

SmartPlant Foundation 2008

Modeling and Mapping

Activity Workbook



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Preface

This is the activity workbook containing all of the hands on activities for each of the chapters in the SmartPlant Modeling and Mapping training course. Use this guide along with the information in each chapter to complete each activity.

1.	<i>Overview of SmartPlant.....</i>	5
2.	<i>Using the Schema Editor.....</i>	5
2.1	Activity 1 – Using the Schema Editor	5
2.2	Activity 2 – Creating a Custom Schema	11
3.	<i>Schema Overview and Modeling New Classes</i>	13
3.1	Activity 1 – Reviewing Schema Concepts	13
3.2	Activity 1 – Answer Key	15
3.3	Activity 2 – Creating Objects and Relationships with the Schema Editor	17
4.	<i>Creating Properties, Enumerated Lists and Relationships</i>	21
4.1	Activity – Creating Properties, Enumerated Lists and Relationships	21
5.	<i>Creating Edge Defs, Graph Defs, View Defs and Class View Maps</i>	29
6.	<i>Viewing and Finding Data</i>	29
6.1	Activity – Viewing and Finding Data	29
7.	<i>Introduction to Schema Mapping</i>	33
7.1	Activity 1 – Extending the Authoring Tool and Mapping.....	33
7.2	Activity 2 – Creating a Custom Interface	37
8.	<i>Mapping with SmartPlant P&ID</i>	39
8.1	Activity 1 – Adding and Mapping a Simple Property with SmartPlant P&ID	39
8.2	Activity 2 – Adding and Mapping a Complex Property with SmartPlant P&ID	43
9.	<i>Loading and Testing Schema Changes</i>	49
9.1	Activity – Loading and Testing Schema Changes.....	49
10.	<i>Mapping with SmartPlant Instrumentation</i>	53
10.1	Activity 1 – Extending and Mapping an Existing Enumerated List with SPI	53
10.2	Activity 2 – Adding and Mapping a Custom Property with SPI	57
11.	<i>Mapping with SmartPlant Electrical</i>	61
11.1	Activity 1 – Adding and Mapping a Simple Property with SmartPlant Electrical	61
11.2	Activity 2 – Adding and Mapping a Complex Property with SPEL.....	65
12.	<i>Mapping with SmartPlant 3D</i>	69
12.1	Activity – Mapping SmartPlant 3D Properties for Publish.....	69

1. Overview of SmartPlant

There is no activity for Chapter 1.

2. Using the Schema Editor

This section contains all of the activities for Chapter 2 – Using the Schema Editor.

2.1 Activity 1 – Using the Schema Editor

The goal of this activity is to familiarize you with using the Schema Editor to view schema components. You will start the schema editor and make open the PIDComponent schema. You will then use different types of views to familiarize yourself with the schema components and the Schema Editor user interface.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click *Start > All Programs > Intergraph SmartPlant Foundation > SmartPlant Schema Component > SmartPlant Schema Editor > Standard* to start the *Schema Editor*.
3. Open the PID component schema xml file.
 - ☐ Click *File > Open > Schema File* on the menu bar.
 - ☐ Browse to **D:\Program Files\SmartPlant Foundation 2008 Server Files\Web_Sites\SPF42\EFSchema\03.08** in the *Open Schema File* dialog box.
 - ☐ Select **PIDComponent.xml** file, and click *Open*.

Viewing Schema Objects

4. On the left-hand side of the window, open the *Schema* tab.
 - ☐ In the tree window, expand the **ClassDef** node.
 - ☐ Find and select the **PIDInstrument** object.
 - ☐ Make sure the **Tree** view is displayed on the right-hand side of the window (**Tree** tab).
 - ☐ Expand the **PIDInstrument** object.

- ☐ List some of the relationships that class def has with other objects:

5. Display the **PIDInstrument** class def in the **Tree/Properties** view (*Properties* tab).

- ☐ What happens to the right pane in the window?

☐ What three properties identify this object (based on the display in the right pane)?

- ☐ What is the *Primary Interface Definition* for this class def?

6. Display the **PIDInstrument** class def in the **Tree/Table (Horizontal)** view (*Table (hor)* tab).

- ☐ What happens to the right pane in the window?

☐ What properties are available to this class def from the IPBSItem Interface?

7. Display the class def in the **Tree/Editable UML** view (*Editable UML* tab).

- ☐ Drag and drop the **PIDInstrument** object into the right pane.
- ☐ When prompted, click the **Yes** button to create a default UML view.
- ☐ Review the objects and relationships in the newly created UML view.
- ☐ What does the acronym UML stand for?

8. Display the class def using the **Tree/Viewable UML** view (*Viewable UML* tab).
 - ☐ Click the **PIDInstrument** object in the tree on the left-hand side.
 - ☐ Click the **PIDInstrumentLoop** object in the tree, just below it.
 - ☐ Toggle back and forth between these objects and note how the display is updated. (You may need to scroll down or to the right to see the **PIDInstrument** object in the display).
 - ☐ With the **PIDInstrument** object displayed, locate the **IInstrumentOcc** interface and click it.
 - ☐ What happens to the display?

 - ☐ Use the **Back** button to return to the previous diagram.
-
9. Display the PIDInstrument class def using the **Browser** view (*Browser* tab).
 - ☐ When prompted, click **Yes** to use the default UML display of the class def.
 - ☐ What two other views are incorporated into the **Browser** view?

-
10. Display the open schema file components using the **Editor** view (*Editor* tab).
 - ☐ Click the **ClassDef** object in the Create list in the Editor view.
 - ☐ Drag and drop the **ClassDef** object into the right pane.
 - ☐ Click **Cancel** in the *New Class Definition* dialog box.

Finding Schema Objects

11. Use the **Find** functionality to locate and view schema file components using the **Tree** view type.
 - ☐ At the top of left-hand side of the *Schema* tab (above the Tree), open the *Search classes* list.
 - ☐ Choose the *Select Classes to Display* dialog box, activate the *Show only selected* check box. This will modify the display to show only the classes that are currently selected.

- ☐ Click on all the classes EXCEPT for **ClassDef** to deactivate them. When you are done, only the **ClassDef** option should be highlighted in blue. Click **OK** to dismiss this dialog box.
 - ☐ In the **With all of the substrings and “words”** field, type **Instrument**, and click the **Find** button just above field.
 - ☐ Expand the **ClassDef** object to review the matches.
12. Close the schema editor, and then re-start it to open the master schema configuration so you can open a different schema file.
13. Click the **File > File Configurations > Open Configuration** from the menu bar.
- ☐ When the **Open Configuration File** dialog box appears, select the name **EFSchema.cfg**, and click **Open**. (This file is located in the same location as the *PIDComponent.xml* file you opened previously.)
 - ☐ From the **Schema** tab (left side), open the **Editable UML** tab (top).
 - ☐ Expand the **ClassDef** object.
 - ☐ Drag and drop the **PIDInstrument** object into the right pane.
 - ☐ When prompted to create a default view, click the **No** button to create a custom UML view.
 - ☐ When the **NewCustInstrument UML View Definition** dialog box appears, provide the UML view name **CustInstrumentView**, and click the browse button beside the **Package** field.
 - ☐ When the **Possible PackageForUMLViewDef** dialog box appears, click **New**.
 - ☐ When the **New Package** dialog box appears, type the package name **CustInstrmPkg**, and click **OK**.
 - ☐ Click **OK** on the **Possible PackageForUMLViewDef** dialog box.
 - ☐ Verify that the **Package** that you created (*CustInstrmPkg*) displays on the **New UML View Definition** dialog box, and click **OK**.
 - ☐ What happens to the view pane?

 - ☐ Expand the **PIDInstrument** object and the **Realized Interface Definitions** object.
 - ☐ Drag and drop the **IInstrument** object into the right pane.
 - ☐ What happens in the view pane?

- ☐ Expand the **IInstrument** object and the **RelDefs for Role** object.
 - ☐ Drag and drop the **ProcessEquipInstrument** object into the right pane.
 - ☐ What happens in the view pane?
-
-

- ☐ Expand the **ProcessEquipInstrument** object, the **End2** object, the listed interface, and the **RelDefs for Role** object.
- ☐ Drag and drop the **SignalPorts** object into the right pane.
- ☐ Locate and drag and drop the **PIDSignalPort** object into the right pane.

14. Use the shortcut menu to change some of the diagram characteristics.

- ☐ Right-click **IInstrument**.
 - ☐ Click the **Display as circle** command on the shortcut menu.
 - ☐ What happens in the view pane?
-
-

15. Change the colors of the objects displayed in the diagram.

- ☐ Right-click one of the objects.
- ☐ Click the **Set color** command on the shortcut menu.
- ☐ Pick a color of your choice from the color palette.
- ☐ Repeat the process for some of the other objects in the view.

16. Add a text heading to your diagram.

- ☐ Right-click the white space in your diagram (not an object).
- ☐ Click the **Place Text** command on the shortcut menu.
- ☐ Type the text of your choice in the *Text* dialog box.
- ☐ Use the **Font** button to set your text style parameters.
- ☐ Click **OK**, and then drag to position your text.
- ☐ Right-click the white space in your diagram, and select **New Class Diagram** from the pop-up menu.

17. Close the Schema Editor. If prompted, do not save any of your changes.

2.2 Activity 2 – Creating a Custom Schema

The goal of this activity is to create an environment in which to store custom schema changes for use with a specific project. This schema will be used to store all the new schema objects that will be made in the upcoming chapters.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click **Start > All Programs > Intergraph SmartPlant Foundation > SmartPlant Schema Component > SmartPlant Schema Editor > Standard** to start the *Schema Editor*.
3. Create a new schema file to store your new schema objects (**File > New > Schema File**). Call the new schema *EISchema.xml* and store it in the following location: *D:\Program Files\SmartPlant\Foundation\2008\Models\Core*.
4. Close the Schema Editor.
5. Repeat step 2 to reopen the schema editor.
6. Click the button beside the **Startup file** field, and open the *900-AllCor.cfg* file as the startup file. (This file is located in the following location: *D:\Program Files\SmartPlant\Foundation\2008\Models\Core*.)
7. Next, click the button beside the **Another schema file** field, and open the *SCHEMA_AuthExample-PBS.xml* file, which can be found in the following folder: *D:\Program Files\SmartPlant\Foundation\2008\Models\AuthExample*.
8. Click the button beside the **Another schema file** field again. This time, open the *EISchema* file that you created in step 3.
9. Click the **File > File Configurations > Edit Configuration** command to open the *Edit Configuration* dialog box.
10. Modify the configuration so that the *EISchema* file is dependent on all the other files open. Make sure that the *EISchema* file is editable, but no other files are, and make sure the *EISchema* is the active file. Close the *Edit Configuration* dialog box.

