

Work Sharing with Smart Instrumentation



Every Smart Instrumentation Project is Work Shared

FLUOR[®]

John Dressel, Fluor
Control Systems Fellow

Introduction to Work Sharing Smart Instrumentation

- ▶ Projects are large and complex requiring contractors to share the work between different offices or even with other companies
- ▶ Smart Instrumentation has some unique requirements when used in a Work Sharing environment
- ▶ This Presentation will address the use of Smart Instrumentation (SI) in a work sharing environment by discussing the following topics:
 - ◆ Types of Smart Instrumentation Work Sharing
 - ◆ Methods of Smart Instrumentation Work Sharing
 - ◆ Configuring Citrix and Smart Instrumentation
 - ◆ Issues with Smart Instrumentation Work Sharing
 - ◆ Successes with Smart Instrumentation Work Sharing



Types of Smart Instrumentation Work Sharing



▶ Inherent Smart Instrumentation Work Sharing

- ◆ Disciplines typically work together in Smart Instrumentation on a project
- ◆ Engineering develops the Index and Specifications
- ◆ Design develops the Index and Wiring
- ◆ Process develops the Process Data for Sizing and Selection

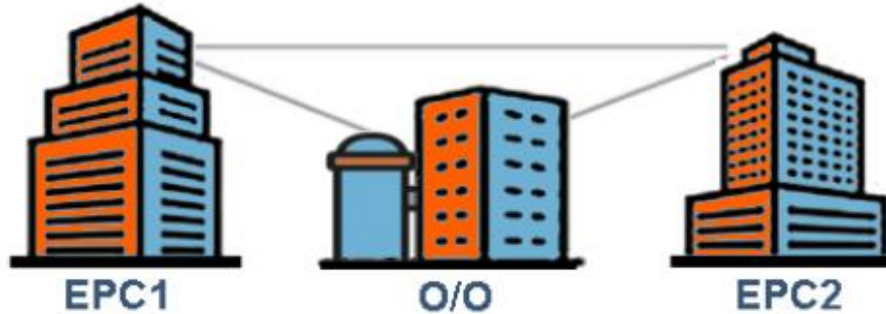
Types of Smart Instrumentation Work Sharing



▶ Splitting Work Between Company Offices

- ◆ Usually involves multiple offices in different hemispheres
- ◆ Offers 24 – 7 work hour software and hardware utilization
- ◆ Reduces costs by utilizing high value work centers
- ◆ Only one office Hosts the Smart Instrumentation database

Types of Smart Instrumentation Work Sharing



▶ Splitting Work between Multiple Companies

- ◆ Involves multiple contractors sharing a common project
- ◆ Utilize capabilities of several companies on one or more projects
- ◆ Conflicting work processes and capabilities are a factor
- ◆ Database hosting and software configuration is done by the main contractor or O/O

Types of Smart Instrumentation Work Sharing



**INSTRUMENT
VENDOR**



**DCS / PLC
VENDOR**

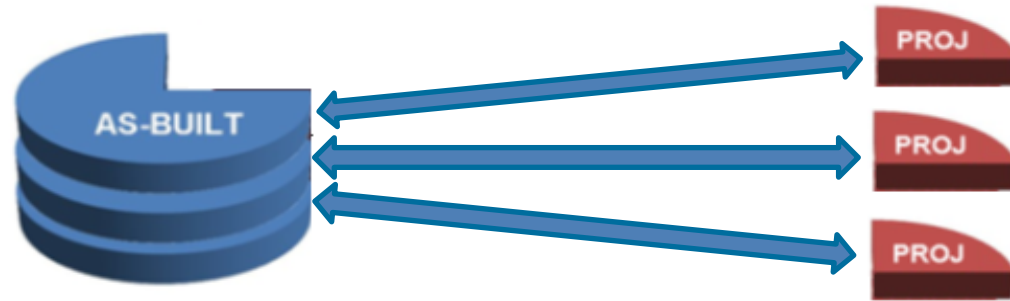


**MECHANICAL
VENDOR**

▶ Work Sharing with Supply Chain Vendors

- ◆ Instrument Vendors can work share with Spec sheets for sizing and selection of Instruments
- ◆ DCS and PLC Vendors work share at wiring I/O points or ranges and alarm setpoints
- ◆ Mechanical Vendors can use Smart Instrumentation's External Editors to work share
- ◆ On some projects Vendors station their users in the EPC offices for work sharing

