SmartPlant® Instrumentation

Interfaces and Interoperability

FLUOR

SmartPlant ©

Implementation Team

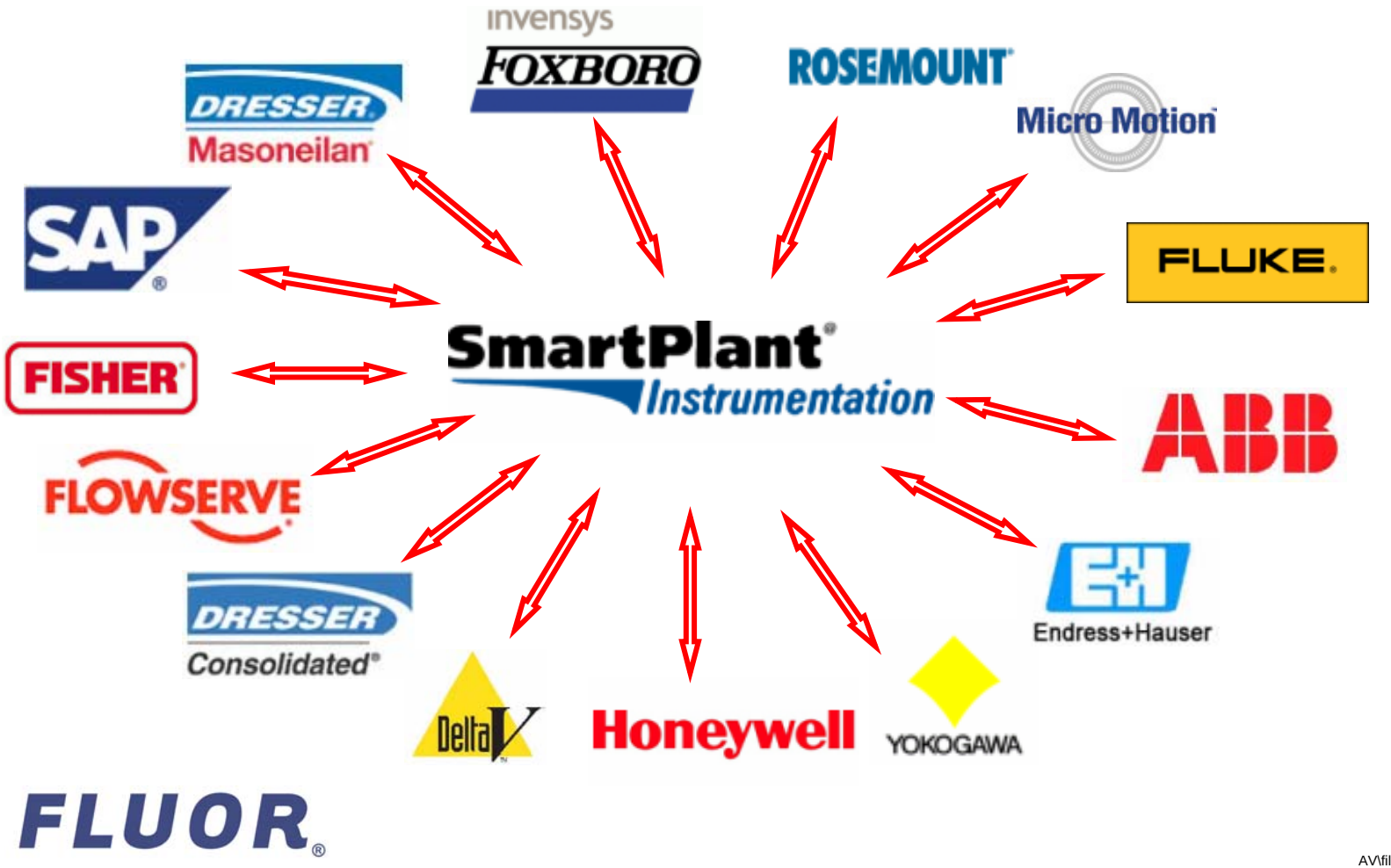
By John Dressel

FLUOR®

INTERGRAPH

Introduction

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

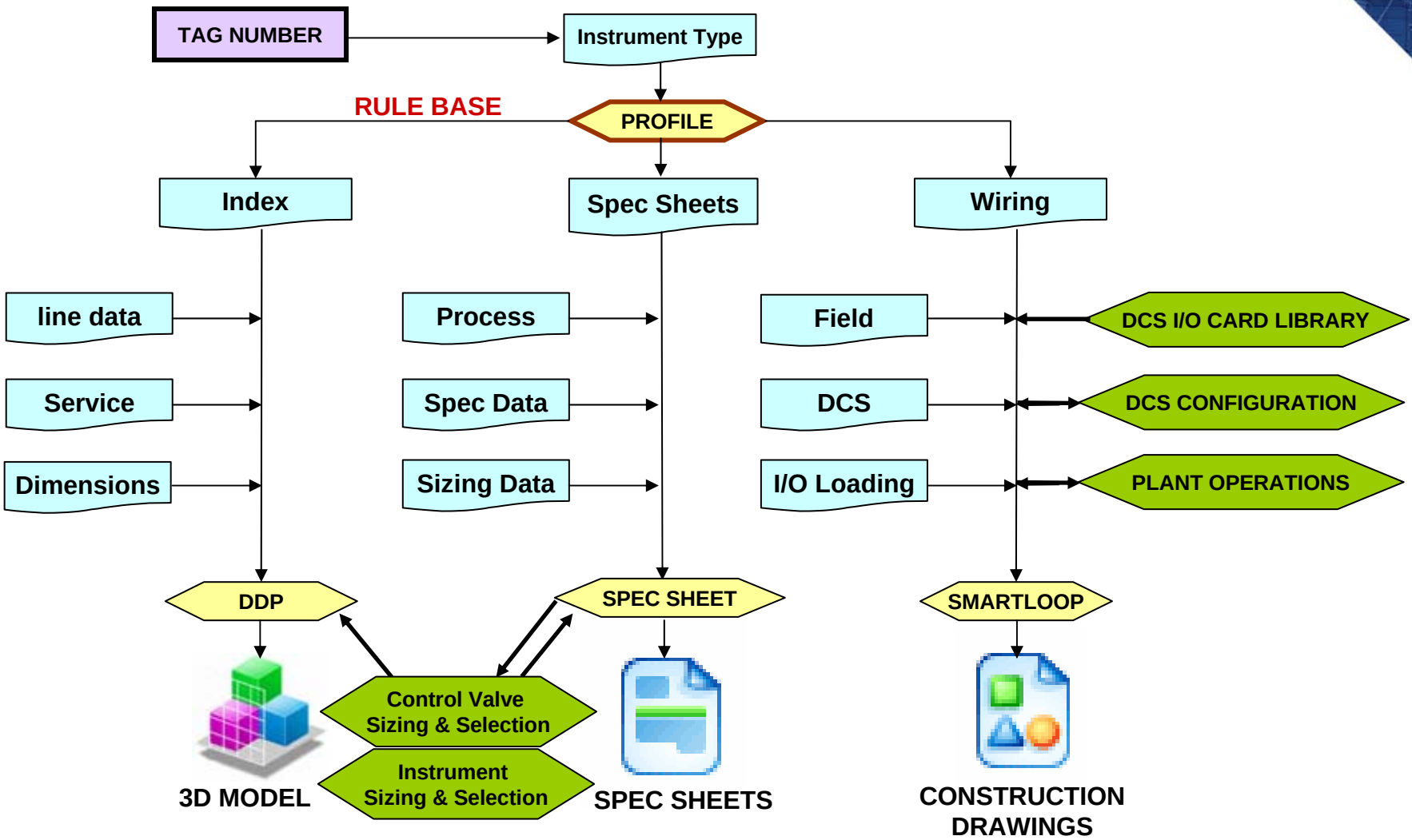


Topics

- **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 is the future of interfaces and integration**
  - How to manage integration, exchange, and hand-over of information between all parties involved in the process industries during the entire life cycle of a plant
  - Standardize on minimum Specs and data sets for interoperability
  - Utilization of NE 100 and ISO 15926 Standards for data interoperability

