to be integrated with any of the SmartPlant Suite of Software using adapters
- The Interfaces will be based on one or more international standards to facilitate Global Implementation across multiple business sectors
- The use of third party data integration tools and cloud based vendor catalogs will standardize vendor data resources

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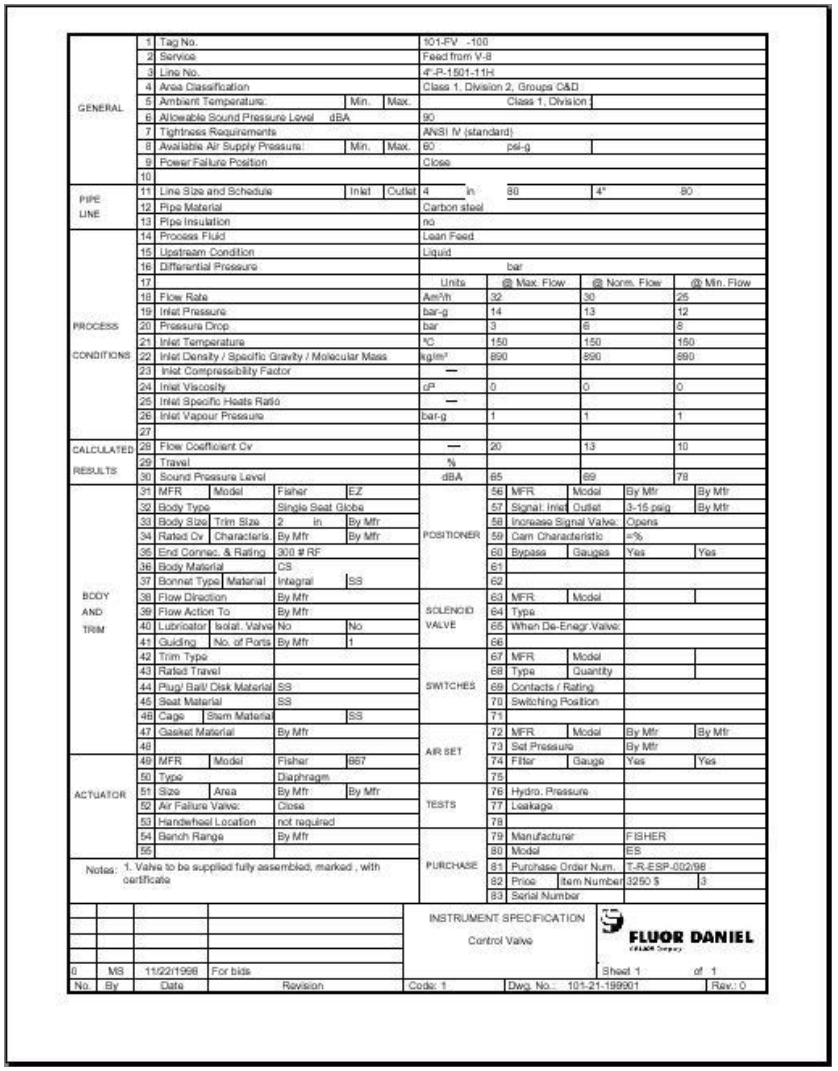
Improving the SPI Vendor Spec Sheets

- Demands on SPI Spec Sheets
  - Sizing Data Requirement
    - Process Data and Ratings
  - Instrument Selection Data
    - Materials and Design conditions
  - Optional Accessories
    - For catalog number resolution
  - Related Components
    - Positioners, etc…
  - Manufacture & Model
    - Catalog Number
  - Vendor Specific Specifications
- Future SPI Specification Libraries
  - Standardized across vendors
  - Specs Simplified for purpose
  - Minimal Required Data indicated



