

# Tutorial Section XII

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## CIMTool

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# Introduction

- The purpose of this presentation is to describe the use of CIMTool
- Some of the uses of CIMTool include:
  - Definition of information exchange profiles
  - Development of RDF Schemas
  - Validation of CIM XML instance files
  - Validation of incremental CIM XML files

# Contents

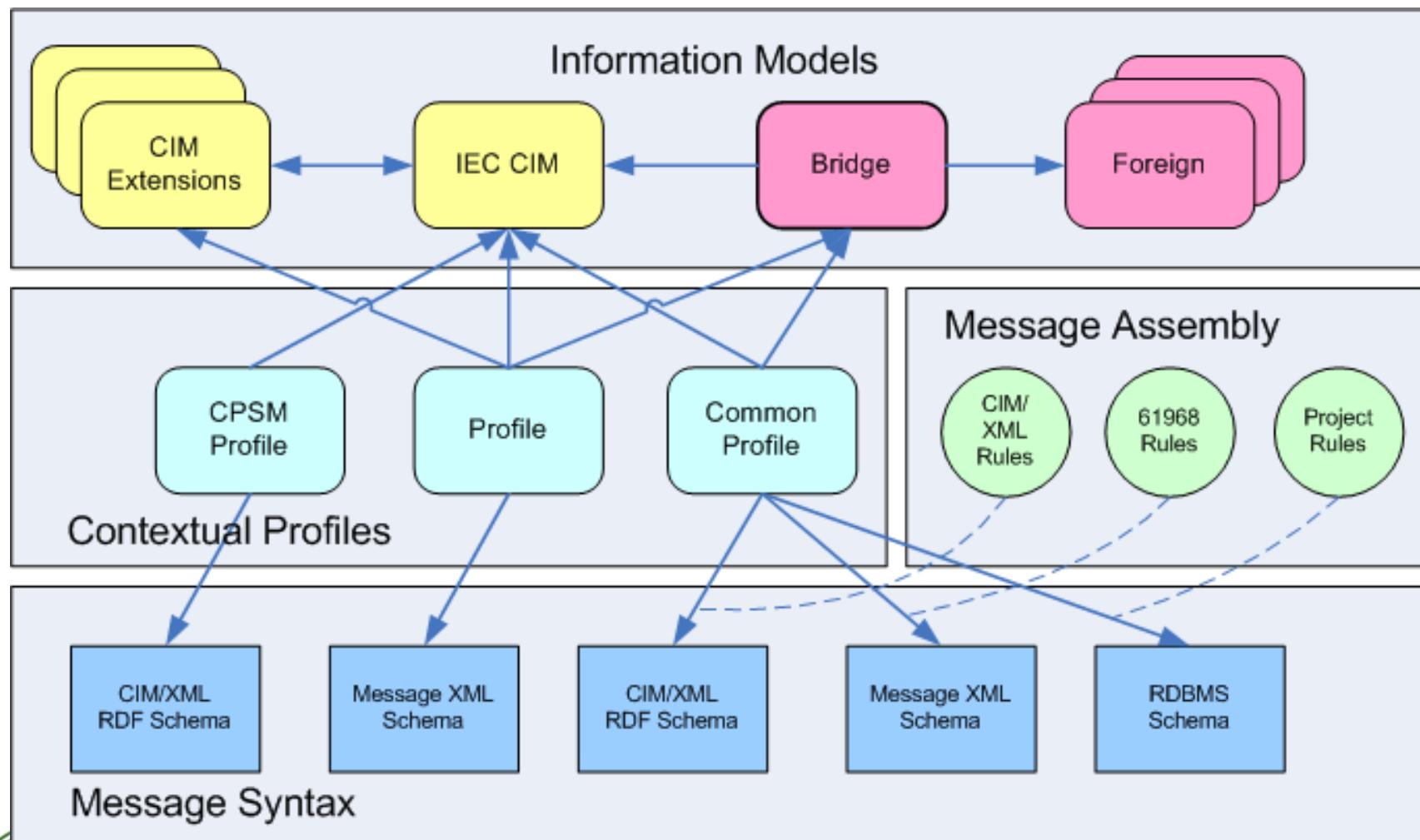
1. CIM Profiles
2. CIMTool Installation
3. Creating a CIMTool Project
4. Importing a Schema
5. Creating and Editing a Profile
6. Importing a Profile (Several Methods)
7. Generating RDF Schemas
8. Importing a Model
9. Validating a Model
10. Importing and Validating an Incremental Model
11. Updating a Schema
12. Miscellaneous

# CIM PROFILES

# What is a Contextual Profile?

- The set of classes, attributes and relationships in a contextual profile (a.k.a. profile) is a subset of the classes, attributes and relationships found in a schema
- The cardinality of a relationship in a profile is either the same or more restrictive than the relationship in the schema
- A profile is often given a name (e.g. CPSM)
- Each profile will have an assigned namespace
- Profiles are also known as ‘contextual models’
- Within CIMTool, profiles are managed using an OWL format, where a .owl extension is used
- Important to note that OWL is based upon RDF
- Profiles can be realized in a variety of forms, including but not limited to RDFS, XML Schema, HTML and Word Documents

# Information Models and Profiles



# CIMTool Installation

# What is CIMTool?

- CIMTool is an Eclipse plugin
- It provides the means to:
  - Define profiles from a UML model
  - Import profiles from a spreadsheet
  - Validate profiles
  - Validate instance files against a profile
  - Validate incremental files against an instance file and a profile
  - Generate RDF schemas from a profile
  - ... and more

CIM**T**ool

# Preparation for Installation

- You should have a PC running a recent version of Windows, Linux or Mac OS, with at least 1GB memory
- Recommend at least 2GB free disk space (much more is recommended if you will be working with large CIM network models)
- You need an internet connection, noting that there may be 200MB of downloads required for installation
- You need a Java runtime environment (JRE)
  - Java 5 JRE is currently recommended
  - If you don't have one you can download from <http://java.com>



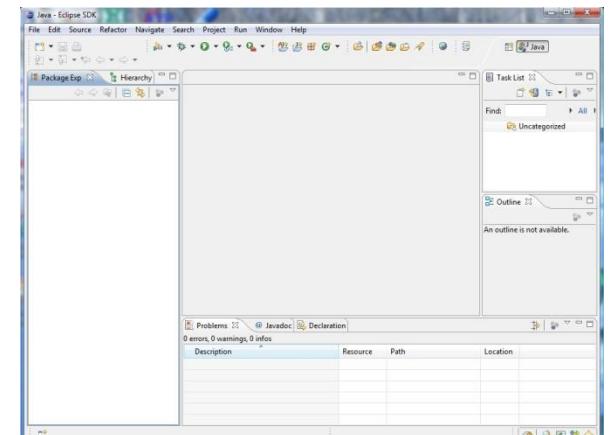
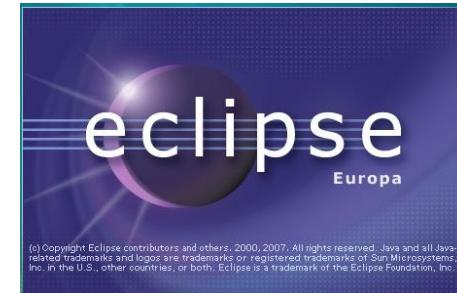
# CIMTool Installation