11. Save the changes as a new configuration file (***File > File Configurations > Save As Configuration***). Call the new file *904-EISchema.cfg*, and save it in the same folder as the EISchema.
12. Close the Schema Editor.

3. Schema Overview and Modeling New Classes

This section contains all of the activities for Chapter 3 – Schema Overview and Modeling New Classes.

3.1 Activity 1 – Reviewing Schema Concepts

The goal of this activity is to review what you have learned about the schema.

1. Fill in the blank:

In the schema, each _____ represents a role.

2. Relationships exist between
 - a. Class Definitions
 - b. Interface Definitions
 - c. Property Definitions
 - d. Property Types

3. Fill in the blank:

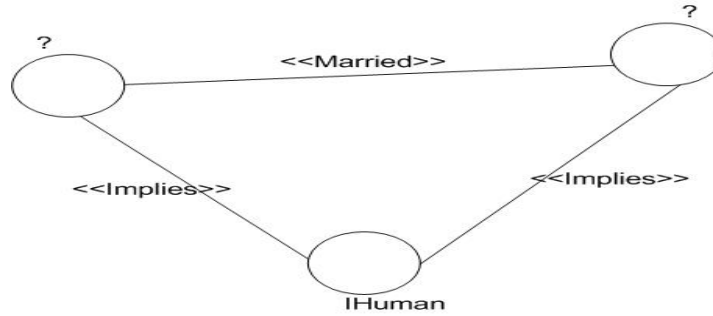
A _____ is a named description of a set of objects, which can represent physical things such as pumps, or conceptual things, such as projects.

4. Fill in the blank:

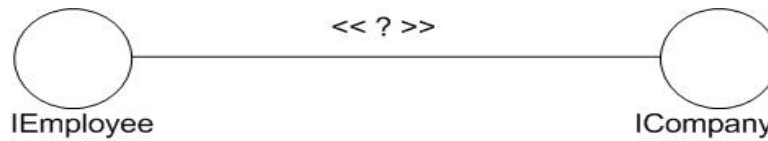
Cardinalities are found at each end of a _____.

5. Suggest Interface names for the two Interfaces represent by “?” below and apply direction to the "implies" relationships:

Note: Interfaces are represented as circles and Relationships are represented with <<Relationship Name>>.



6. Suggest a name for the relationship represented by the “?” below:



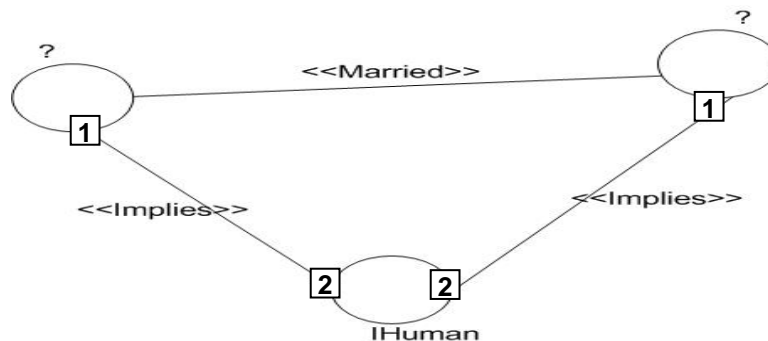
Fill in the blanks:

7. _____ Realize _____.
8. _____ Expose _____.
9. _____ Imply _____.
10. _____ are Scoped by _____.
11. Every Class Definition must Realize the _____ Interface.
12. Every Interface Definition must Imply the _____ Interface.

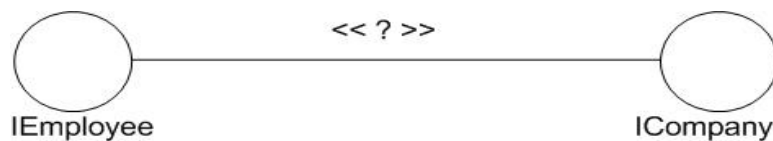
3.2 Activity 1 – Answer Key

This section provides the answers to the questions in Activity 1.

1. In the schema, each interface definition represents a role.
2. Relationships exist between
 - a. Class Definitions
 - b. Interface Definitions
 - c. Property Definitions
 - d. Property Types
3. A class definition is a named description of a set of objects, which can represent physical things such as pumps, or conceptual things, such as projects.
4. Cardinalities are found at each end of a relationship definition.
5. Suggest Interface names for the two Interfaces represent by “?” below:
 - *IHusband*
 - *IWife*



6. Suggest a name for the relationship represented by the “?” below:
EmployedBy

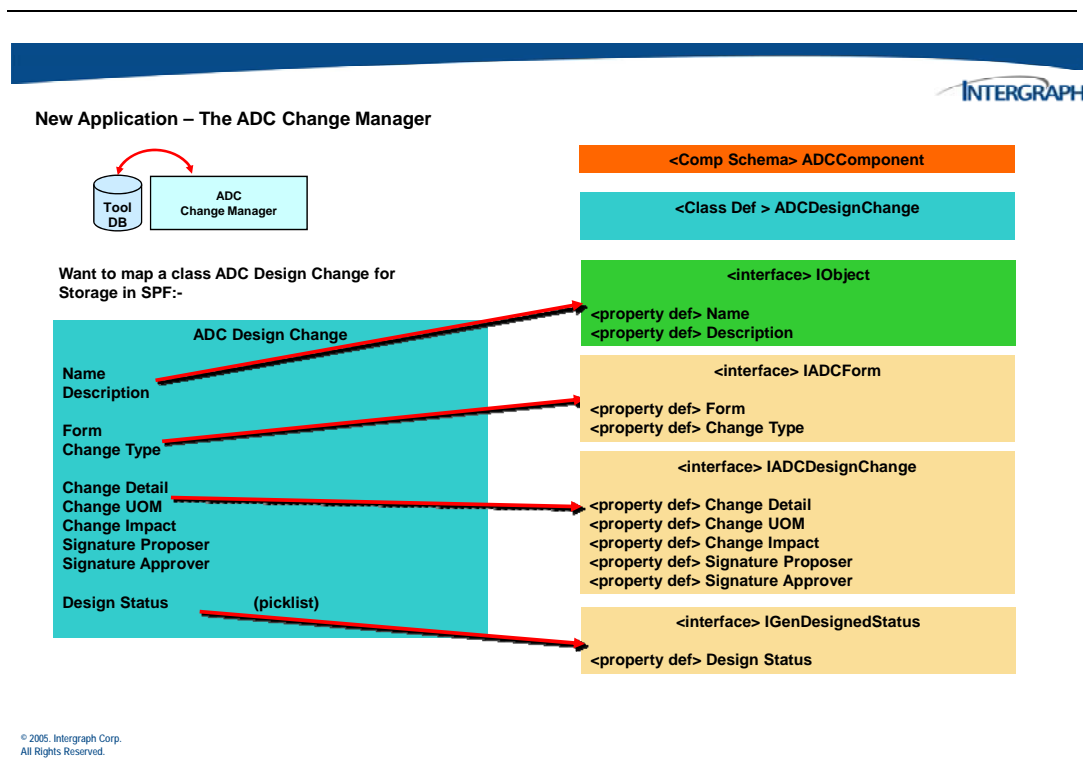


Fill in the blanks:

7. Class definitions Realize interface definitions.
8. Interface definitions Expose property definitions.
9. Interface definitions Imply other interface definitions.
10. Property definitions are Scoped by property types.
11. Every Class Definition must Realize the IObject Interface.
12. Every Interface Definition must Imply the IObject Interface.

3.3 Activity 2 – Creating Objects and Relationships with the Schema Editor

The objective of this activity is to provide practice performing the procedures covered in Chapter 3. The following illustration shows the requirements for a new class definition that you will be modeling in the SmartPlant schema. In this activity, you will create a new class def to represent a Design Change, a new primary interface for the new class definition, and a new component schema.



1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click **Start > All Programs > Intergraph SmartPlant Foundation > SmartPlant Schema Component > SmartPlant Schema Editor > Standard** to start the *Schema Editor*.
3. Create a new schema file to store your new schema objects (**File > New > Schema File**). Call the new schema *ADCSchema.xml* and store it in the following location:
D:\Program Files\SmartPlant\Foundation\2008\Models\Core.

4. Close the Schema Editor.
5. Repeat step 2 to reopen the schema editor.
6. Click the button beside the **Startup file** field, and open the *900-AllCore.cfg* file as the startup file. (This file is located in the following location: *D:\Program Files\SmartPlant\Foundation\2008\Models\Core.*)
7. Next, click the button beside the **Another schema file** field, and open the *SCHEMA_AuthExample-PBS.xml* file, which can be found in the following folder: *D:\Program Files\SmartPlant\Foundation\2008\Models\AuthExample.*
8. Click the button beside the **Another schema file** field again. This time, open the *ADCSchema* that you created in step 3.
9. Click the **File > File Configurations > Edit Configuration** command to open the **Edit Configuration** dialog box.
10. Modify the configuration so that the *ADCSchema* file is dependent on all the other files open. Make sure that the *ADCSchema* file is editable, but no other files are, and make sure the *ADCSchema* is the active file. Close the **Edit Configuration** dialog box.
11. Save the changes as a new configuration file (**File > File Configurations > Save As Configuration**). Call the new file *905-ADCSchema.cfg*, and save it in the same folder as the *ADCSchema* file.