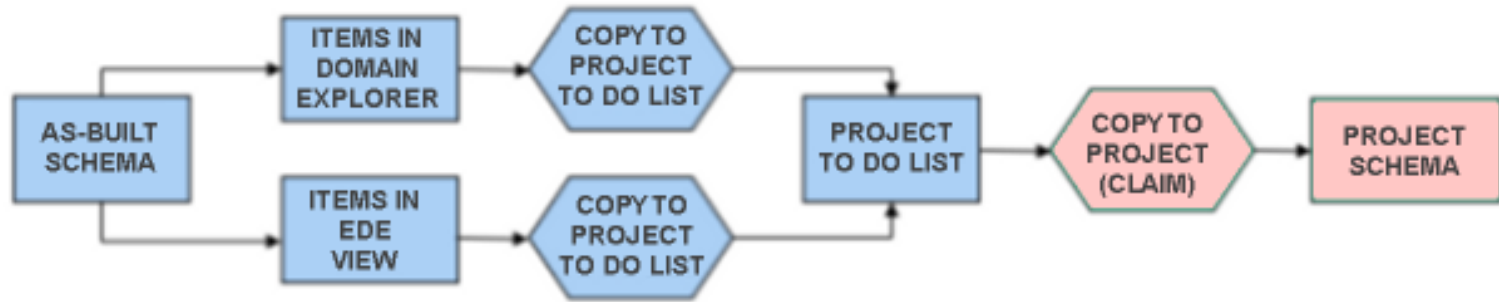
Types of Smart Instrumentation Work Sharing



▶ Smart Instrumentation **Projects** Work Sharing

- ◆ Claiming data for a project enables contractors to work without disturbing ongoing maintenance
- ◆ All data stays in the Smart Instrumentation database but it is simply isolated by Project
- ◆ The Project data is merged back into the As-Built as needed or after Project completion
- ◆ Project Mode is used when the database is being hosted by an Owner Operator and Project work is performed by project engineering or over Citrix by external contractors

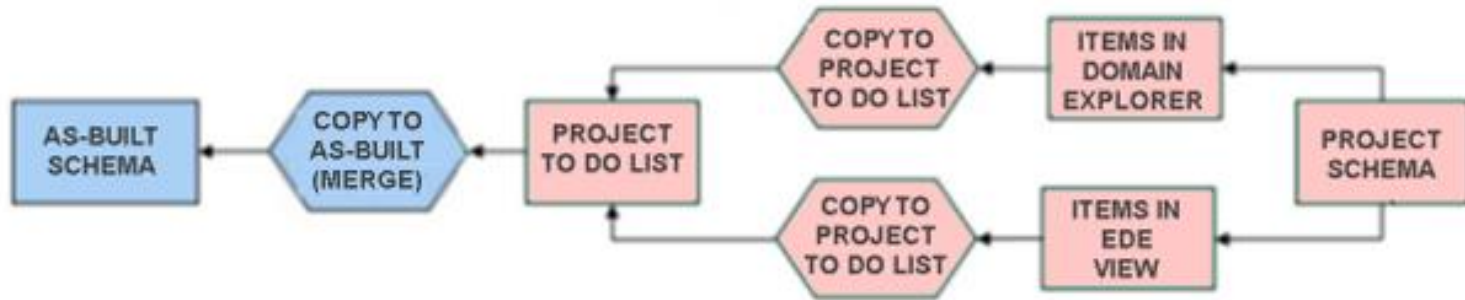
Types of Smart Instrumentation Work Sharing



▶ Smart Instrumentation **Projects** Claiming Workflow

- ◆ Projects mode starts by Smart Instrumentation administrators creating a project from As-Built
- ◆ As-Built users select Items using the Domain Explorer or EDE View and copies to the TO DO LIST
- ◆ Project users then Claim Items from the Project TO DO LIST into the Project
- ◆ Work on the Project Items can proceed without affecting tags in the As-Built Schema