- Go to <http://cimtool.org>
- Version 1.9.3 is currently available for download
- Download a zip file with Eclipse and CIMTool (full installation package)
- Following the directions on the screen

# Starting CIMTool

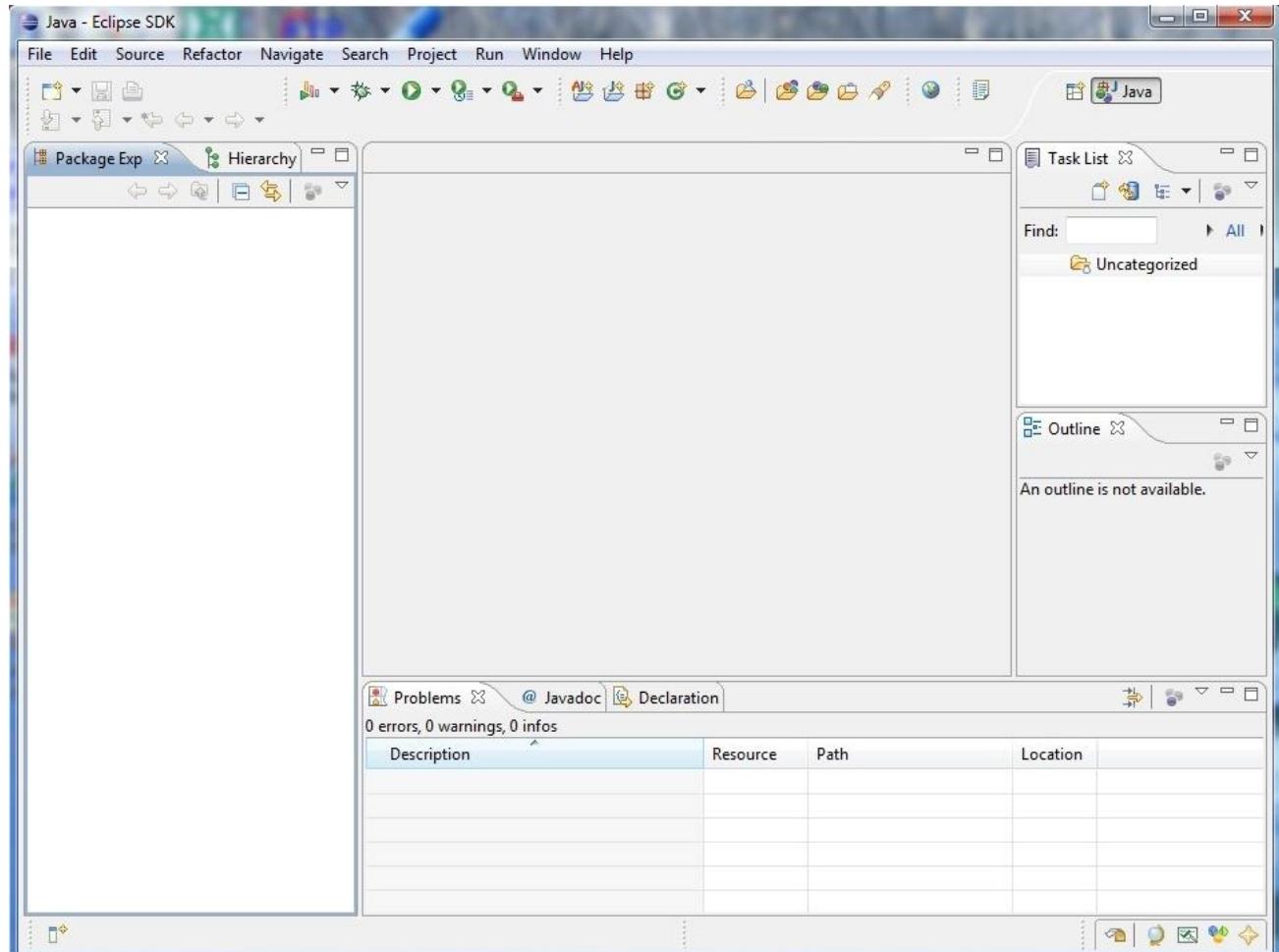


- Click on the Eclipse icon
- The Eclipse startup dialog will appear
- Define a ‘workspace’ directory when prompted
- The workbench view will then appear



# Eclipse/CIMTool Workbench

- Initial default view before any projects are created
- Default installation supports Java development



# CIMTool/Eclipse Hints and Tips

- Files, Packages and Workspaces:
  - It is important that you never add, modify or delete anything inside a workspace directory with tools other than Eclipse
  - If there is ever a ‘resource out of sync’ problem, you can usually correct by using the ‘refresh’ option
  - You may however safely read files directly from the workspace folder if needed