To create a new class definition in the schema, do the following:

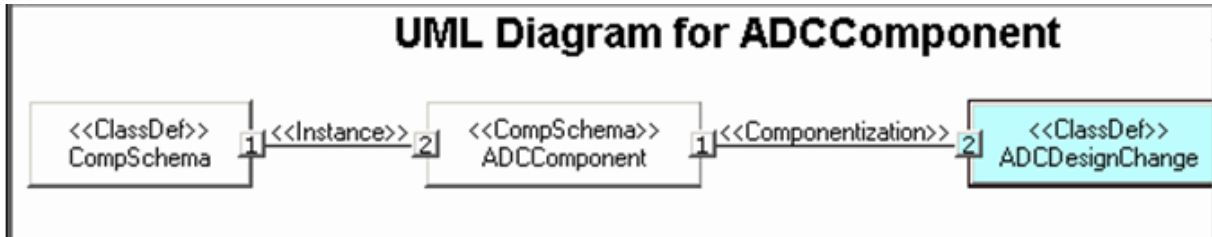
12. Open the **Schema** tab (left side), and then open the **Editor** view.
13. From the **Create** section of the **Editor** view, find the **CompSchema** option. Drag and drop it into the UML view.
11. In the **New Component Schema** dialog box, type *ADCComponent* in the **Name** field.
12. Type *Component Schema for Design Changes* in the **Description** field.
13. Beside the **Class definitions defined by component schema** field, click the browse button. Click the **New** button from the dialog box that appears.

14. In the **New Class Definition** dialog box, type *ADCDesignChange* in the **Name** field.
15. Type *Acme Design Change Form* in the **Description** field.
16. Type *Design Change* in the **Display Name** field.
17. Beside the **Model definition** field, click the browse button and choose **PlannedMaterialModel** from the list of available model definitions.
18. Beside the **Class factory definition** field, click the browse button, and select **SchemaCompFactory**.

Creating Interfaces and Property Definitions

19. Beside the **Primary interface definition** field, click the browse button to display the **Possible Primary interface definition for ADCDesignChange** dialog box.
20. Click **New** button to create a new interface definition.
21. Create a new interface using the following information
 - ☐ **Name** – IADCDesignChange
 - ☐ **Description** – Primary Interface for the ADCDesignChange Class
 - ☐ **Display Name** – Design Change Primary Interface
 - ☐ **Primary interface for class defs** – ADCDesignChange (value is here automatically)
 - ☐ **Implies interface definitions** – Iobject
22. Click **OK** in the **New Interface Definition** dialog box.
23. Click **OK** in the **Possible PrimaryInterfaceDef Values for ADCDesignChange** dialog box to choose the new primary interface definition.
24. Click **OK** in the **New Class Definition** dialog box to save the new class definition.

25. Click **OK** on the *Possible ComponentClassDefs for ADCComponent* dialog box to add the new class to the new component.
26. Click **OK** in the *New Component Schema* dialog box to save the new component schema.
27. A prompt will appear asking if you want to create a default view of the component schema. Click **Yes** to create the default view in the UML as shown below:



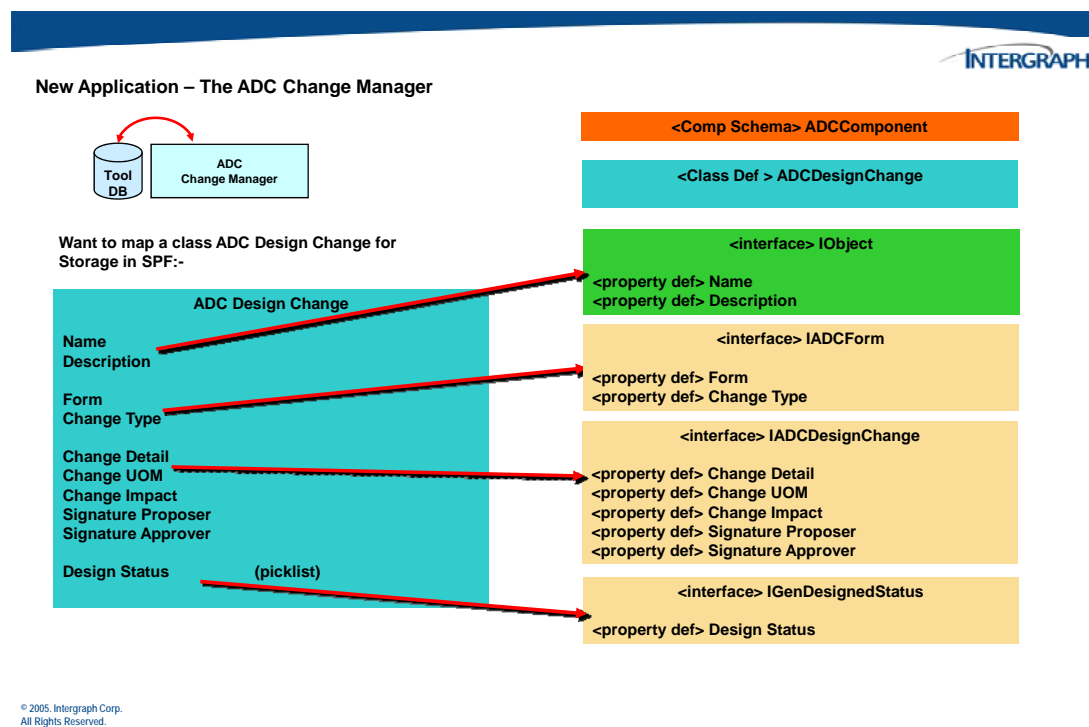
28. Save your changes to the *ADCSchema.xml* file, and close the Schema Editor.
29. Once you have closed the Schema Editor, you may take a short break until the other students have finished this activity.

4. Creating Properties, Enumerated Lists and Relationships

This section contains all of the activities for Chapter 4 – Creating Properties, Enumerated Lists and Relationships.

4.1 Activity – Creating Properties, Enumerated Lists and Relationships

In this activity you will continue to model the requirements for the Design Change, illustrated below. You will create additional interfaces, as well as property definitions, and two enumerated lists.



1. Open the Schema Editor and the saved configuration file, *905-ADCSchema.cfg*.
 - ☐ Click the **File > File Configurations > Open Configuration** command from the menu bar.
 - ☐ Select the *905-ADCSchema.cfg* file, and click **Open** (Path is *D:\Program Files\SmartPlant\Foundation\2008\Models\Core.*)
2. Open the **Schema** tab (along the left side of the window), and expand the tree.
3. Open the **Editor** view (**Editor** tab along the top of the window).

4. Open a package and saved view from the previous session so that you can continue with your modeling exercise.

Create an Enumerated List Type

5. Use the *Editor* view to view and edit your model. Drag **EnumListType** from the *Create* tree to the UML view.
6. In the *New Enumerated List* dialog box, provide a UID, a short description and a long description as shown below:

- ☐ **UID** – GenStatus
- ☐ **Short name** – GenStatusPL
- ☐ **Long name** – Generic Status Pick List

7. Click the *New Child Entry* button and enter the following info:

- ☐ **UID**: Created
- ☐ **Short name**: CR
- ☐ **Long name**: Created

Click the *New Sibling* button and enter the following info:

- ☐ **UID**: Required
- ☐ **Short name**: REQ
- ☐ **Long name**: Required

Click the *New Sibling* button, again, and enter the following info:

- ☐ **UID**: Approved
- ☐ **Short name**: AP
- ☐ **Long name**: Approved

Click the *New Sibling* button, and enter the following info:

- ☐ **UID**: InProgress
- ☐ **Short name**: IP
- ☐ **Long name**: Inprogress

Click the *New Sibling* button, and enter the following info:

- ☐ **UID**: Completed
- ☐ **Short name**: COM

- ☐ **Long name:** Completed
8. Click **OK** to create the new enumerated listType with the new values.
 9. When prompted, click **Yes** to create a default view of the EnumListType in the UML window.
 10. From the **Tree**, find and right-click on the **IADCDesignChange** interface def. Open the **Edit Form** view.
 11. Click the browse button beside the **Exposed property definitions** box.
 - ☐ Click **New** in the **Possible ExposedPropertyDefs for IADCDesignChange** dialog box.
 12. Create the a property definition with the following information, and then click **OK**.
 - ☐ **Name** – ADCDetail
 - ☐ **Description** – ACME Detail Property
 - ☐ **Display Name** – Change Detail
 - ☐ **Exposed by interface definition** – IADCDesignChange (filled in automatically)
 - ☐ **Scoped by property type** - string
 13. Click **New** on the **Possible ExposedPropertyDefs for IADCDesignChange** dialog box.
 14. Create a new property with the following information, and then click **OK**.
 - ☐ **Name** – ADCMeas
 - ☐ **Description** – ACME Measurement Property
 - ☐ **Display Name** – Change UOM
 - ☐ **Exposed by interface definition** – IADCDesignChange (filled in automatically)
 - ☐ **Scoped by property type** - FlowRateUoM
 15. Repeat step 11.
 16. Create a new property with the following information, and then click **OK**.

- ☐ **Name** – ADCImpact
- ☐ **Description** – ACME Impact Property
- ☐ **Display Name** – Change Impact
- ☐ **Exposed by interface definition** – IADCDesignChange (filled in automatically)
- ☐ **Scoped by property type** - string

17. Repeat step 11.

18. Create a new property with the following information, and then click **OK**.

- ☐ **Name** – ADCProposerSignature
- ☐ **Description** – ACME Proposer Signature
- ☐ **Display Name** – **Signature Proposer**
- ☐ **Exposed by interface definition** – IADCDesignChange (filled in automatically)
- ☐ **Scoped by property type** - string

19. Repeat step 11.

20. Create a new property with the following information, and then click **OK**.

- ☐ **Name** – ADCApproverSignature
- ☐ **Description** – ACME Approver Signature
- ☐ **Display Name** – Signature Approver
- ☐ **Exposed by interface definition** – IADCDesignChange (filled in automatically)
- ☐ **Scoped by property type** - string

21. With all five properties selected in the **Possible ExposedPropertyDefs for IACDDesignChange** dialog box, click **OK** to associate the properties with the interface.