Types of Smart Instrumentation Work Sharing



▶ Smart Instrumentation **Projects** Merging Workflow

- ◆ Upon completion of the Project or at selected milestones Items in the Project can be Merged back into the As-Built Schema
- ◆ Project users select Items using the Domain Explorer or EDE View and copy to the TO DO LIST
- ◆ As-Built users can then Merge Items from the Project TO DO LIST into the As-Built Schema

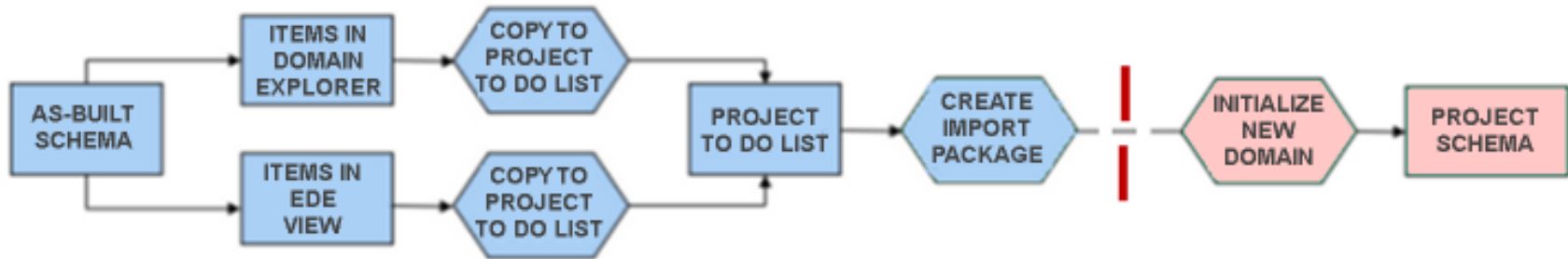
Types of Smart Instrumentation Work Sharing



▶ Smart Instrumentation Disconnected **Offline** Work Sharing

- ◆ Offline Projects allows Smart Instrumentation users to export work packages to external companies then import and merge them back into the As-Built database
- ◆ The work packages are database platform and Smart Instrumentation version independent
- ◆ A rules mechanism allows only Specifications and Process Data or Wiring Data or All data in the work package for import and export
- ◆ A Ref Data Comparison utility to track reference data modifications done by the subcontractor

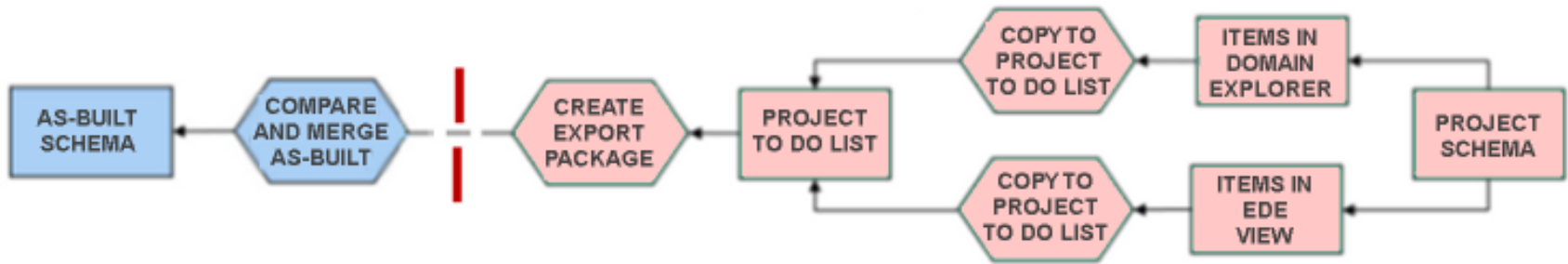
Types of Smart Instrumentation Work Sharing