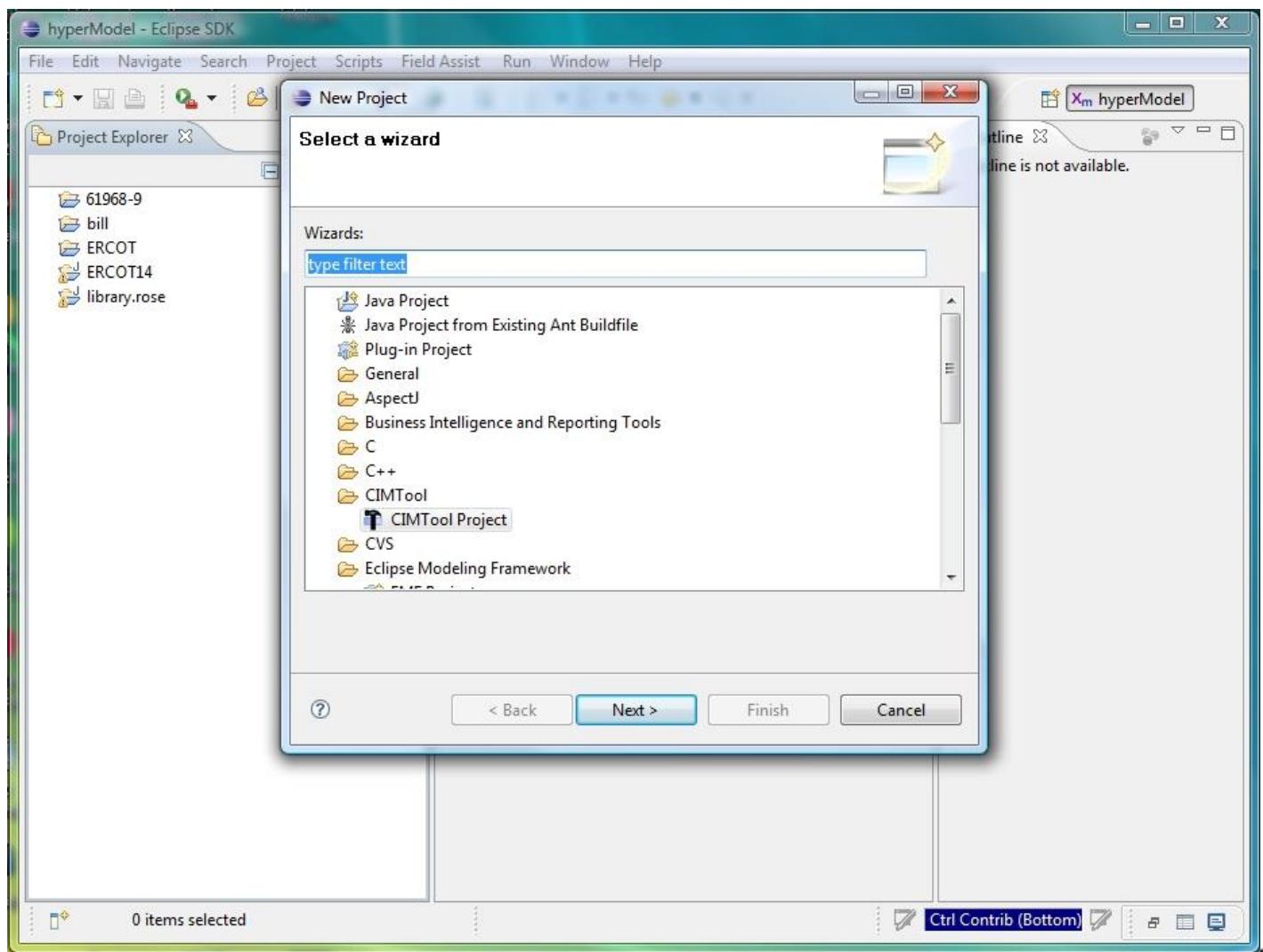
# Creating a CIMTool Project

# CIMTool Projects

- Each project has a named folder in the workspace directory
- Each CIMTool project will have four sub-folders:
  - ***Incremental***: for CIM XML incremental files in RDF format with a .xml extension
  - ***Instances***: for CIM XML instance files in RDF format with a .xml extension
  - ***Profiles***: for profile definitions, where
    - Profile definitions are stored in an OWL & RDFS formats
    - Log files, which may identify errors, are text files with a .log extension
    - Depending upon the usage of CIMTool, there may also be HTML, RDFS and XSD files
  - ***Schema***: for the CIM model in XMI format with a .xmi extension (Generated using the UML model from the EA Tool)
- Folders and files that have errors may include a red X on their associated icon

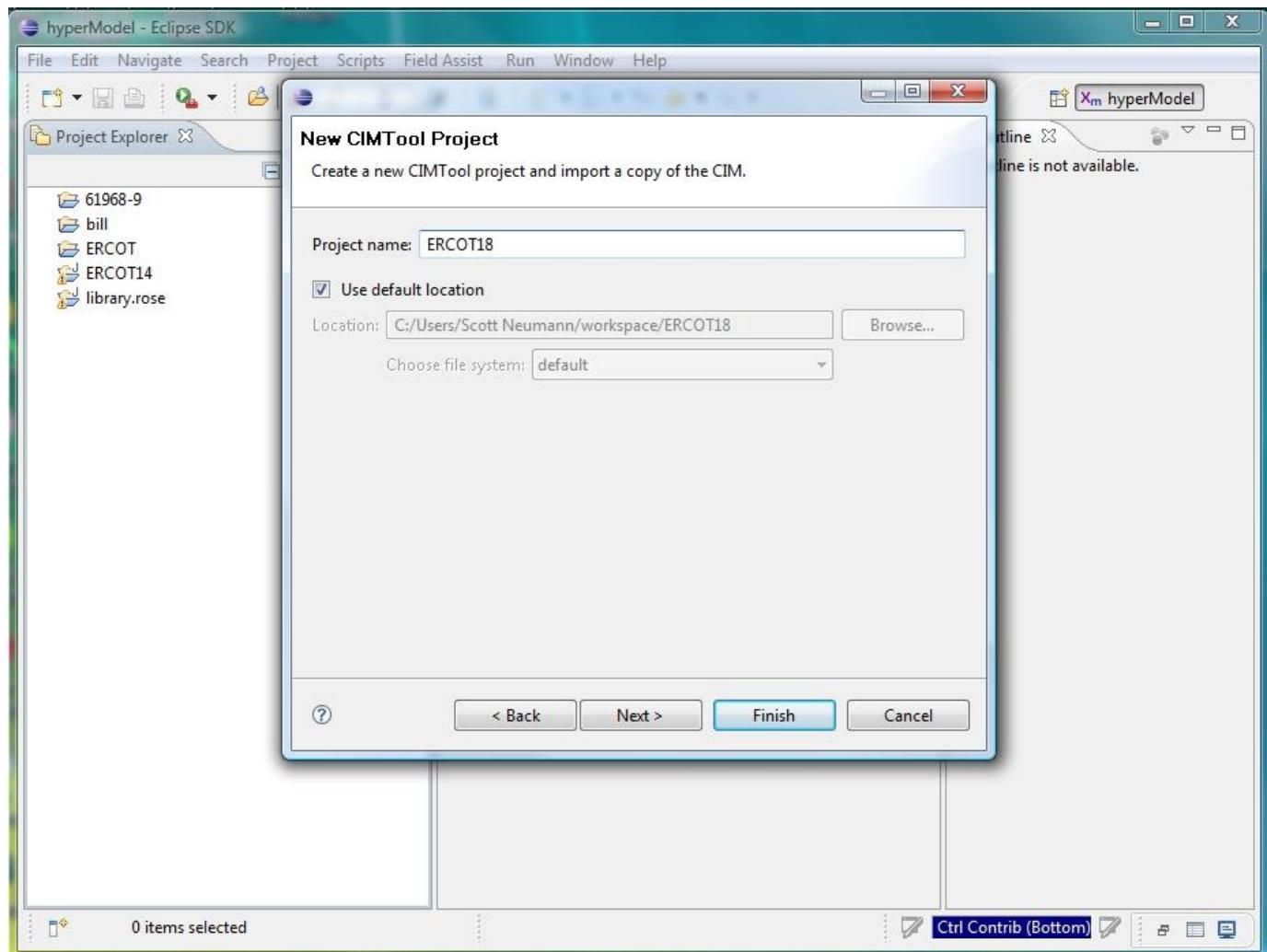
# Creating a New CIMTool Project

- Select 'File > New > Project'
- Select 'CIMTool Project' option
- Click 'Next'