GENERAL	1	Tag No.				101-FV -100													
	2	Service				Feed from V-8													
	3	Line No.				4"-P-1501-11H													
	4	Area Classification				Class 1, Division 2, Groups C&D													
	5	Ambient Temperature:		Min.	Max.					Class 1, Division									
	6	Allowable Sound Pressure Level	dBA			90													
	7	Tightness Requirements				ANSI IV (standard)													
	8	Available Air Supply Pressure:		Min.	Max.	60		psi-g											
	9	Power Failure Position				Close													
	10																		
PIPE LINE	11	Line Size and Schedule		Inlet	Outlet	4	in	80		4"		80							
	12	Pipe Material				Carbon steel													
	13	Pipe Insulation				no													
PROCESS CONDITIONS	14	Process Fluid				Lean Feed													
	15	Upstream Condition				Liquid													
	16	Differential Pressure						bar											
	17						Units	@ Max. Flow		@ Norm. Flow		@ Min. Flow							
	18	Flow Rate					Am³/h	32		30		25							
	19	Inlet Pressure					bar-g	14		13		12							
	20	Pressure Drop					bar	3		6		8							
	21	Inlet Temperature					°C	150		150		150							
	22	Inlet Density / Specific Gravity / Molecular Mass					kg/m³	890		890		890							
	23	Inlet Compressibility Factor					—												
	24	Inlet Viscosity					cP	0		0		0							
	25	Inlet Specific Heats Ratio					—												
	26	Inlet Vapour Pressure					bar-g	1		1		1							
	27																		
CALCULATED RESULTS	28	Flow Coefficient Cv					—	20		13		10							
	29	Travel					%												
	30	Sound Pressure Level					dBA	85		89		78							
BODY AND TRIM	31	MFR	Model	Fisher	EZ			POSITIONER	56	MFR	Model	By Mfr	By Mfr						
	32	Body Type		Single Seat Globe					57	Signal: Inlet	Outlet	3-15 psig	By Mfr						
	33	Body Size	Trim Size	2 in	By Mfr				58	Increase Signal Valve:		Opens							
	34	Rated Cv	Characteris	By Mfr	By Mfr				59	Cam Characteristic		=%							
	35	End Connec. & Rating		300 # RF					60	Bypass	Gauges	Yes	Yes						
	36	Body Material		CS					61										
	37	Bonnet Type	Material	Integral	SS				62										
	38	Flow Direction		By Mfr				SOLENOID VALVE	63	MFR	Model								
	39	Flow Action To		By Mfr					64	Type									
	40	Lubricator	Isolat. Valve	No	No				65	When De-Energ.Valve:									
	41	Guiding	No. of Ports	By Mfr	1				66										
	42	Trim Type						SWITCHES	67	MFR	Model								
	43	Rated Travel							68	Type	Quantity								
	44	Plug/ Ball/ Disk Material		SS					69	Contacts / Rating									
	45	Seat Material		SS					70	Switching Position									
	46	Cage	Stem Material		SS				71										
	47	Gasket Material		By Mfr				AIR SET	72	MFR	Model	By Mfr	By Mfr						
	48								73	Set Pressure		By Mfr							
ACTUATOR	49	MFR	Model	Fisher	667				74	Filter	Gauge	Yes	Yes						
	50	Type		Diaphragm					75										
	51	Size	Area	By Mfr	By Mfr			TESTS	76	Hydro. Pressure									
	52	Air Failure Valve:		Close					77	Leakage									
	53	Handwheel Location		not required					78										
	54	Bench Range		By Mfr				PURCHASE	79	Manufacturer		FISHER							
	55								80	Model		ES							
Notes: 1. Valve to be supplied fully assembled; marked , with certificate									81	Purchase Order Num.		T-R-ESP-002/98							
									82	Price	Item Number	3250 $	3						
									83	Serial Number									

No.	By	Date	Revision	Code: 1	Dwg. No.: 101-21-199901	Rev.: 0
0	MS	11/22/1998	For bids			