22. Click **OK** in the **Edit Interface Definition** dialog box.

Creating Another Interface Definition

23. Drag **InterfaceDef** from the **Create** section of the *Editor* view to the UML view.
24. In the *New Interface Definition* dialog box, provide the following information:
 - ☐ **Name** – IGenDesignStatus
 - ☐ **Description** – Generic Design Item Status
 - ☐ **Display Name** – Design Item Status
 - ☐ **Realized by class definitions** – ADCDesignChange
 - ☐ **Implies interface definition** – IObject
 - ☐ **Implied by interface definitions** – IADCDesignChange
25. Click the browse button beside the *Exposed property definitions* field.
 - ☐ Click **New** in the *Possible ExposedPropertyDefs for IADCForm* dialog box.
26. Create a new property with the following information, and then click **OK**.
 - ☐ **Name** – GenDesignedItemStatus
 - ☐ **Description** – Generic Designed Item Status Property
 - ☐ **Display Name** – Generic Status
 - ☐ **Exposed by interface definition** – IGenDesignStatus (filled in automatically)
 - ☐ **Scoped by property type** – GenStatusPL (created earlier in this chapter)
27. Click **OK** to create the new property definition.
28. Click **OK** to accept the new property definition.
29. Click **OK** to create the new interface definition.

Creating Additional Objects

30. Create a new enumerated list – *ChangeType* – with the following values:
 - ☐ Temporary
 - ☐ Semi-permanent
 - ☐ Permanent

31. Create an interface definition with the following properties:

- ☐ **InterfaceDef:** Name – IADCForm
- ☐ **PropertyDef:** ADCForm - Property Type: *String*
- ☐ **PropertyDef:** ADCChangeType – Property Type: *ChangeType*
- ☐ **Implies interface definitions:** IObject
- ☐ **Implied by interface definition:** IADCDesignChange

Creating Relationships

32. Right-click in white space in the UML view, and click the **New Class Diagram** command.

33. In the **Tree**, find the **ADCDesignChange** class def. Drag and drop it into the UML window. When prompted, click **Yes** to create a default view of the class def.

34. In the **Tree**, find the **ISPFFunctionalUnit** interface. Drag and drop it into the UML window.

35. In the **Create** section of the **Editor** window, find the **RelDef** option, drag and drop it into the UML window.

36. In the dialog that appears, create a relationship definition with the following information:

- ☐ **Name** – DesignChangeUnit
- ☐ **Description** – Relationship between design changes and units

End 1

- ☐ **Interface definition** – IADCDesignChange
- ☐ **Role** – Design Change
- ☐ **Minimum cardinality** – 0
- ☐ **Maximum cardinality** -- *

End 2

- ☐ **Interface definition** – ISPFFunctionalUnit
- ☐ **Role** – Unit
- ☐ **Minimum cardinality** – 1
- ☐ **Maximum cardinality** -- *

37. Click **OK** to create the relationship.
38. Exit the Schema Editor and save the changes to *ADCSchema.xml*.
39. Once you have exited the Schema Editor, you may take a short break until the other students have finished this activity.

5. Creating Edge Defs, Graph Defs, View Defs and Class View Maps

There is no individual activity for chapter 5.

6. Viewing and Finding Data

This section contains all of the activity for Chapter 6 – Viewing and Finding Data.

6.1 Activity – Viewing and Finding Data

The goal of this activity is to familiarize you with using the Schema Editor to view data files. You will start the Schema Editor and make sure the *EFSchema.xml* schema is open. You will then use different types of views to open and review the data published by an authoring tool.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click **Start > All Programs > Intergraph SmartPlant Foundation > SmartPlant Schema Component > SmartPlant Schema Editor > Developer** to start the *Schema Editor*.
3. Open the custom SmartPlant schema configuration file, **EFSchema.cfg**.
 - ☐ Click the **File Configurations** button, and select **Open Configuration** from the Schema Editor **Workflows** dialog.
 - ☐ Select the *EFSchema.cfg* file, and click **Open** (Path is *D:\SmartPlant Foundation 2008 Server Files\Web_Sites\SPF42\EFSchema\03.08*)

Viewing Data Files

4. Open and view objects from a data file using the **Tree/Viewable UML** view type.
 - ☐ In the **Workflows** dialog box, select the **Data** tab, then click the **Open** button, which is just above the **Data File** button.
 - ☐ When the **Open Data File** dialog box appears, go to *D:SPF42_Training\XML_Data_Files*, click *PID-128-5001ver1.xml* file, and click the **Open** button.
 - ☐ In the **Workflows** dialog box, click the **View** button beside the **Data File** button.
 - ☐ Click **OK** to view all the data in the file.
 - ☐ Expand the **PIDInlineInstrument** object.

- ☐ Click the instrument object **ABV-12815**, and open the *Viewable UML* view.
- ☐ What happens to the right pane in the window?
-
- ☐ Click the piping port object 1.
- ☐ What happens to the right pane in the window?
-
- ☐ Expand the **ABV-12815** object in the tree.
- ☐ Expand the **Piping Ports** object.
- ☐ Click the port object 2.
- ☐ Close the view window (click the **X** icon).
-
- 5. Open and view objects from a data file using the **Tree/Table (vert)** view type.
 - ☐ In the *Workflows* dialog box, click the *View* button beside the *Data File* button.
 - ☐ When the *View Data* dialog box appears, click the *Options* button.
 - ☐ On the Multi-Tab tab, activate the check box beside the *Table (Vertical)* option. Click *OK* on the *Options* dialog box.
 - ☐ Click *OK* on the *View Data* dialog box.
 - ☐ Expand the **PIDNozzle** object.
 - ☐ Click the **A5** nozzle object, and select the *Table (vert)* view.
 - ☐ What happens to the right pane in the window?-
- 6. Open and view objects from a data file using the *Tree/Properties* view type.
 - ☐ Expand the **PIDProcessVessel** object.
 - ☐ Click the instrument object **T-103**.
 - ☐ What happens to the right pane in the window?-
- ☐ Close the view window.

Finding Data Objects

7. Use the find functionality to locate and view schema file components using the *Tree/Properties* view type.
 - ☐ In the **Workflows** dialog box, click the **View** button beside the **Data File** button.
 - ☐ When the **View Data** dialog box appears, click the **Find** tab.
 - ☐ Beside the **Only Classes** field, click the browse button.
 - ☐ In the **Select Classes to Display** dialog box, scroll down the list, choose **PIDPipingComponent**, **PIDPipingConnector** and **PIDProcessVessel**, and click **OK**.
 - ☐ In the **Name** field, type ***10*** and click **OK**.
 - ☐ Expand the **PIDPipingConnector** object.
 - ☐ What do you see in the view?

 - ☐ Repeat this for **PIDProcessVessel**.
 - ☐ Close the view window.
8. Close the Schema Editor and take a short break while the other students complete the activity.

7. Introduction to Schema Mapping

This section contains the activity for Chapter 7 – Introduction to Schema Mapping.

7.1 Activity 1 – Extending the Authoring Tool and Mapping

The objective of this activity is to extend an existing select list in SmartPlant P&ID, to extend the corresponding enumerated list in the SmartPlant schema, and to create the mapping relationships to publish those new values.

1. If you are not already logged onto the VM session, log on to your operating system as *Administrator* with the password *spf2008*.
2. Click **Start > All Programs > Intergraph SmartPlant Engineering Manager > Data Dictionary Manager** to start the *SmartPlant Data Dictionary Manager*.
3. On the left-hand toolbar, click the **Select List** button.
4. In the **Select List** window, find and select *Fluid System*, and then click the **Select Entry** button on the side toolbar.
5. Scroll the to bottom of the list, and add the *Corrosive* value in the empty field.
6. Return to the **Select List** window, and find and select the *Fluid Code* value.
7. Return to the **Select Entry** window, and add the following *Fluid Code* values:

Value	Short Value	Dependent Value
KA	(KA) Ammonia, Anhydrous	Corrosive
KC	(KC) Caustic	Corrosive
KP	(KP)Process Chemical	Corrosive
KW	(KW) Ammonia, Aqueous	Corrosive

8. Save your changes (**File > Save**).
9. Close the Data Dictionary Manager (**File > Exit**).
10. Open the Desktop Client, and logon as superuser.

11. Find the schema file (*Find > Integration > Schema Documents*).
12. Check out the CMF file.
13. Launch the Schema Editor from the CMF file.
14. When prompted, choose the *2007 SP5* schema as the active configuration.
15. When the Schema Editor opens, save the session file (*File > Session Files > Save Session File*).
16. Open the *Overall Workflow* (*Workflow > Overall Workflow*).
17. From the *Application Metadata* tab, click the *SmartPlant* button, and choose the *Edit Engineering Tool Options* command.
18. Choose the *SmartPlant P&ID* metadata adapter. Open the tool map schema and connect to the application schema.
19. On the *Synchronize* dialog box, push the new values from the P&ID schema to the tool map schema.
20. In the *Map Environment*, drill down under *SmartPlant P&ID* to the *Map Enumerated List* node.
21. Find and select *Fluid System*. Go to the *Edit Form* view and the *Publish* tab.
22. Expand the *Fluid System* list in the SmartPlant Schema (tree in the top-right area). Right-click on a value in the list, and choose the *Create New EnumList Type* command.
23. Create a new *Corrosive* list. Be sure to provide a name and short description. You may override the UID if you like, but the UID must be unique.
24. Outside of the Schema Editor application, open the following Excel file:
D:\SPF_Training\Mapping\FluidCodes.xlsx. Copy the values in the spreadsheet to the clipboard.
25. On the *New Enumerated List* dialog box, click the **Import Entries from Clipboard** button.