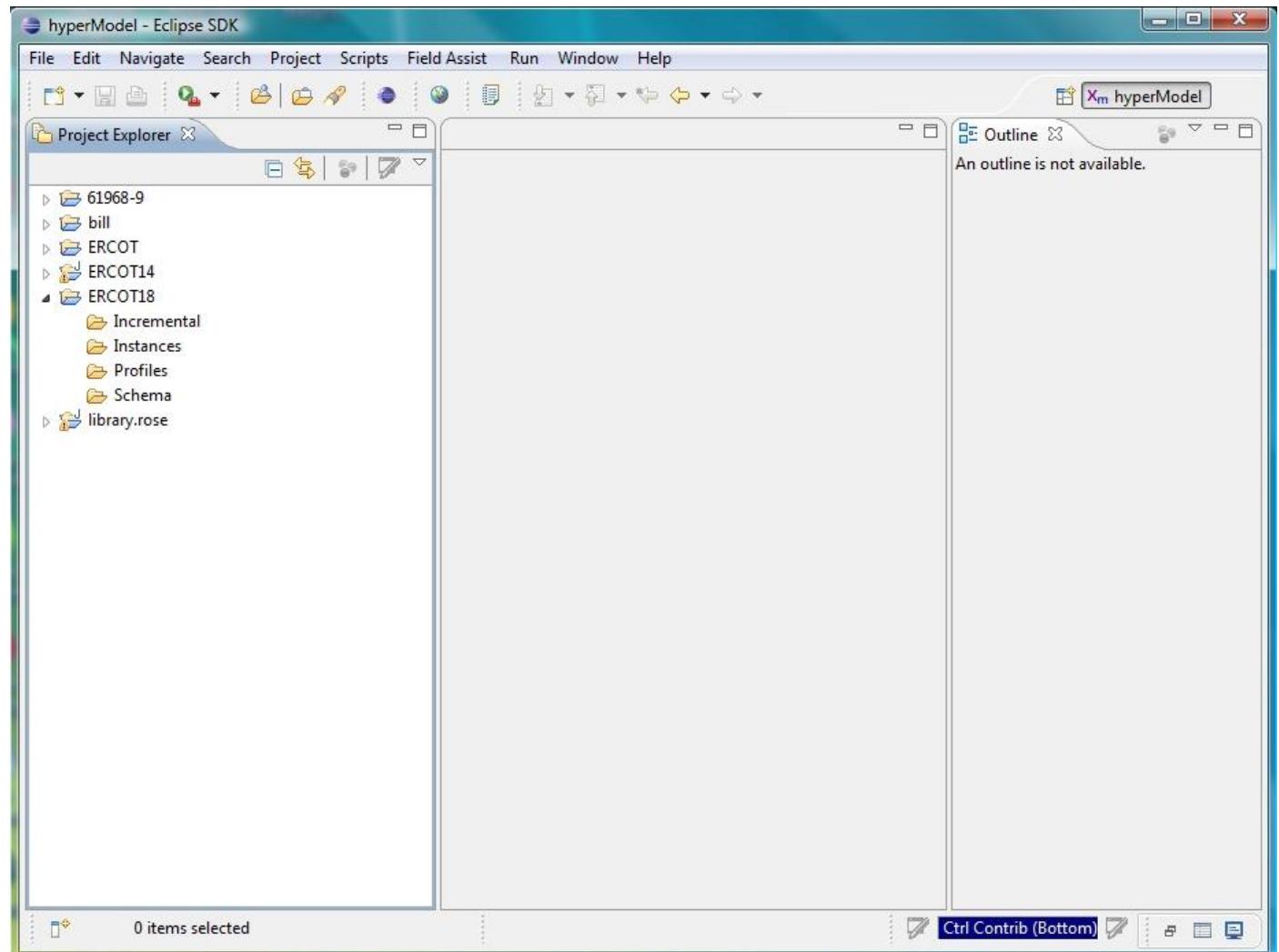
# Creating a New CIMTool Project

- Name it – e.g. ‘IIE18’
- Click ‘Finish’
- This will create a new folder in your workspace directory



# Browsing the Project

- Click on arrow to the left of the desired project name in the Project Explorer to expand it
- See that project has the 4 set of folders
- Exp