INSTRUMENT SPECIFICATION
Control Valve

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GTI&M Company

Sheet 1 of 1

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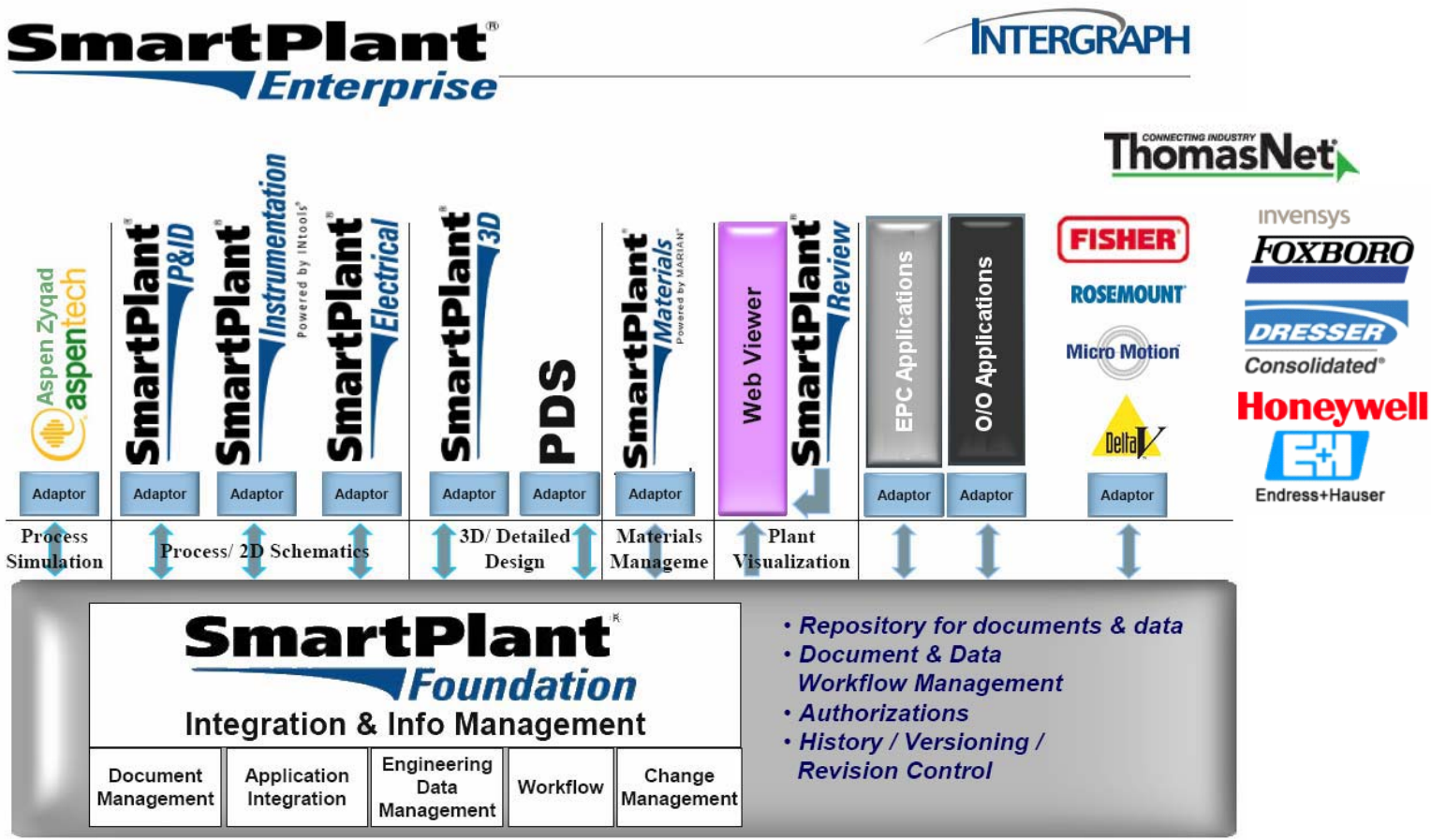
Improving the SPI Vendor Interfaces



- Utilization of SmartPlant Foundation Integration will normalize the Vendor Interfaces

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Improving the SPI Interface Standards

- The Process Engineering communities need to further coordinate efforts in areas critical to lifecycle information Interface and Integration
- Companies like Emerson, Fluor, Bechtel and Intergraph are working together to utilize international data interface standards for interoperability
- **Data Interface and Integration** *STANDARDS WARS*

PROLIST® INTERNATIONAL
simple data integration, easy engineering

- **NAMUR / ProlistNE-100** Interface Data Definition Interface Standard for engineering processes to build and maintain chemical plants

ISO 15926

- **ISO 15926** is a Cross Product Data Mapping Integration Standard for data exchange developments in the oil and gas industries