▶ Smart Instrumentation Disconnected **Offline** Claiming Workflow

- ◆ Offline Projects work the same as As-Built mode until items are copied to the project TO DO LIST
- ◆ Users create a Project IMPORT PACKAGE from the TO DO LIST to send to the disconnected project
- ◆ Disconnected project users then initialize a new offline project domain from the IMPORT PACKAGE
- ◆ Work in the Disconnected Project Items can proceed without affecting tags in the As-Built Schema

Types of Smart Instrumentation Work Sharing



- ▶ Smart Instrumentation Disconnected **Offline** Merging Workflow
 - ◆ Upon completion of the Project or at selected milestones Items in the Disconnected Project can be Exported and Merged to the As-Built Schema
 - ◆ Project users select Items using the Domain Explorer or EDE View and copy to the TO DO LIST
 - ◆ Project users then create a Project EXPORT PACKAGE from the Project TO DO LIST
 - ◆ As-Built users Compare and Merge Items from the Project Export Package into the As-Built Schema

Types of Smart Instrumentation Work Sharing



- ▶ Smart Instrumentation Work Sharing in an Integrated Environment
 - ◆ The Database is hosted in one location usually by the prime contractor or owner operator
 - ◆ Only hosting administrators can publish and retrieve with SmartPlant Foundation
 - ◆ Remote Contractor access most Smart Instrumentation functions via Citrix server
 - ◆ If the Remote Contractor needs DDP publishing they must use a Ghost SI Database

Types of Smart Instrumentation Work Sharing



UNIT 1 - Contractor A

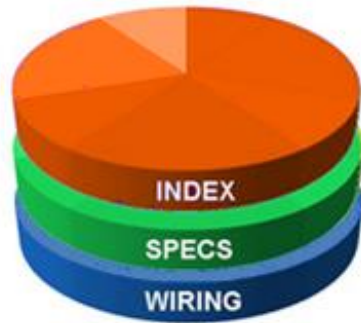
UNIT 2 - Contractor B

UNIT 3 - Contractor C

▶ Splitting Smart Instrumentation Work Sharing Vertically

- ◆ Dividing work between contractors by physical Units
- ◆ Using Unit Rights to regulate contractor access
- ◆ most effective on large multi-contractor projects
- ◆ Only main prime contractor has administrative capabilities
- ◆ The SI Database is hosted in one location usually by the main contractor or owner operator

Types of Smart Instrumentation Work Sharing



INDEX - Contractor A

SPECS - Contractor B

WIRING - Contractor C

▶ Splitting Smart Instrumentation Work Sharing Horizontally

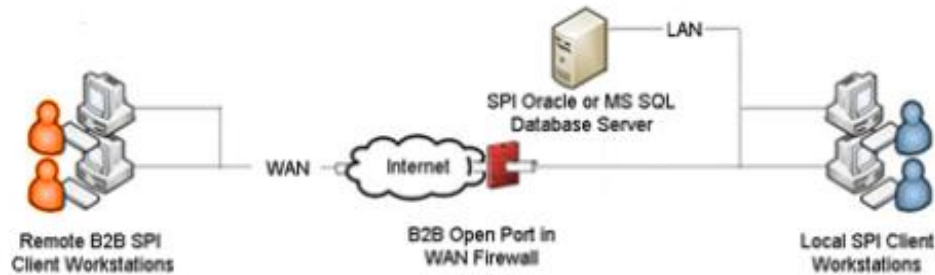
- ◆ Dividing work between contractors or offices by tasks
- ◆ Using Task Rights to regulate contractor or office access
- ◆ Most effective on projects involving multiple offices
- ◆ Only one main office must have administrative capabilities
- ◆ The SI Database is hosted in one location usually at the main office or engineering center