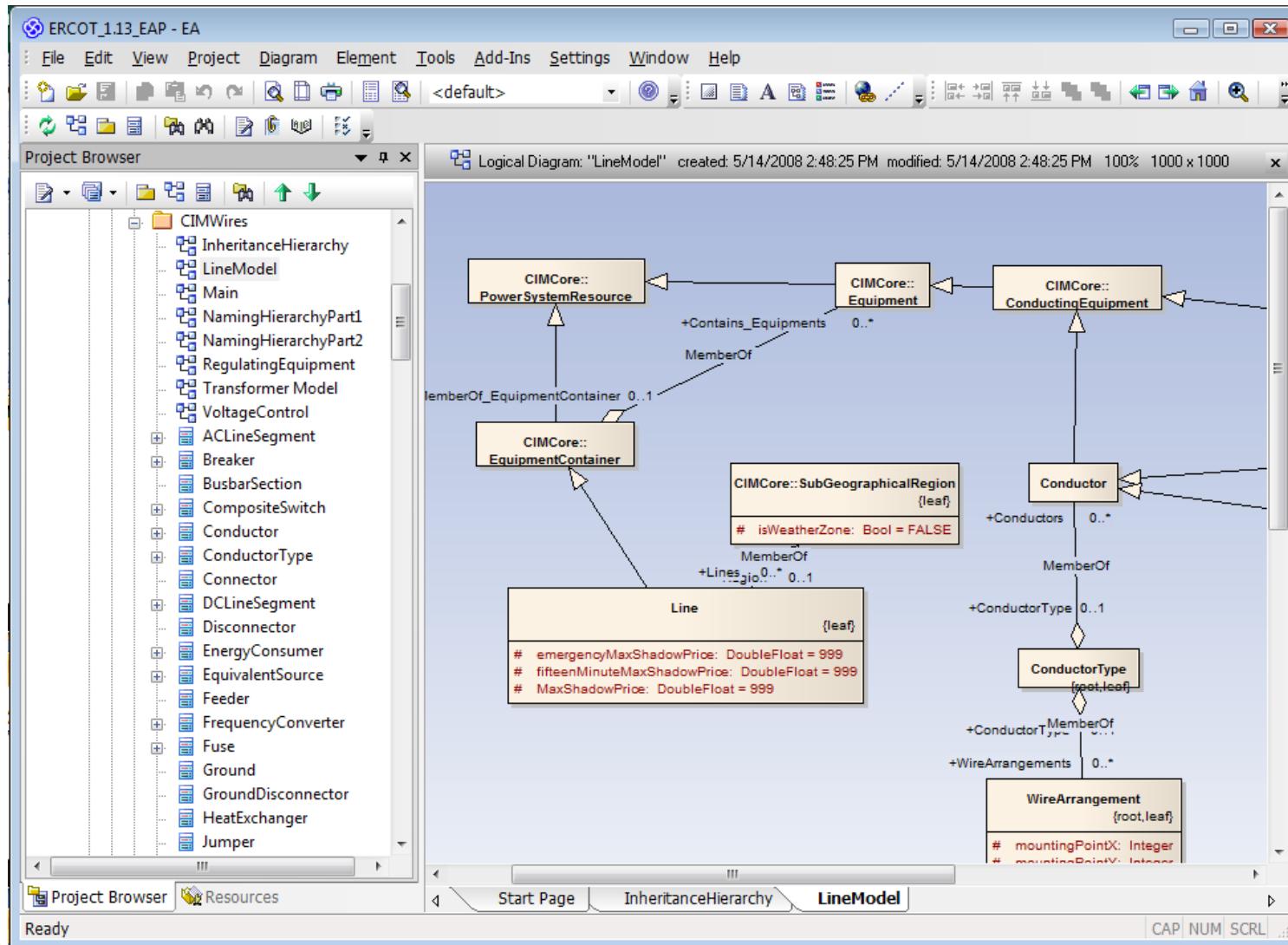


# Importing a Schema

# Importing a Schema

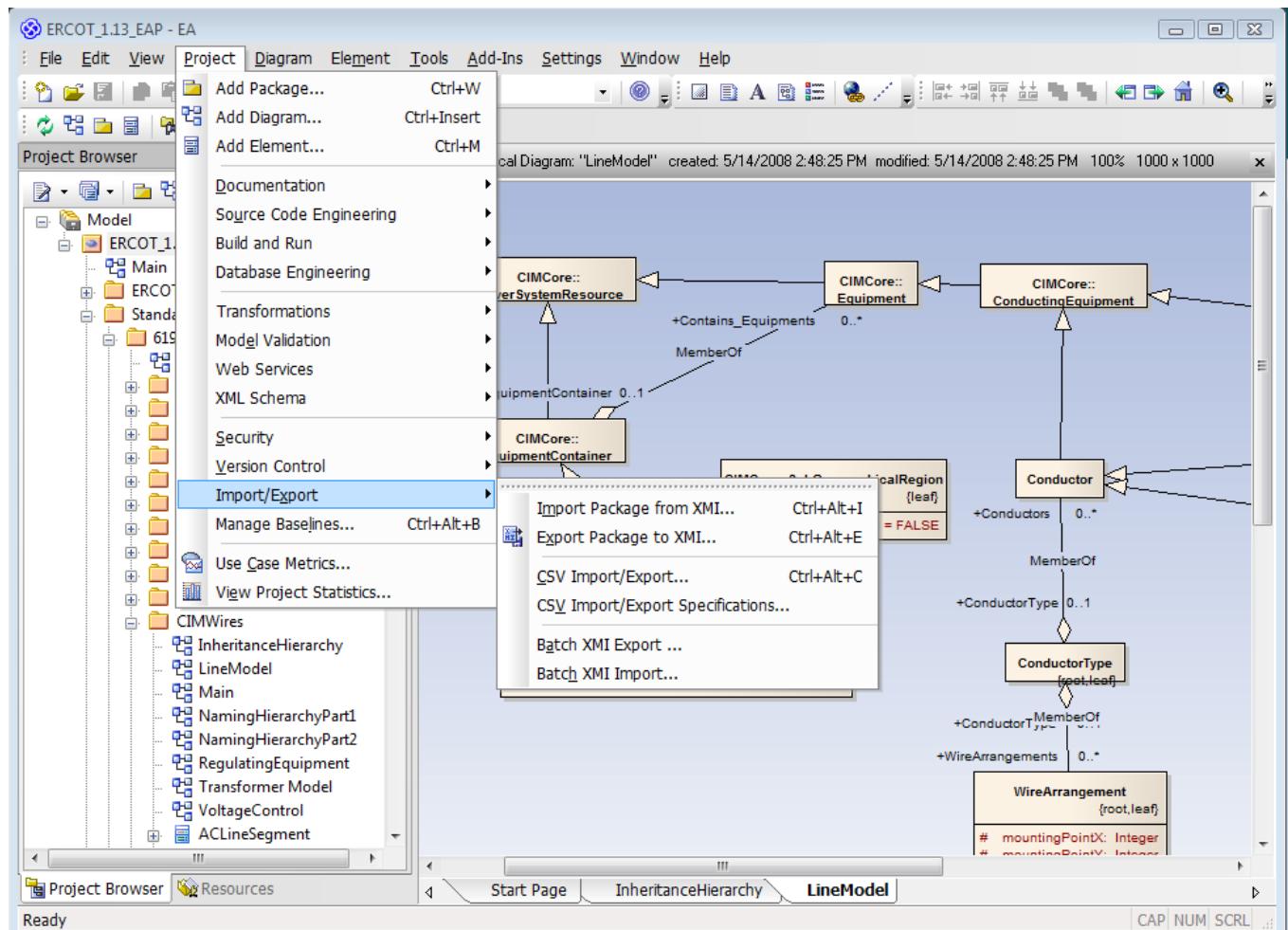
- Schemas describe the classes, attributes and relationships defined by a UML model
- Anything defined by a profile MUST be described within the UML model
- Schemas must be in a suitable XMI format for import
- The XMI files are typically generated from the CIM UML model created/maintained using Enterprise Architect
- Schemas will be stored in the ‘Schema’ folder of the project
- There is typically one schema for a project, although there are cases where there may be more than one