26. On the ***Import Child Enumerated Entries*** dialog box, confirm the values and then click **OK** to dismiss the dialog box.
27. Click **OK** to dismiss the ***New Enumerated List*** dialog box.
28. Choose ***Corrosive*** in both the tool and SmartPlant Schema side of the mapping form (Hint: to see Corrosive on the SmartPlant side, you should select ***Fluid System*** in the tree in the pane above.)
29. With ***Corrosive*** selected on both sides, click the ***Map*** button.
30. From the ***Map Enumerated List*** section of the tree, find the ***FluidCode*** list. Select it, and open the ***Edit Form*** view.
31. Map each of the new values, one at a time, by selecting the value on each side, and clicking the ***Map*** button.
32. Confirm the mapping in the bottom of the window.
33. Save your changes (**File > Save All Modified Files**). Save the changes to the CMF file and the SPPID map file.
34. Close the Schema Editor (**File > Exit**).

7.2 Activity 2 – Creating a Custom Interface

The purpose of this activity is to create a new custom interface that will be used in later activities to exposes custom properties that will be mapped between authoring tools.

1. Open the Schema Editor application, and open the session file you created in the last activity (...My Documents\EFSchema.eds).
2. Open the **Overall Workflows** user interface (**Workflow > Overall Workflow**).
3. Click the **View** button beside the **Another Schema File** button. When prompted click **OK** to open the MultiTab view.
4. Select the **Editor** view.
5. From the **Create** section of the **Editor** view, find the **InterfaceDef** option. Drag and drop it into the UML window.
6. Create a new interface with the following information:
 - ☐ **Name** – ICustomInterface
 - ☐ **Description** – New Interface for Custom Properties
 - ☐ **Display Name** – Custom Interface
 - ☐ **Implies Interface Definitions** – IObject
7. Click **OK** to create the new interface definition. If necessary, create a new view and new package in which to store the new view.
8. Save your changes to the CMF file (**File > Save All Modified Files**).
9. Close the Schema Editor.

8. Mapping with SmartPlant P&ID

This section contains the activity for Chapter 8 – Mapping with SmartPlant P&ID.

8.1 Activity 1 – Adding and Mapping a Simple Property with SmartPlant P&ID

The goal of this activity is to give you the opportunity to create a custom property in the SmartPlant P&ID application metadata, the SmartPlant P&ID tool map schema, and the SmartPlant schema. You will then perform the necessary mapping steps that would be used in a Publish and Retrieve operation.

1. If you are not already logged onto the VM session, log on to your operating system as *Administrator* with the password *spf2008*.
2. Click **Start > All Programs > Intergraph SmartPlant Engineering Manager > Data Dictionary Manager** to start the *SmartPlant Data Dictionary Manager*.
3. Open the **Plant Item** database table.
 - ☐ Click **Plant Item** in the **Database Tables** window.
 - ☐ Select **Edit > Add Property** from the menu.
 - ☐ In the **Add Property** dialog box, enter the following information:
 - **Name** – SystemCode
 - **Display Name** – System Code
 - **Data Type** – String
 - **Maximum Length** – 8
 - **Display to User** – Yes
 - **Use for Filtering** – Yes
 - **Category** – Miscellaneous
 - **Depends on** – None
 - ☐ Click **OK** to close the **Add Property** dialog box.
4. Save the changes to the SmartPlant Data Dictionary Manager.
 - ☐ Click **File > Save**.
 - ☐ Click **File > Exit**.

5. Click **Start > Programs > Intergraph SmartPlant Foundation > Schema Component > SmartPlant Schema Editor > Developer** to start the Schema Editor.
6. Click **Workflows > Overall Workflows**, and then click the **Session Files** button at the bottom of the window. From the **Open** dialog box, find the saved session file from the **My Documents** folder.
7. Synchronize the SmartPlant P&ID map file.
 - ☐ Open the **Application Metadata** tab at the top right portion of the **Workflows** dialog.
 - ☐ Click the **SmartPlant** button, and click **Edit Engineering Tool Options** command.
 - ☐ Select the tool map schema to be loaded, **SMARTPLANTPID/SmartPlant P&ID Tool Schema**.
 - ☐ Enable the **Load map schema** toggle.
 - ☐ Enable the **Connect to application schema** toggle.
 - ☐ Click **Finish**.
8. When the **Synchronize** dialog appears, confirm that the new property values will be added to the tool map file by the metadata adapter, and click **OK**.
9. Perform schema analysis to determine how the *ICustomInterface* should be modified for use with SPPID objects.
 - ☐ In the **Map Environment**, find the following map classes and view them with the **Property** view. Find the **MapClassstoClass|Class** value for each, and note that on the corresponding line.

• Instruments	_____
• Instrument Loop	_____
• Nozzles	_____
• Piping Components	_____
• Process Equipment Components	_____
• Piping Connectors	_____
• Pipelines	_____
 - ☐ In the left frame, swap from the **Tool** tab to the **Schema** tab. In the **ClassDefs** section, find each of the class defs from the list above. For each, note the primary interface of that class def.

10. Modify the *ICustomInterface* to make it available for the applicable Map Classes.

- ☐ Using the lists created in the previous step, add realizes relationships so that *ICustomInterface* is realized by all the class defs in the previous list and implied by the corresponding primary interfaces.
- ☐ Also add realizes and implies relationships for the following class defs and interfaces that will be used in later activities for other authoring tools.

• INDXInstrument	IInstrumentOcc
• INDXLoop	IInstrumentLoop
• ELEElectricMotor	IElectricMotorOcc
• ELECable	ICableOcc
• ELEWire	IWireOcc
• ELEInstrument	IInstrumentOcc
• P3DPipelineSystem	IPipelineSystem
• P3DPipingSystem	IPipingSystem
• P3DPipeRun	IPipeRun
• P3DPipe	IPipeOcc

11. Add a new property to the SmartPlant schema to correspond to the new property that has been added to a tool metaschema and tool map schema.

- ☐ Return to the **Tool** tab in the left-hand pane.
- ☐ Expand the **Tool** object in the tree of the *Map Environment* window so that the SmartPlant P&ID Tool Schema entries are displayed.
- ☐ Expand the **Map Classes** and select the *Instrument* entry in the tree. Open the *Edit Form* view.
- ☐ Go to the *Publish* tab. Expand the tree for both the application/tool map schema and the SmartPlant schema in the upper control.
- ☐ Select the *New Property Definition* button below the SmartPlant tree in the upper control.
- ☐ In the *New Property Definition* dialog box, enter the following information:
 - **Name** – SystemCode
 - *Description* – System code property
 - *Display Name* – System Code
 - Click the browse button next to the *Exposed by interface definitions* field, and select the **ICustomInterface** interfaceDef from the *Possible ExposedByInterfaceDefs for SystemCode* dialog box.

- Click the browse button next to the *Scoped by property type* field, and select the **string** property type from the *Possible ScopedByPropertyType for SystemCode* dialog box.
 - ☐ Click **OK** to close the *New Property Definition* dialog box.
12. Highlight the *SystemCode* MapProperty in the **Unmapped applications properties** control and the *SystemCode* MapProperty in the **Unmapped SmartPlant properties** control in order to perform the schema mapping.
- ☐ Make sure that **SystemCode** is highlighted in the middle control in the application section and that **SystemCode** is highlighted in the SmartPlant section.
 - ☐ Click the **Map** button to define the mapping between the SPPID tool map schema and the SmartPlant schema.
 - ☐ Verify in the bottom control that *SystemCode* maps to *SystemCode* in the two schemas. You may have to scroll to the bottom of the list to see this.
13. Repeat the mapping for the following classes:
- ☐ **EquipComponent**
 - ☐ **InstrumentLoop**
 - ☐ **Nozzle**
 - ☐ **Pipeline**
 - ☐ **PipeRun**
 - ☐ **PipingComp**
14. Save the changes to the all schema files.
- ☐ From the menu, click **File > Save All Modified Files**.
 - ☐ Answer **Yes** to all of both the tool map file and the CMF file.
 - ☐ Click **File > Exit** to close and exit the Schema Editor.
15. When you are finished with this activity, you may take a short break until the other students have finished.
- .

8.2 Activity 2 – Adding and Mapping a Complex Property with SmartPlant P&ID

In this activity you will be creating custom properties in the SmartPlant P&ID authoring tool. You will also create a select list that will be used with a new property. Finally, you will perform the necessary mapping steps that would be used in a Publish and Retrieve operation.

1. If you are not already logged onto the VM session, log on to your operating system as *Administrator* with the password *spf2008*. Use Microsoft Excel to open the following file: *D:\SPF_Training\Mapping\engsys.xlsx* before starting Data Dictionary Manager.
2. Click *Start > All Programs > Intergraph SmartPlant Engineering Manager > Data Dictionary Manager* to start the SmartPlant Data Dictionary Manager.
3. Add a new select list (picklist).
 - ☐ Click **Select List** on the left side of the application window.
 - ☐ Scroll to the bottom of the **Select List** table, and enter a new name in the empty row at the bottom of this table.
 - **Name** – EngSys
 - **Dependent List** – None
 - ☐ Click **Select Entry** on the left side of the application window.
 - ☐ In the **Select Entry** window, enter the following information in the blank row (you can copy and paste the Short Value from the excel spreadsheet):
 - **Value** – AA
 - **Short Value** – Steam Gen & Fired Htr, Water/Steam Side
 - **Dependent Value** – <blank>
 - ☐ Select the **Add Row** command from the tool bar to add the next entry to the new Select List:
 - **Value** – BA
 - **Short Value** – Steam Generator and Fired Heater - Air/Gas Side
 - **Dependent Value** – <blank>

- ☐ Select the **Add Row** command from the tool bar to add the next entry to the new Select List:
 - **Value** – CA
 - **Short Value** – Ammonia/Urea
 - **Dependent Value** – <blank>
 - ☐ Select the **Add Row** command from the tool bar to add the next entry to the new Select List:
 - **Value** – DC
 - **Short Value** – Crude Oil Production
 - **Dependent Value** – <blank>
 - ☐ Select the **Add Row** command from the tool bar to add the last entry to the new Select List:
 - **Value** – EA
 - **Short Value** – Auxiliary AC Power Systems
 - **Dependent Value** – <blank>
9. Add a new property to the **Plant Item** database table that uses the new select list just created.
- ☐ Click the **Database Tables** button then **Plant Item** in the **Database Tables** window.
 - ☐ Select **Edit > Add Property** from the menu.
 - ☐ In the **Add Property** dialog box, enter the following information:
 - **Name** – EngSystem
 - **Display Name** – Engineering System
 - **Data Type** – Select List
 - **Select List** – EngSys
 - **Format** – Variable length
 - **Default Value** – None
 - **Display to User** – Yes
 - **Use for Filtering** – Yes
 - **Category** – Process
 - **Depends on** – None
 - ☐ Click **OK** to close the **Add Property** dialog box.