Methods of Smart Instrumentation Work Sharing



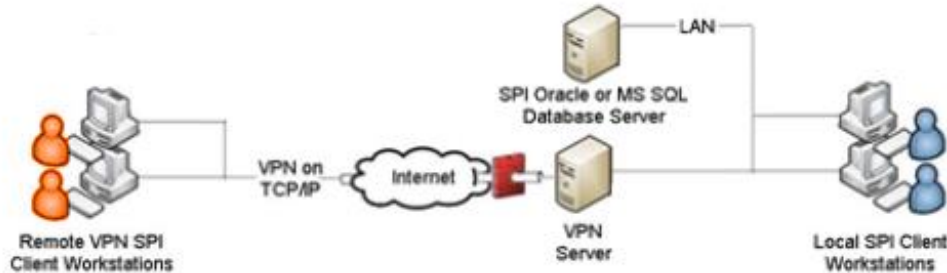
- ▶ Thick or Fat Client Work Share via WAN or LAN
(Smart Instrumentation client software resides on each user workstation)
 - ◆ Using Local Area Network (LAN) for Local SPI Users
 - ◆ Using Wide Area Network (WAN) for Remote SPI Users
 - ◆ Connections never leave the company network or exit Firewall

Methods of Smart Instrumentation Work Sharing



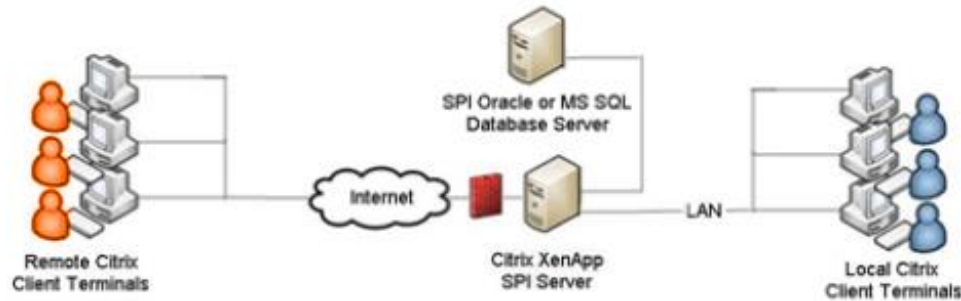
- ▶ Thick or Fat Client Work Share via B2B
(Smart Instrumentation client software resides on each user workstation)
 - ◆ Using Business to Business Connections (B2B)
 - ◆ Open Port in Firewall allows secure connection over WAN
 - ◆ Most corporate IT security agents do not like open ports

Methods of Smart Instrumentation Work Sharing



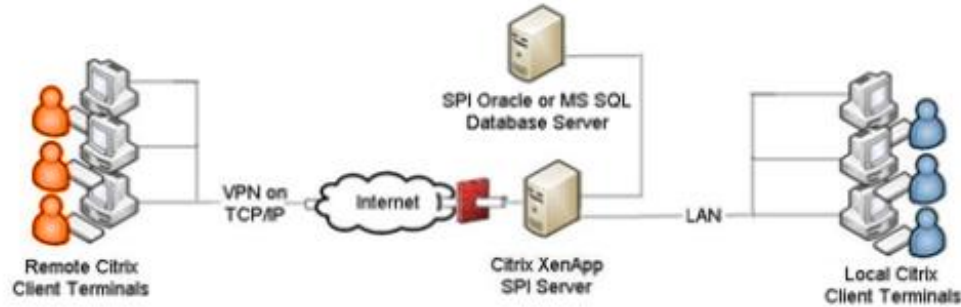
- ▶ Thick or Fat Client Work Share via VPN TCP/IP
(Smart Instrumentation client software resides on each user workstation)
 - ◆ Using Virtual Privet Network (VPN)
 - ◆ Dedicated IP address allows secure connection over Internet
 - ◆ Connections ported through Firewall only to secure server