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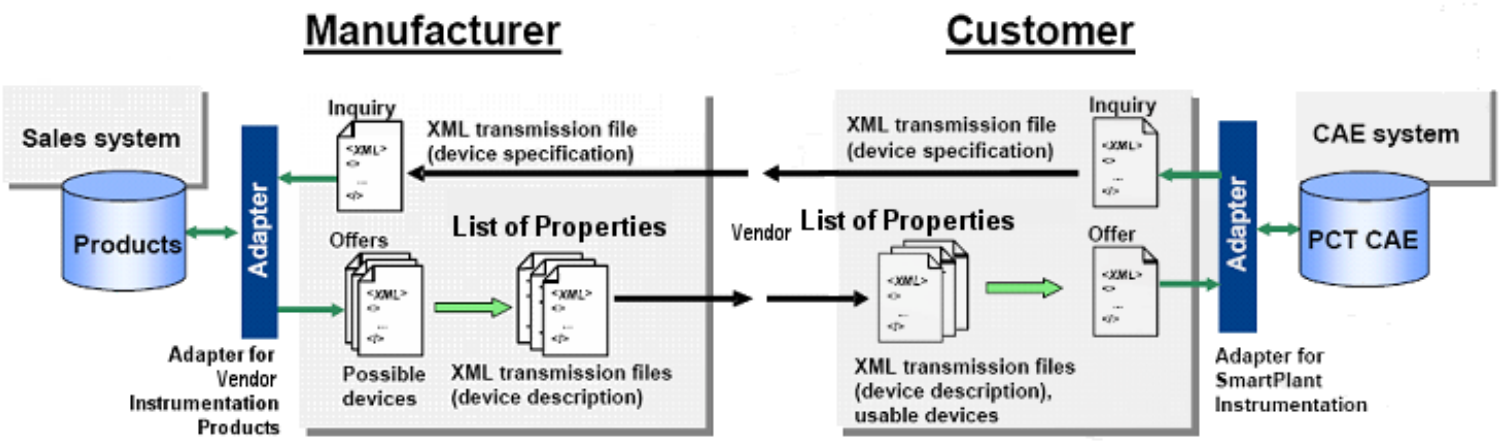
NAMUR / Prolist NE-100 Standard

- NE-100 for engineering processes to build and maintain chemical plants using Lists of Properties (LOP) for data exchange
  - NE-100 Version 3.1 (2009) contained 105 LOP for:
    - Measuring instruments (51)
    - Interface Devices (37)
    - Actuators (19)
    - In preparation: I/Os for DCS/PLC



XML Interface Data Definition Interface Standard

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ISO 15926 Integration Standard

- ISO 15926 is the basis for many developments in oil and gas data exchange
  - Part 1 - Introduction, information concerning engineering, construction and operation of production facilities is created, used and modified by many different organizations throughout a facility's lifetime. The purpose of ISO 15926 is to facilitate integration of data to support the lifecycle activities and processes of production facilities.
  - Part 2 - Data Model. a generic 4D model that can support all disciplines, supply chain company types and life cycle stages, regarding information about functional requirements, physical solutions, types of objects and individual objects as well as activities.
  - Parts 4,5,6 - Reference Data, the terms used within facilities for the process industry.
  - Part 7 - Implementation methods for the integration of distributed systems, defining an implementation architecture that is based on the W3C Recommendations for the Semantic Web.

- SmartPlant Foundation is the information management and integration component of SmartPlant Enterprise. The underlying SmartPlant Foundation and SmartPlant Instrumentation data model has shared a common basis with ISO 15926 Part 2.

Cross Product Data Mapping Integration Standard

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Future Interfaces and Integration Standards

- While many of the Interface Standards work together and even complement each other, Others contradict or duplicate data transfer definitions
- Whatever standards the Intergraph SmartPlant Foundation integration component of SmartPlant Enterprise adopt – will probably become the de-facto standard for other interfaces
- The demand for Vendor Interfaces and Integration into Engineering Automation tools is growing and Intergraph is well positioned to take the lead in furnishing well designed and functional interfaces for some time to come

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Recommendations for Future Interfaces

Use Interfaces for shortening engineering schedules and cost

Optimize the use of critically scarce resources with focused Interfaces

Develop Interfaces for areas large in numbers but short on experience

Create Interfaces that require less human intervention between suppliers and contractors

Continue to look for Interface opportunities that provide an advantage to bringing a project on-line

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