# Schema in a UML Tool



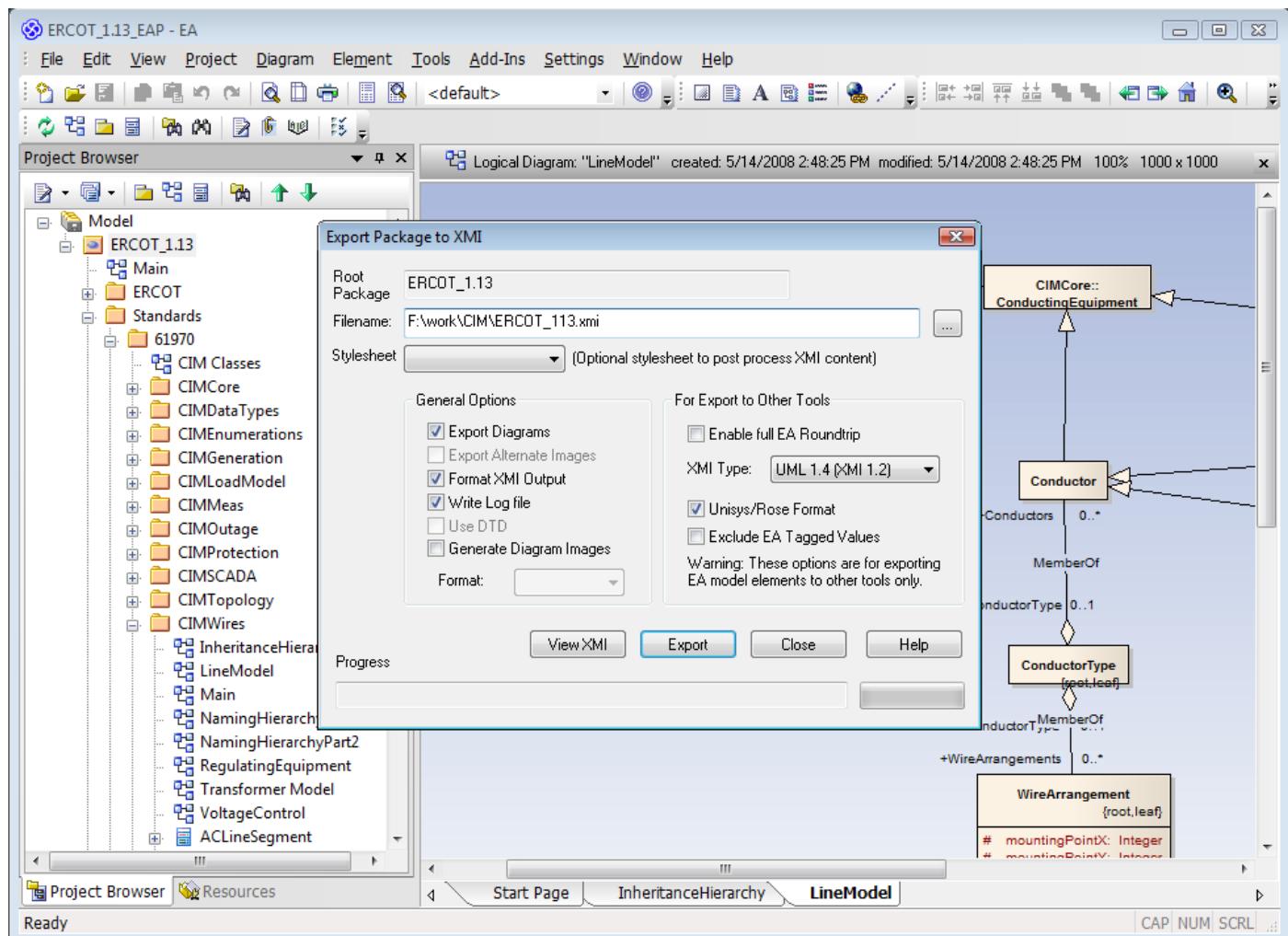
# Exporting UML Model as XMI

- In Enterprise Architect select the top-level package
- Select Project > Import/Export > Export Package to XMI



# Exporting XMI from UML Tool

- Use export options shown
- Export as UML 1.4
- Unselect 'Enable full EA Roundtrip'
- Select 'Unisys/Rose format' option
- Enter file name for XMI file
- Click on Export button



# Schema Import within CIMTool

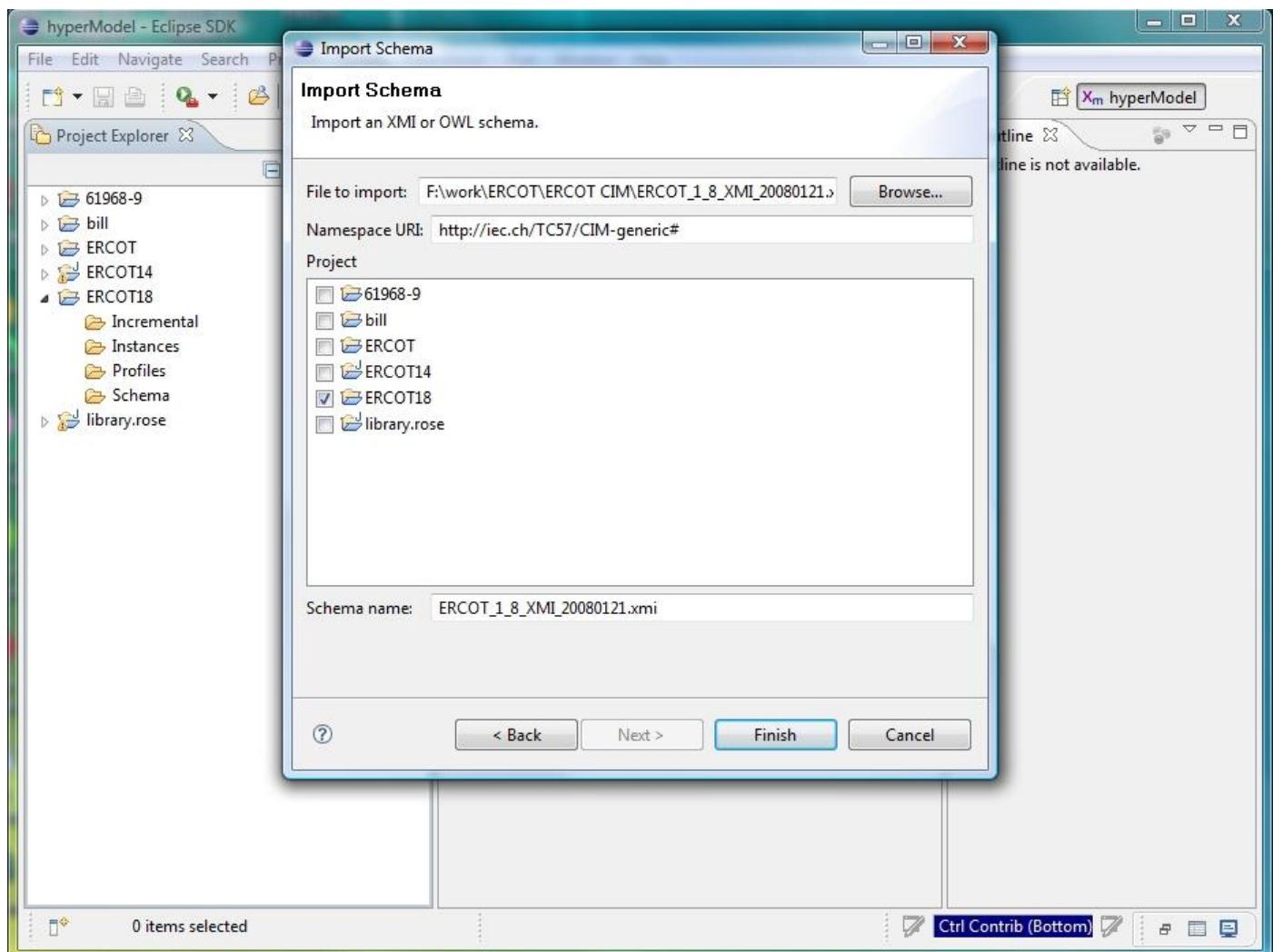
- Schemas are imported when creating a new CIMTool project
- Schemas can also be added to supplement an existing schema
- Schemas can also replace an existing schema, as in the case of a new CIM version