Methods of Smart Instrumentation Work Sharing



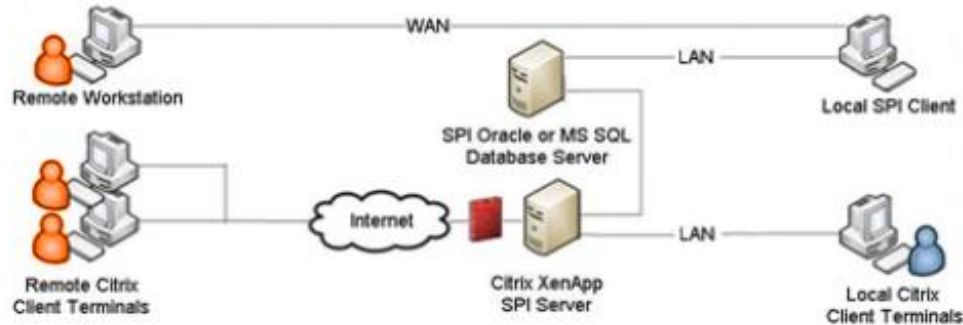
- ▶ Thin Client Server or Terminal Services Work Share
(Smart Instrumentation client software resides on Terminal Server)
 - ◆ Using Citrix XenApp or other Terminal Server software
 - ◆ Connections over the Internet or LAN and via Firewalls
 - ◆ SmartPlant Instrumentation software runs on Citrix Server

Methods of Smart Instrumentation Work Sharing



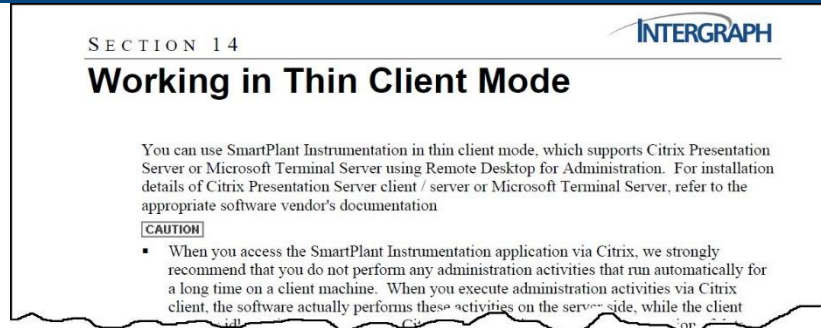
- ▶ Thin Client Server Work Share via VPN TCP/IP
(Smart Instrumentation client software resides on Terminal Server)
- ◆ Using Citrix XenApp or other Terminal Server software
- ◆ Connection over Internet using Virtual Private Network (VPN)
- ◆ SmartPlant Instrumentation Software runs on Citrix Server

Methods of Smart Instrumentation Work Sharing



- ▶ Remote Connections to a Smart Instrumentation Local Client (bypasses Citrix using Local Client Terminal accessed remotely)
 - ◆ Used for administration functions and drawing generation
 - ◆ Using two computers per user to bypass Citrix Server
 - ◆ Connections over WAN and LAN for optimal performance

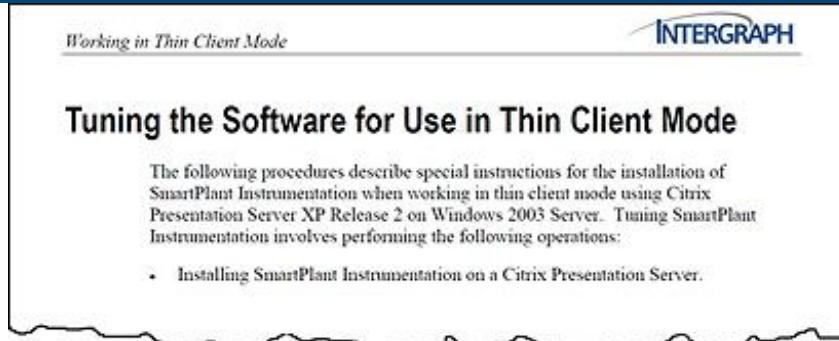
Configuring Citrix and Smart Instrumentation



▶ Working in Thin Client Mode (Citrix) “CAUTIONS”