5. Save the changes to the SmartPlant Data Dictionary Manager.
 - ☐ Click **File** > **Save**.
 - ☐ Click **File** > **Exit**.

Adding a Schema Property and Enumerated List

6. Click **Start** > **Programs** > **Intergraph SmartPlant Foundation** > **Schema Component** > **SmartPlant Schema Editor** > **Developer** to start the *Schema Editor*.
7. Open the session file: Click **Workflows** > **Overall Workflow**. Click the **Session Files** button and find and open your session file with the integrated plant information.
8. Open the SPPID tool map file, and update it with the metadata adapter.
 - ☐ Open the **Application Metadata** tab.
 - ☐ Click the **SmartPlant** button, and choose the **Edit Engineering Tool Options** command.
 - ☐ Select the tool map schema to be loaded, **SMARTPLANTPID/SmartPlant P&ID Tool Schema**.
 - ☐ Enable the **Load map schema** toggle.
 - ☐ Enable the **Connect to application schema** toggle.
 - ☐ Click **Finish**.
9. When the **Synchronize** dialog displays, confirm that the new property values have been imported by the metadata adapter, and click **OK**.
10. Add new entries to a new enumerated list in the SmartPlant schema to correspond to new entries that have been added to a tool map schema during the synchronization.
 - ☐ Expand the **Tool** object in the tree of the **Map Environment** window so that the SmartPlant P&ID Tool Schema entries are displayed.
 - ☐ Expand the **Map Enumerated Lists** node, and verify that the entry for **EngSys** was added to the SmartPlant P&ID Tool Map Schema as a result of the synchronization with the SPPID application meta schema.
 - ☐ Open the **Edit Form** view of the **EngSys** list.
 - ☐ Select the **Advanced** tab. Verify that the new list is displayed, and has all of the correct entries in it.

- ☐ At the bottom of the dialog, locate and select the **New SmartPlant Enumerated List with Correlated Entries** button. Using the dialog that appears, confirm the new list you are creating in the SmartPlant schema, and then close this dialog.
- ☐ On the **Publish** tab, right-click on the **EngSys** list in the top, right pane, and click **Edit**.
- ☐ Change the child entry numbers in the **EngSys** list to match the numbers in the chart below:

Text	Description	Number
AA	Steam Gen & Fired Htr, Water/Steam Side	10111
BA	Steam Generator and Fired Heater - Air/Gas Side	10112
CA	Ammonia/Urea	10113
DC	Crude Oil Production	10114
EA	Auxiliary AC Power Systems	10115

- ☐ Click the **OK** button to close the **Edit Enumerated List** dialog.
11. Add a new property to the SmartPlant schema to correspond to the new property that has been added to a tool metaschema and tool map schema.
- ☐ Expand the **Map Classes** and select the **Instrument** entry in the tree. Open the **Edit Form** view.
 - ☐ Select the **Publish** tab. Expand the tree for both the application/tool map schema and the SmartPlant schema in the upper control.
 - ☐ In the middle section (unmapped properties), select the **EngSystem** property in the tool map file.
 - ☐ Click the **Auto-create** button to create a matching property in the SmartPlant schema.
 - ☐ In the **Create and Map Properties** dialog box, modify the following fields to have the information provided here:
 - **Interface Definition** – ICustomInterface
 - **Property Definition** – EngineeringSys
 - **Property Description** – Engineering System property
 - **Property Display Name** – Engineering System
 - Click the browse button next to the **Property Type** field, and select the **EngSys** enumerated list from the **Possible ScopedByPropertyType Values for EngineeringSys** dialog box.
 - ☐ Click **OK** to close the **Create and Map Properties** dialog box.

- ☐ Verify that the EngSystem property from the tool map file is mapped to the EngineeringSys property in the SmartPlant schema (displayed as <<**Not in View Def**>>).

Defining Schema Mapping

12. Map the new property for the following map classes. Remember, the property already exists in the SmartPlant schema, so you will not need to create the property again, but you should create the publish mapping for each class.

- ☐ **EquipComponent**
- ☐ **InstrumentLoop**
- ☐ **Nozzle**
- ☐ **Pipeline**
- ☐ **PipeRun**
- ☐ **PipingComp**

13. Save the changes to the all schema files.

- ☐ From the menu, click **File > Save All Modified Files**.
- ☐ Answer **Yes** to the prompts to save the tool map file and the CMF file.
- ☐ Click **File > Exit** to close and exit the Schema Editor.

14. When you are finished with this activity, you may take a short break until the other students have finished.

9. Loading and Testing Schema Changes

This section contains all of the activities for Chapter 9 – Loading and Testing Schema Changes.

9.1 Activity – Loading and Testing Schema Changes

The objective of this activity is to use the Schema Import Wizard to load the schema changes created for SmartPlant P&ID into SmartPlant Foundation and test the publish functionality. Once the load is complete you will log on to SmartPlant P&ID to test the model by publishing some updated data values.

1. If you are not already logged onto the VM session, log on to your operating system as *Administrator* with the password *spf2008*.
2. Launch the SmartPlant Foundation Desktop Client, and log in as *superuser* with no password.
3. Make sure that the *SPF42* plant is the active plant for the query and create/update scopes, and then click **Find > Integration > Schema Documents**.
4. Find the checked out CMF file. Right-click on it, and click the **Launch Schema Editor** command.
5. When prompted, choose the *2008* version of the SmartPlant schema as your active configuration. Do NOT close the Desktop Client window.
6. Once in the Schema Editor, click **Tools > Schema > Validate > Validate/Display Results**.
7. Specify a location where the system should place the validation results, and click **OK**.
8. When the results of the validation appear, review the information, looking specifically for errors.
9. When you are done reviewing the results, close the Schema Editor, and return to the Desktop Client window.
10. Right-click on the CMF File again, and launch the Schema Editor. This time choose the *2007* version of the schema as your active configuration.

11. When the Schema Editor opens, use the **Tools > Schema > Validate > Validate/Display Results** command again.
12. Specify a location for the results file to be placed, and when the results appear, review them, checking for errors that need to be addressed.
13. Once you have reviewed the validation results, close the Schema Editor and return to the Desktop Client window.
14. Right-click on the CMF file, and use the **Edit > Check In** command to check the updated version of the CMF file into SPF.
15. When the file is checked in, right-click in the CMF file, and use the **Launch CMF File Manager (XML)** command.
16. In the **Build Support** dialog box, make sure the **CMF file** radio button is selected and the 2008 version of the schema is selected. Also note the **Output Path** location. The system will place the resulting XML file in that location. Click **Export** to begin creating the XML file.
17. When the **Build Support** dialog disappears, click **Administration > Schema Import Wizard**.
18. Choose the **Compare content of selected file with the database** radio button, and then using the browse button find the **SCHEMA_EFSchema-Gen.xml** file that was just created. Click **Next** to compare the database with the xml file.
19. When the comparison is complete, review the list of changes in the **Comparison Results** window. Click the **Select All** button to activate all the check boxes, and then click **Next**.
20. In the **Review Changes** window, review the changes the wizard just made to the database. Make sure each item had a **Loaded State** value of **Loaded**, and click **Finish** when you are done.
21. Right-click on the CMF file again, and click **Regenerate Schema Files** to manually begin the process of regenerating the schema files. This process will take a few minutes. Check the progress by querying on scheduler tasks.
22. From the **Start** menu, click **Start > All Programs > Intergraph SmartPlant P&ID > Drawing Manager**.

23. Drill down under the SPF42 plant, the area, and the unit. Then double-click the *128-5001.pid* drawing in the right-hand window.
24. In the P&ID drawing, find several different components for which we have set up mapping and use the new and modified fields. For example, find an offline instrument and in the **Properties** grid, provide a value for the *System Code* and *EngSystem* properties. You might also use the new **Corrosive** fluid system and a new fluid code value. You may also change information for nozzles found in the drawing.

Notes:

- ☐ If you change information for a piperun, do NOT change the fluid system or fluid code values.
 - ☐ You should note the names of the object that you make changes to. That information will make it easier to troubleshoot or track down your information later.
25. Once you have updated information, save your changes, and then publish the P&ID drawing using the **SmartPlant > Publish** command.
 26. When the publish is complete, return again to the SmartPlant Foundation Desktop client.
 27. Use the **Find > Published Data > Published Documents** command to search for all published documents for that active plant.
 28. Find the P&ID drawing, and right-click on it. Use the **Files > Save Target As** command to save out a copy of the *FileToolData* xml file to another location.
 29. When the save is complete, view the xml with Notepad or an Internet Explorer window, and search for your new values.

OR

30. You can open the data file in the Schema Editor, as illustrated in Chapter 6. Note that you will need to open the session file, or EFSchema, in the schema editor as well, because the schema editor needs to compare the xml file against the applicable schema.

10. Mapping with SmartPlant Instrumentation

This section contains all of the activities for Chapter 10 – Mapping with SmartPlant Instrumentation.

10.1 Activity 1 – Extending and Mapping an Existing Enumerated List with SmartPlant Instrumentation

The objective of this activity is to use the Schema Editor to extend the SmartPlant Schema and two application tool schemas. Once this has been done, it will be possible to publish a document from the P&ID authoring tool and retrieve the document in the SmartPlant Instrumentation tool and view the results of the retrieve.