# Initial Schema Import

1. Select 'File > Import'
2. ***Note the different import options under CIMTool***
3. Select 'Import Schema' option
4. Click 'Next'

# Initial Schema Import

- Browse to find the XMI file to import
- Check the project for the import
- Don't edit the Namespace
- Click “



# Creating and Editing a Profile

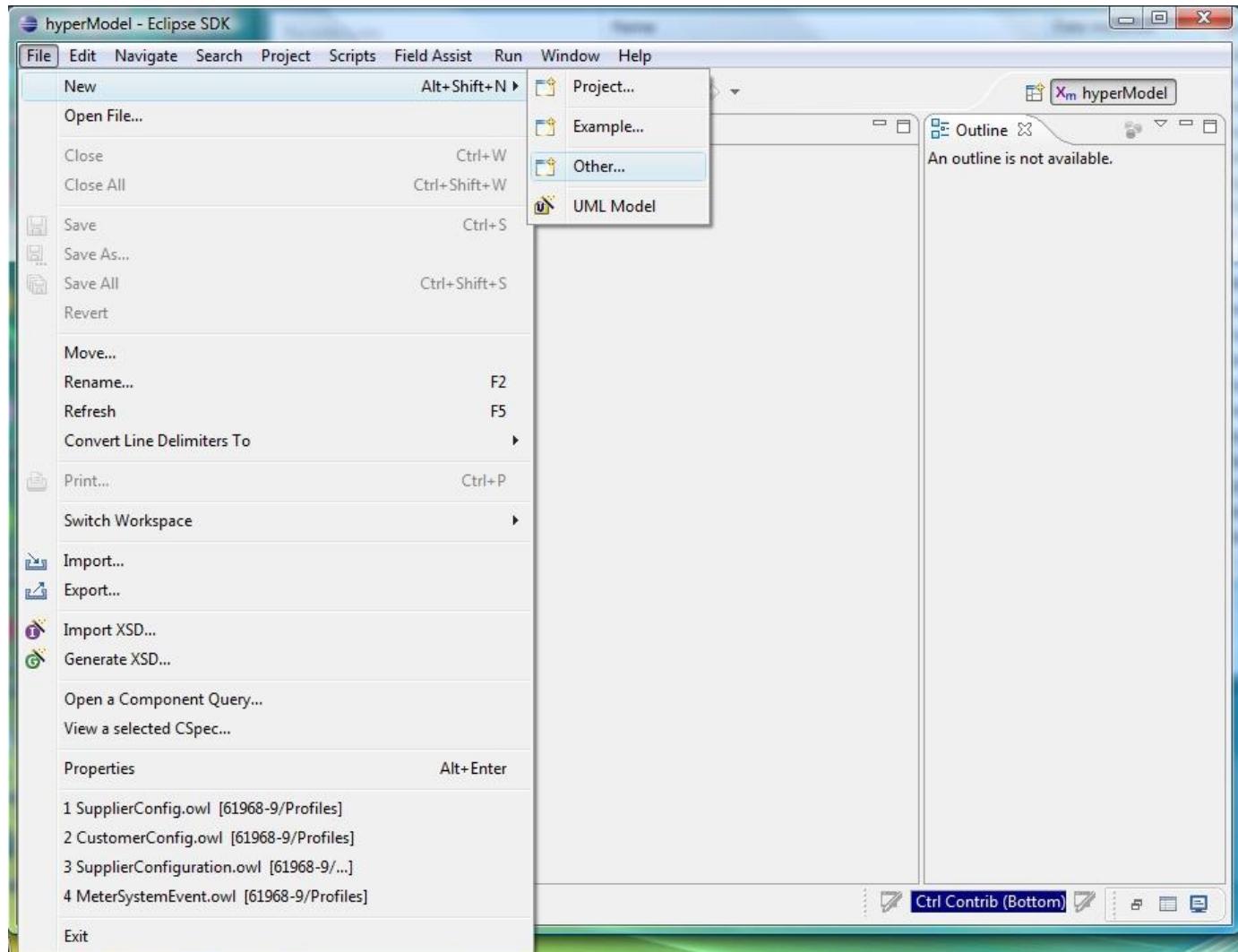
# Creating a New Profile

- There are four ways to create a new profile:
  1. Create it from scratch within CIMTool
  2. Import an OWL profile previously constructed using CIMTool
  3. Import the profile from a data dictionary spreadsheet
  4. Copy and paste an existing profile within CIMTool
- Once created, profiles are stored in the ‘Profiles’ folder of the project
- A project may have many profiles
- Each profile will have a namespace
- The following slides describe the creation of a new profile using the edit capabilities within CIMTool