FLUOR®

SmartPlant Instrumentation Interfaces



FLUOR®

SPI Interfaces in a Perfect World

HOW SPI WORK PROCESSES SHOULD WORK FOR CONTROL VALVES

- 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 SPI or Vendor valve sizing calculations
  - Use Vendor valve selection software
  - Import Manufacturer and Model Numbers into SPI From Vendor Selection Software
  - Export DDP data to SP3D for model
  - Issue Purchase Orders and Construction Hookup documents from SPI

FLUOR®

SPI Interfaces in a Perfect World

HOW SPI WORK PROCESSES SHOULD WORK FOR INSTRUMENTS

- Build Instrument Tags and input process sizing and selection data in SPI using automation functions
- Create Field Instrument 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
  - Issue Purchase Orders and Construction Hookup documents from SPI

FLUOR®

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

FLUOR®

SPI Interfaces in the Real World

Issues with the SmartPlant Instrumentation 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)*
  - Some SPI Functions only work in the "Engineering Company" mode and not in the "Owner / Operator" As-Built Mode – *(Intergraph is working on a solution)*
  - 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*

FLUOR®

SPI Interfaces in 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*

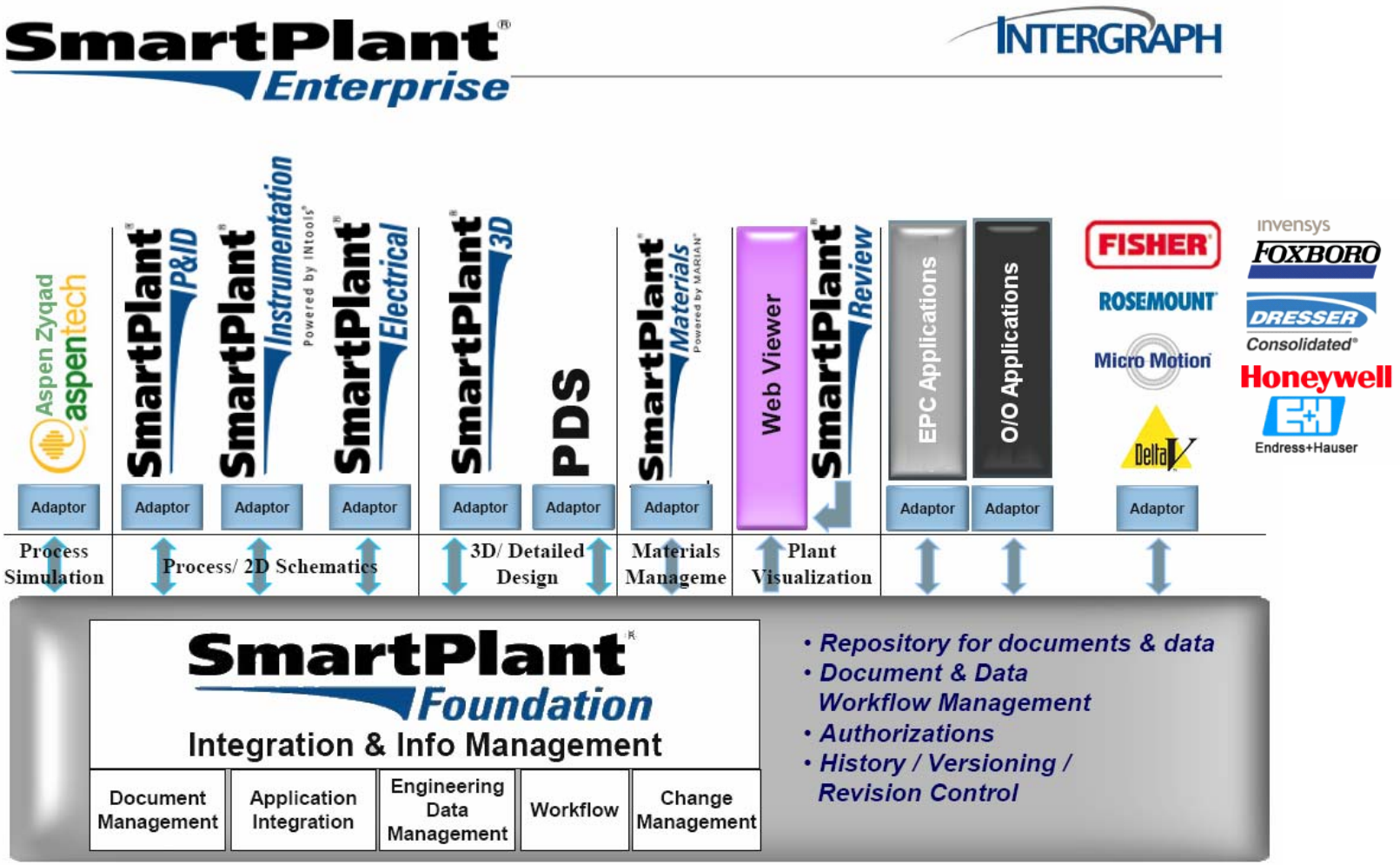
FLUOR®

Interfaces in the World of the Future

- 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

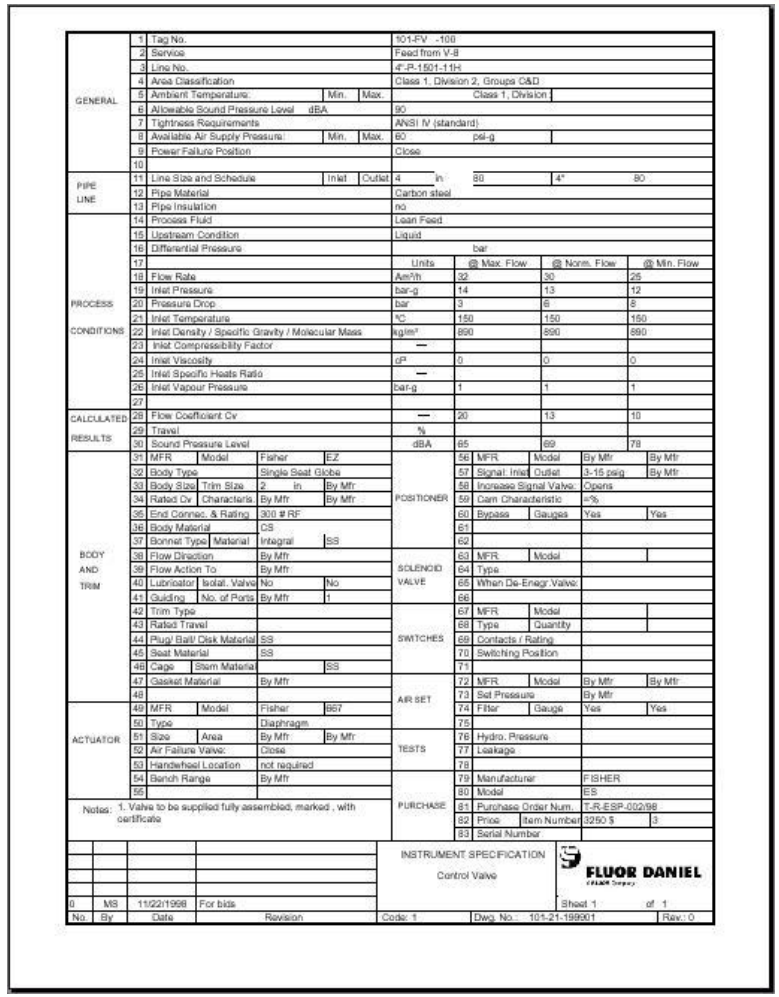
FLUOR®

Future SmartPlant Foundation Interface



Standardized Instrument Specs

- **Are we doing too much with 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 Specification Libraries**
  - Standardized across vendor
  - 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	65	69	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 Materia		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		Sheet 1 of 1	