1. Open *SmartPlant P&ID Data Dictionary Manager* and add a new entry – *Preconstruction* – to the Construction Status select list. Be sure to save your changes.
2. Launch the Desktop Client application, and find the CMF file. Check out the CMF file and launch the Schema Editor from the checked out CMF file.
3. Once in the schema editor, immediately save the session file with the applicable session information.
4. When the session file is saved, click *Workflows > Overall Workflow*, and then go to the *Application Metadata* tab.
5. Click the *SmartPlant* button, and choose the *Edit Engineering Tool Options* command.
6. Choose the SPPID tool map file, and activate the check boxes for *Load map schema* and *Connect to application schema*. Click *Finish*.
7. On the *Synchronize* dialog box, push the preconstruction status to the tool map file.

8. Add the new value to the existing enumerated list in the SmartPlant schema.
 - ☐ In the **Map Environment**, extend the SmartPlant P&ID tool and drill down to the **Map Enumerated Lists** node.
 - ☐ In that list, find the *ConstructionStatus* entry. Select it, and open the **Edit Form** view.
 - ☐ On the **Publish** tab, expand the **Construction State** tree in the top right-hand corner to display the values for that list in the SmartPlant Schema.
 - ☐ Expand **New** to find a **New** value (enum enum) beneath it. Right-click on the second **New**, and click the **Create New EnumEnum** option.
 - ☐ On the form that appears, create a new enum enum with a name and display name of *Preconstruction*. The **Contained in** field should be set to **New** automatically. Click **OK** to close this dialog.
 - ☐ Back on the **Publish** tab, find the **Preconstruction** value on both sides of the unmapped properties section, and click the **Map** button.
9. Save your changes using the **File > Save All Modified Files** command. Save the changes to both the tool map file and the CMF file.
10. Open SmartPlant Instrumentation (login in as *DBA* with a password of *dba*) and add a new entry to **Instrument Status** table. Refer to section 10.1.5 of your course guide for specific instructions for adding the *Preconstruction* status to the Instrument status table.
11. Launch the Schema Editor, and open your saved session file.
12. Open the **Application Metadata** tab, and click the **SmartPlant** button. Choose the **Edit Engineering Tool Options** command from the shortcut menu.
13. Connect to the *INtools* tool map file, and check both the **Load map schema** and **Connect to application schema** check boxes. Click **Finish**.
14. When the **Synchronize** dialog box appears, push the new construction status to the tool map file.
15. Map the new construction status to an existing enumerated list in the SmartPlant Schema.
 - ☐ In the **Map Environment**, drill down under the SmartPlant Instrumentation node to the **Map Enumerated Lists** section.
 - ☐ There, find the *ConstructionStatuses* object. Open it in the **Edit Form** view, and go to the **Retrieve** tab.

- ☐ In the middle section (unmapped properties), find the ***Preconstruction*** value in both the tool map file and the SmartPlant schema, and use the **Map** button to create a mapping relationship.
 - ☐ Repeat the previous step on the ***Publish*** tab, as well.
16. Use the **File > Save All Modified Files** command to save the changes you made to the tool map file. **Note:** You did not make any changes to the CMF file.
 17. As in chapter 9, check in the CMF file, generate an XML file of the CMF file, and load the changes in the database using the Schema Import Wizard.
 18. Once the import is complete, manually regenerate the component schemas as we saw in chapter 9.
 19. Using the Drawing Manager, open the *128-5001.pid* drawing in SmartPlant P&ID. Modify multiple instruments in the drawing to have a construction status of *Preconstruction*.
 20. Save your changes, and republish the drawing.
 21. Retrieve the changes into SmartPlant Instrumentation:
 - ☐ Open SmartPlant Instrumentation, and use the **SmartPlant > Retrieve** command to retrieve the P&ID drawing you just published.
 - ☐ Click **SmartPlant > To Do List** to open the **To Do List** window.
 - ☐ Highlight all the tasks in the list, and click the **Run** button on the bottom toolbar to incorporate all the changes from the P&ID drawing.
 - ☐ Open the **Instrument Index Browser** and view the details of the instruments. Check to see if the *PRC* construction status was retrieved properly.
 22. When you are finished with this activity, you may take a short break until the other students have finished.

10.2 Activity 2 – Adding and Mapping a Custom Property with SmartPlant Instrumentation

The goal of this activity is to give you the opportunity to create a custom property in the SmartPlant Instrumentation application metadata and the SmartPlant Instrumentation tool map schema. You will then perform the necessary mapping steps that would be required to share the information in a Publish or Retrieve operation.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click **Start > All Programs > Intergraph SmartPlant Instrumentation > Administration** to start the *SmartPlant Instrumentation Administration* module.
3. Select the Domain Administrator.
 - ☐ Click **SPF42_IN** in the **Open Administration Module** dialog.
 - ☐ Click **OK** to close the dialog.
4. Use Domain Administration to add the new custom SPI property.
 - ☐ From the **Domain Administration** window, select the **Fields** tool.
 - ☐ In the **Custom Fields** dialog, select the **Plant** - *SPF42* and the **Item Type** - *Instrument*.
 - ☐ Add the user defined field (UDF): Type *SystemCode* in the **Definition** field and 8 in the **Length** field.
 - ☐ Click **Apply**.
 - ☐ Select the **Item Type** - *Loop*.
 - ☐ Add the user defined field (UDF): Type *SystemCode* in the **Definition** field and 8 in the **Length** field.
 - ☐ Click **Apply**.
 - ☐ Click **Close** to close the **Domain Administration** dialog box.
 - ☐ Click **File > Exit** from **Domain Administration** dialog box.
5. Start SPI, and configure the new custom property in the *Instrument Index* browser.
 - ☐ From the **Instrument Index** module, use the browse button to display a **Browser View** window.

- ☐ Use the **Manager** button to add the new property to the **Style** of the **Default View**. Refer to the chapter for details on how to do this.
 - ☐ Open the **Instrument Index Browser View** window to confirm that the new property will appear in the view.
 - ☐ Exit the SPI application.
6. Click **Start > Programs > Intergraph SmartPlant Foundation > Schema Component > SmartPlant Schema Editor > Developer** to start the *Schema Editor*.
 7. On the **Application Metadata** tab, click the **SmartPlant** button, and choose the **Edit Engineering Tool Options** command.
 8. Choose the *INtools* tool map file, and activate the check boxes for **Load map schema** and **Connect to application schema**. Click **Finish**.
 9. When the **Synchronize** dialog displays, confirm that the new property values have been imported by the metadata adapter, and click **OK**.
 10. Configure the new custom property for retrieve mapping.
 - ☐ Expand the **Tool** object in the tree of the **Map Environment** window so that the *SmartPlant Instrumentation Tool Schema* entries are displayed.
 - ☐ Expand the **Map Classes** node, scroll down find the *TEFRetrieve_PIDDrawing_Instrument* entry in the tree. Open the **Edit Form** view.
 - ☐ Select the **Retrieve** tab in the **Edit Map Map Class Definition** dialog.
 - ☐ Highlight the **SystemCode** MapProperty in the **Unmapped applications properties** control and the **SystemCode** MapProperty in the **Unmapped SmartPlant properties** control in order to perform the schema mapping.
 - ☐ Make sure that **SystemCode** is highlighted in the middle control in the application section and that **SystemCode** is highlighted in the SmartPlant section.
 - ☐ Click the **Map** button to define the mapping between the SPI tool map schema and the SmartPlant schema.
 - ☐ Verify in the bottom control that *SystemCode* maps to *SystemCode* in the two schemas. You may have to scroll to the bottom of the list to see this.
 - ☐ Click **OK** to close the **Edit Map Class Definition** dialog box.

11. Save the changes to the all schema files.
 - ☐ From the menu, click **File > Save All Modified Files**.
 - ☐ Answer **Yes** to save the CMF file and the toop map file.
 - ☐ Click **File > Exit** to close and exit the Schema Editor.

12. Using the example in Chapter 10, retrieve the P&ID instrument into SP Instrumentation.
 - ☐ Select the **SmartPlant > Retrieve** command to retrieve the changes/additions. Select Show **All documents** and use only 128-5001.pid.
 - ☐ Use the **SmartPlant > To Do List** command to view the changes/additions.
 - ☐ Review the *Properties* of one of the instrument objects that have a status of **Update** to see the *Old* value and the *New* value once this task is executed.
 - ☐ Select and run the *Update* tasks to apply the new retrieved values.
 - ☐ Use the **Instrument Index Module** to review the results of the retrieve.

OPTIONAL: Configure publish mapping for a custom property, publish a change to an instrument and use the schema editor to see the change in the XML file.

When you are finished with this activity, you may take a short break until the other students have finished.

11. Mapping with SmartPlant Electrical

This section contains all of the activities for Chapter 11 – Mapping with SmartPlant Electrical.

11.1 Activity 1 – Adding and Mapping a Simple Property with SmartPlant Electrical

The goal of this activity is to give you the opportunity to create a custom property in the SmartPlant SPEL application meta data and the SmartPlant SPEL tool map. You will then perform the necessary mapping steps that would be used in Publish and Retrieve operations.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click *Start > All Programs > Intergraph SmartPlant engineering Manager > Data Dictionary Manager* to start the *SmartPlant Data Dictionary Manager*.
3. Click *File > Open Database* and from the dialog that appears, choose **SmartPlant Electrical** from the *Application* field. Be sure that **SPF42** is selected in the *Available plant structures* field.
4. Open the *Plant Item* database table.
 - ☐ Click *Plant Item* in the Database Tables window.
 - ☐ Select *Edit > Add Property* from the menu.
 - ☐ In the *Add Property* dialog box, enter the following information:
 - *Name* –SystemCode1
 - *Display Name* –EF System Code
 - *Data Type* –String
 - *Maximum Length* –8
 - *Display to User* – Yes
 - *Use for Filtering* –Yes
 - *Category* –Miscellaneous
 - *Depends on* –None
 - ☐ Click *OK* to close the *Add Property* dialog box.