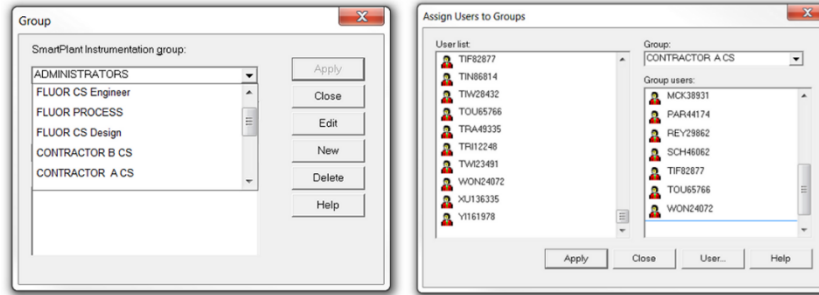
- ◆ Do not perform administration functions over Citrix:
 - Initializing or upgrading a domain
 - Claiming or merging items
 - Rebuilding stored procedures and triggers
- ◆ In Thin Client mode you must have separate Intools.ini file for each multiple user

Configuring Citrix and Smart Instrumentation



- ▶ **Tuning Smart Instrumentation and Citrix for Thin Client Mode**
 - ◆ Intergraph's "Working in Thin Client Mode" should be followed
 - Publish the SmartPlant Applications on the Citrix Server
 - Configuring the Citrix Presentation Server
 - Create Individual INtools.ini Files for Each User
 - Create the MKIntools.cmd File
 - Modify the Registry Path Key
 - Tune Citrix for Seamless Mode
 - Terminal Server Logon Sequence

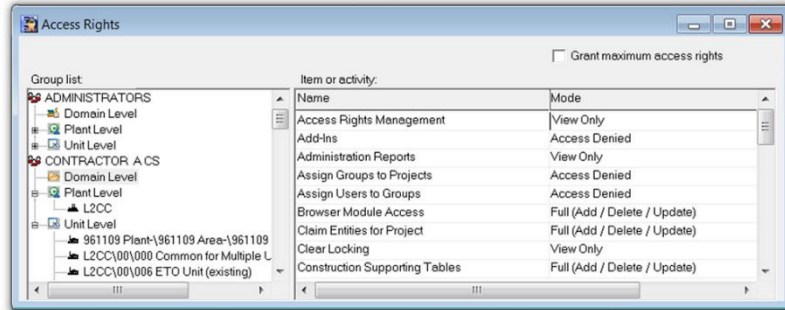
Configuring Citrix and Smart Instrumentation



▶ Creating Smart Instrumentation User Groups

- ◆ Create User Groups for each entity accessing Smart Instrumentation over Citrix:
 - Rights will be assigned to each User Group depending on their access requirements
 - Only the Administration Group should have rights to change the configuration, Primary Tables or Specification Forms
 - Assign Users to the specific User Group that fits their access requirements

Configuring Citrix and Smart Instrumentation



▶ Creating Smart Instrumentation Group Access Rights

- ◆ Each User Group has three levels of Access Rights:
 - Domain Level, Plant Level and Unit Level
- ◆ Each Activity in a Level can be assigned a different access mode
 - Full (add / delete / Update), Modify (Add / Update), View Only or Access Denied
- ◆ Rights control the User Group capabilities according to the Work Split (Vertical or Horizontal)

Issues with Smart Instrumentation Work Sharing



▶ Speed Issues when Work Sharing

- ◆ Distance is the most important factor involving remote users
- ◆ Bandwidth is an issue when using thick client
- ◆ Firewalls affect speed and can cause connection timeouts
- ◆ Remote connections will slow down with more internet users
- ◆ Multiple server locations will have a dramatic affect on speed

Issues with Smart Instrumentation Work Sharing



▶ Licensing Issues when Work Sharing

- ◆ Intergraph does not allow companies to share Smart Instrumentation licenses
- ◆ Each company involved in work sharing must purchase or lease their own licenses
- ◆ Smart Licensing Client is an application that must be installed on each client computer where a licensed application is running.
- ◆ Smart Licensing Project-based configuration allow multiple Keystores for each work sharing contractor

Issues with Smart Instrumentation Work Sharing



▶ Printing Issues when Work Sharing

- ◆ Constant connections to local Printers are an issue when working remotely over Citrix
- ◆ In many cases it is necessary to have additional printer drivers installed on the Servers
- ◆ Generic printer drivers (Screw Drivers) can help
- ◆ Printing to Adobe PDF requires server folder access and FTP capabilities as well as robust PDF creator software