INSTRUMENT SPECIFICATION
Control Valve

FLUOR DANIEL

FLUOR®

SmartPlant® Instrumentation

Future Interfaces and Integration

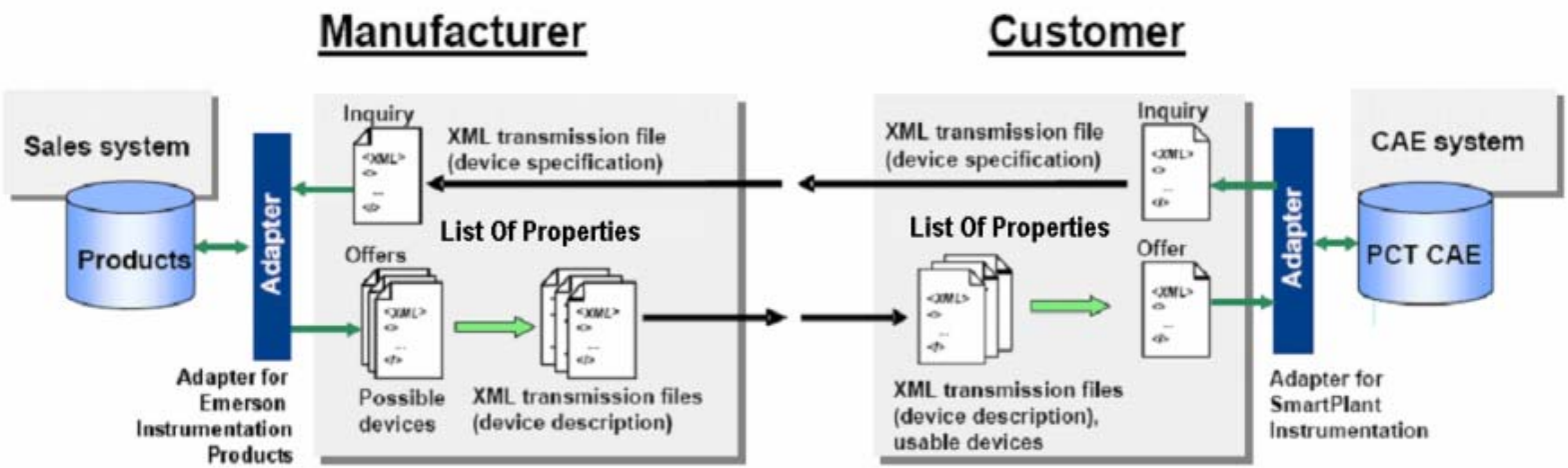
- The Process Engineering communities need to further coordinate efforts in areas critical to lifecycle information Interface and Integration
- Companies like Emerson, Fluor, Bechtel and Intergraph are working together to utilize international data interface standards for interoperability
- Data Interface and Integration *STANDARDS WARS*
  - **NAMUR / Prolist NE-100** Interface Data Definition Interface Standard for engineering processes to build and maintain chemical plants
  - **ISO 15926** is a Cross Product Data Mapping Integration Standard for data exchange developments in the oil and gas industries
- Additional Standards that may apply
  - **eCl@ss** has established a Product, Services and Materials Naming Code Standard in many European market places and is integrating the German classifications (ETIM, Proficlass, …)
  - **PIDX** is the eCommerce Standard for using XML Data Integration as a basis for procurement processes and data exchanges in oil and gas
  - **ECCMA** - developed a standard descriptive language for Data Exchange Compliance Requirements and cataloging individuals, organizations, locations, goods and services

FLUOR®

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 currently contains 105 Instrument LOP for:
    - Sensing instruments (51)
    - Actuators (17)
    - Interfaces (37)

PROLIST® INTERNATIONAL
simple data integration, easy engineering



XML Interface Data Definition Interface Standard

FLUOR®

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 data model has shared a common basis with ISO 15926 Part 2.

Cross Product Data Mapping Integration Standard

FLUOR®

Future Interfaces and Integration

- 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
- The two standards that are the best fit for SPI are the NE 100 and ISO 15926. The remaining presentations at this meeting will focus on these two standards

FLUOR®

Recommendations for a Stronger Future

Work together to continue shortening engineering schedules and cost

Optimize the use of critically scarce resources

Develop resources in areas large in numbers but short on experience

Use project execution tools that require less human intervention between suppliers and contractors

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

FLUOR®

SPI Interfaces and Interoperability

- **Questions & Comments**

Presentation created by: John Dressel, Fluor

FLUOR®

SmartPlant® Instrumentation