5. Save the changes to the SmartPlant Data Dictionary Manager.
 - ☐ Click **File > Save**.
 - ☐ Click **File > Exit**.
6. Click **Start > Programs > Intergraph SmartPlant Foundation > Schema Component > SmartPlant Schema Editor > Developer** to start the Schema Editor.
7. On the **Application Metadata** tab, click the **SmartPlant** button, and choose the **Edit Engineering Tool Options** command.
8. Choose the SPEL tool map file, and activate the check boxes for **Load map schema** and **Connect to application schema**. Click **Finish**.
9. When the **Synchronize** dialog displays, confirm that the new property values have been imported by the meta data adapter and click **OK**.
10. Map the *SystemCode1* property:
 - ☐ Expand the **Tool** object in the tree of the **Map Environment** window so that the SmartPlant SPEL Tool Schema entries are displayed.
 - ☐ Expand the **Map Classes** and find the **Motor** entry in the tree. Select it, and open the **Edit Form** view.
 - ☐ Open the **Publish** tab. Expand the tree for both the application/tool map schema and the SmartPlant schema in the upper control.
 - ☐ Highlight the *SystemCode1* MapProperty in the **Unmapped applications properties** control and the *SystemCode* MapProperty in the **Unmapped SmartPlant properties** control in order to perform the schema mapping.
 - ☐ Make sure that **SystemCode1** is highlighted in the middle control in the application section and that **SystemCode** is highlighted in the SmartPlant section.
 - ☐ Click the **Map** button to define the mapping between the SPEL tool map schema and the SmartPlant schema.
 - ☐ Verify in the bottom control that *SystemCode1* maps to *SystemCode* in the two schemas. You may have to scroll to the bottom of the list to see this.
 - ☐ Click **OK** to close the **Edit Map Class Definition** dialog box.
11. Repeat the mapping for the following classes:
 - ☐ **Instrument**
 - ☐ **Cable**

12. Save the changes to the all schema files.

- ☐ From the menu, click ***File > Save All Modified Files.***
- ☐ Answer ***Yes*** to the modified tool schema file.
- ☐ Click ***File > Exit*** to close and exit the Schema Editor.

When you are finished with this activity, you may take a short break until the other students have finished.

11.2 Activity 2 – Adding and Mapping a Complex Property with SmartPlant Electrical

In this activity you will be creating custom properties in the SmartPlant SPEL authoring tool. You will also create a select list that will be used with a new property. Finally, you will perform the necessary mapping steps that would be used in a Publish and Retrieve operation.

1. Log on to your operating system as *Administrator* with the password *spf2008* (if not already logged in).
2. Click *Start > All Programs > Intergraph SmartPlant engineering Manager > Data Dictionary Manager* to start the *SmartPlant Data Dictionary Manager*. Verify you are connected to the SPEL database.
3. Add a new select list (picklist).
 - ☐ Click **Select List** on the left side of the application window.
 - ☐ Scroll to the bottom of the **Select List** table, and enter a new name in the empty row at the bottom of this table.
 - **Name** – EngSys
 - **Dependent List** – None
 - ☐ Click **Select Entry** on the left side of the application window.
 - ☐ In the **Select Entry** window, enter the following information in the blank row shown:
 - **Value** – AA
 - **Short Value** – Steam Gen & Fired Htr, Water/Steam Side
 - **Dependent Value** – <blank>
 - ☐ Click the **Add Row** command from the tool bar to add the next entry to the new select list:
 - **Value** – BA
 - **Short Value** – Steam Generator and Fired Heater - Air/Gas Side
 - **Dependent Value** – <blank>

- ☐ Click the **Add Row** command from the tool bar to add the next entry to the new select list:
 - **Value** – CA
 - **Short Value** – Ammonia/Urea
 - **Dependent Value** – <blank>
 - ☐ Click the **Add Row** command from the tool bar to add the next entry to the new select list:
 - **Value** – DC
 - **Short Value** – Crude Oil Production
 - **Dependent Value** – <blank>
 - ☐ Click the **Add Row** command from the tool bar to add the last entry to the new select list:
 - **Value** – EA
 - **Short Value** – Auxiliary AC Power Systems
 - **Dependent Value** – <blank>
4. Add a new property to the **Plant Item** database table that uses the new select list just created.
- ☐ Click **Plant Item** in the **Database Tables** window.
 - ☐ Select **Edit > Add Property** from the menu.
 - ☐ In the **Add Property** dialog box, enter the following information:
 - **Name** – EngSystem
 - **Display Name** – Engineering System
 - **Data Type** – Select List
 - **Select List** – EngSys
 - **Format** – Variable length
 - **Default Value** – None
 - **Display to User** – Yes
 - **Use for Filtering** – Yes
 - **Category** – Miscellaneous
 - **Depends on** – None
 - ☐ Click **OK** to close the **Add Property** dialog box.

5. Save the changes to the SmartPlant Data Dictionary Manager.
 - a. Click **File > Save**.
 - b. Click **File > Exit**.

Defining Schema Mapping

6. Click **Start > Programs > Intergraph SmartPlant Foundation > Schema Component > SmartPlant Schema Editor > Developer** to start the *Schema Editor*.
7. From the **Application Metadata** tab, click the **SmartPlant** button, and choose the **Edit Engineering Tool Options** command on the shortcut menu.
8. Select the tool map schema to be loaded, *SmartPlant SPEL Tool Schema*, and choose to load the map schema and to connect to the application schema. Then click **Finish**.
9. When the **Synchronize** dialog displays, confirm that the new property values have been imported by the meta data adapter and click **OK**.
10. Map the enumerated list and its entries.
 - ☐ Expand the **Tool** object in the tree of the **Map Environment** window so that the SmartPlant SPEL Tool Schema entries are displayed.
 - ☐ Expand the **Map Enumerated Lists** objects and find the entry for **EngSys**. Select it, and open the **Edit Form** view.
 - ☐ Click the browse button beside the **Publish to** field, and find the enumerated list in the SmartPlant schema that the **EngSys** map enumerated list should be mapped to.
 - ☐ Find the **EngSys** enumerated list in the SmartPlant schema, select it, and then click **OK**.
 - ☐ Select the **Publish** tab. One at a time, select each of the list values in the tool map file and the corresponding enum in the SmartPlant schema, and click the **Map** button. Repeat this step until all the list values are mapped.
11. Map the new SPEL property to the existing property in the SmartPlant schema.
 - ☐ Expand the **Map Classes** node. Find and select the **Motor** entry in the tree, open the **Edit Form** view.
 - ☐ On the **Publish** tab, find the **EngSystem** property in the tool map file and **Engineering System** property in the SmartPlant schema, and then click the **Map** button.

12. Save the changes to the all schema files.
 - ☐ From the menu, click ***File > Save All Modified Files.***
 - ☐ Save the changes you made to the SPEL map schema.
 - ☐ Click ***File > Exit*** to close and exit the Schema Editor.

13. When you are finished with this activity, you may take a short break until the other students have finished.

12. Mapping with SmartPlant 3D

This section contains the activity for Chapter 12 – Mapping with SmartPlant 3D.

12.1 Activity – Mapping SmartPlant 3D Properties for Publish

The objective of this activity is to create publish mapping for SmartPlant 3D and test publishing custom properties from that authoring tool.

1. Log on to your operating system as *Administrator* with a password of *spf2008* (if not already logged in).
2. Click *Start > Programs > Intergraph SmartPlant Foundation > Schema Component > SmartPlant Schema Editor > Developer* to start the *Schema Editor*.
3. From the *Application Metadata* tab, click the *SmartPlant* button, and click the *Edit Engineering Tool Options* command.
4. Connect to the *SmartPlant 3D* metadata adapter. Be sure to load the tool map schema and connect to the too meta schema.
5. Synchronize the tool map file by pushing changes in the tool schema to the map file.
6. In the *Map Environment*, drill down under *SmartPlant 3D* to the *Map Classes* section.
7. Find the *IUPBSItem* SP3D interface (where we added the custom properties to SP3D). Select it, and open the *Edit Form* view.
8. Click the browse button beside the *Publish to* field. Find and select the *ICustomInterface* interface where we have placed the custom properties. Click **OK**.
9. Go the *Publish* tab. Map the *Engineering System* and *System Code* properties for publish.
10. Save the changes you made to the tool map file.
11. Close the Schema Editor.

12. From the desktop, find the *SP3DClass.ses* icon, and double-click it to launch an existing session file in SmartPlant 3D.
13. When the SP3D application opens, it will open in the *Piping* task. From the list box in the top left corner, choose the *Piping Runs* option.
14. Move your cursor over the piperun in the window. As your cursor moves over it, the piperun will be outlined in purple. Click it, and the outline will turn red.
15. Right-click on the pipe run, and click the *Properties* command
16. In the *Properties* dialog box, find the new *System Code* and *Engineering System* properties. Change the values for these fields, if you wish, or note the value that exists.
17. Click *Tasks > Drawings and Reports*.
18. In the *Management Console* window, right-click on the *SPF42* plant, and click *New*.
19. Create a new folder.
20. Rename the folder that appears beneath the *SPF42* plant.
21. Right-click on the folder, and click *New*.
22. Choose the *3D Model Data* option.
23. Right-click on the *3D Model Data* node that appears under your folder, and click the *Setup* option to choose a filter.
24. Expand the *Filter* drop list, and click *More*.
25. From the *Select Filter* dialog box, choose the *all* filter, under the *Plant Filters* section. Click *OK*.
26. Click *OK* on the *Setup* dialog box.
27. Right-click the *3D Model Data* node, and choose the *Create Drawing* command. A new drawing template will appear in the window on the right. The icon will include a red X.
28. Right-click on the drawing template, and choose the *Revise* command.

29. Choose a revision scheme, and specify the major revision, and then click **OK**.
30. When the revise process is complete, right-click on the drawing template again, and click the **Update Drawing** command. This process may take a few moments. When it is complete, the red X in the icon will be replaced with a green check mark.
31. When the update is complete, right-click on the drawing template one more time, and click the **Publish** command.
32. Click **OK** on the **Publish** dialog box.
33. When the publish process is complete, you may close SmartPlant 3D.
34. View the published XML file in an IE window or with the Schema Editor application as we have already seen.

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SmartPlant Foundation 2008 (4.2) Modeling and Mapping

Activity Workbook