Issues with Smart Instrumentation Work Sharing



▶ Integration Issues when Work Sharing

- ◆ Publishing and Retrieving data between application servers is necessary when work sharing in an Integrated Environment
- ◆ When SPI is hosted by an Owner Operator, Integration requires special handling to access data from the remote database:
 - DDP “Ghost” Databases for inline tags to integrate to S3D
 - Legacy software needs B2B access or export/import must be used

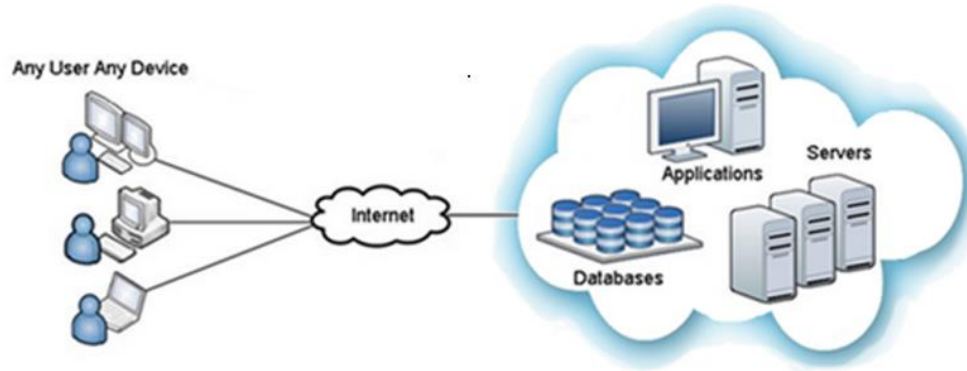
Issues with Smart Instrumentation Work Sharing



▶ File Handling Issues when Work Sharing

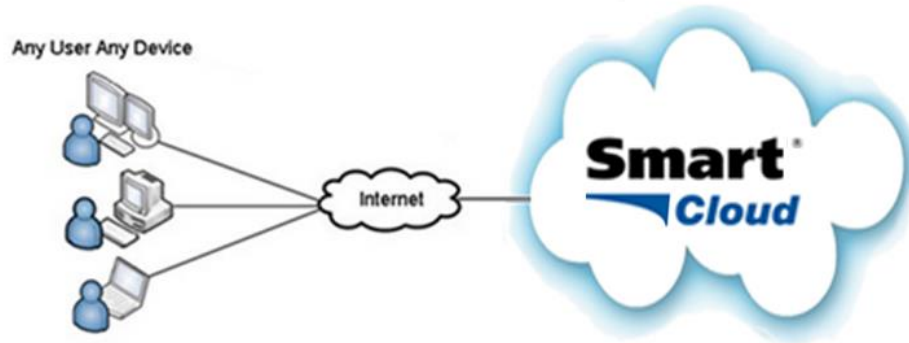
- ◆ SPI uses ESL, AutoCAD or MicroStation when generating drawings and must be able to call these executables and have writing access to folders where documents are stored
- ◆ Exporting and Importing Excel files are normal work processes
- ◆ Large quantities of Adobe PDF files are also created
- ◆ Users need to have a read-write work area on the SPI server to facilitate file manipulation
- ◆ Writing files locally will drastically slowdown the SPI application

Successes with Smart Instrumentation Work Sharing



- ▶ Fluor has Work Shared over 300 Smart Instrumentation projects out of 28 offices in 22 countries involving over 50 other EPC, Owner Operator or Vendor companies
- ▶ Fluor has successfully launched several **Cloud** Hosted Projects

Successes with Smart Instrumentation Work Sharing



- ▶ Hexagon Intergraph's Smart[®] Cloud is hosting some of our Projects
- ▶ Intergraph's Software as a Service solution allows users global access and provides them with 24/7 support and pay-per-use service

**“ IF YOU WANT TO SHARE THE REWARDS,
SHARE THE WORK ”
~ Frank Sonnenberg**



For additional information, please contact:

**John Dressel,
Fluor Fellow of Smart Instrumentation**

John.Dressel@Fluor.com