# Creating a New Profile

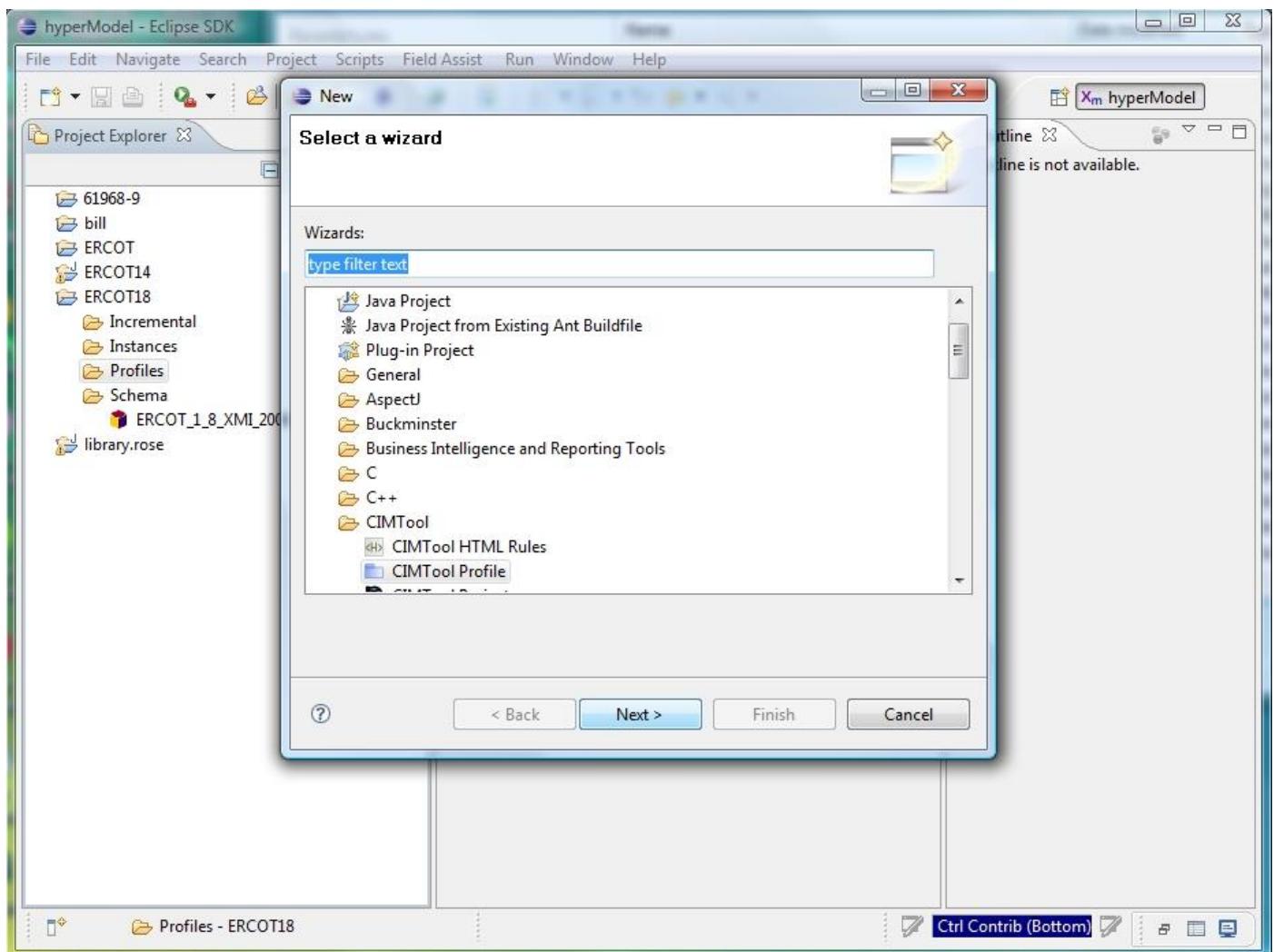
1. Select  
'File >  
New >  
Other  
,

...



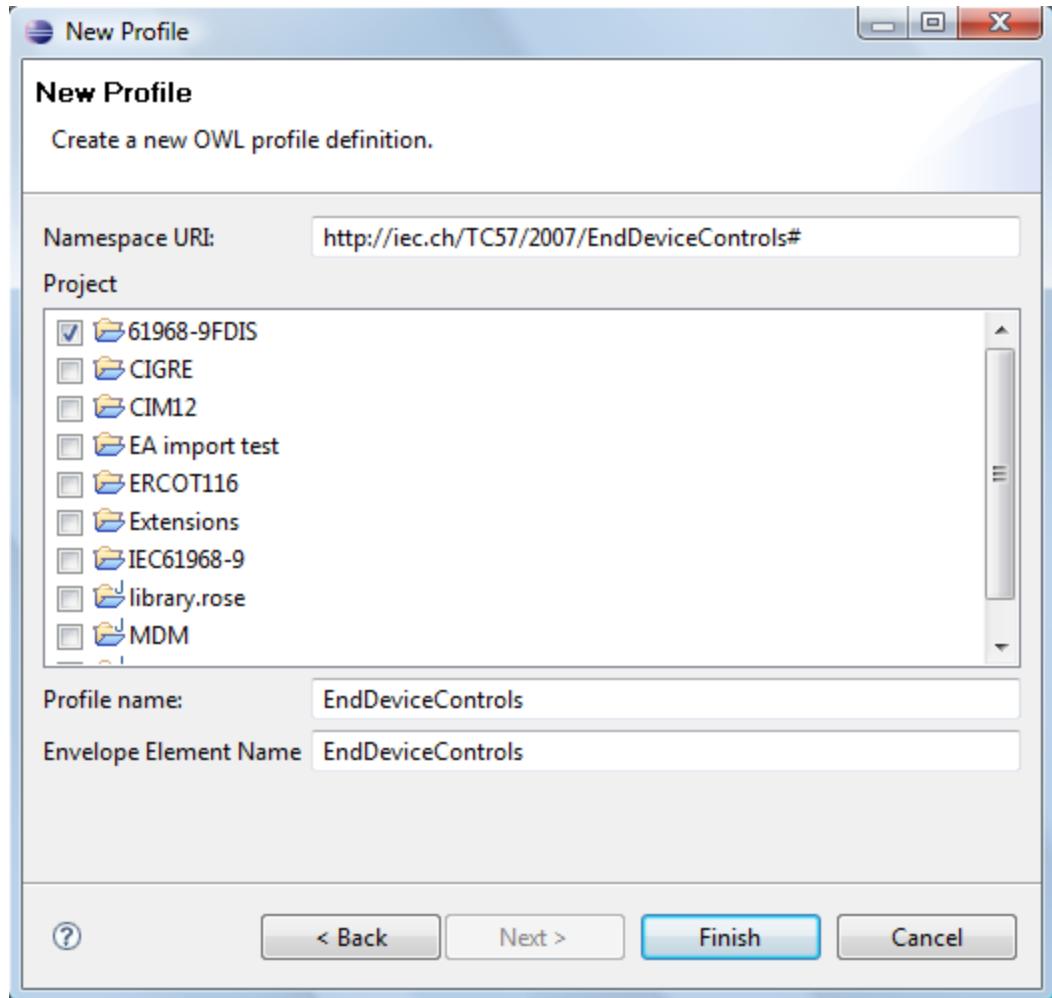
# Creating a New Profile

1. Select 'CIMTool Profile' option
2. Click 'Next'



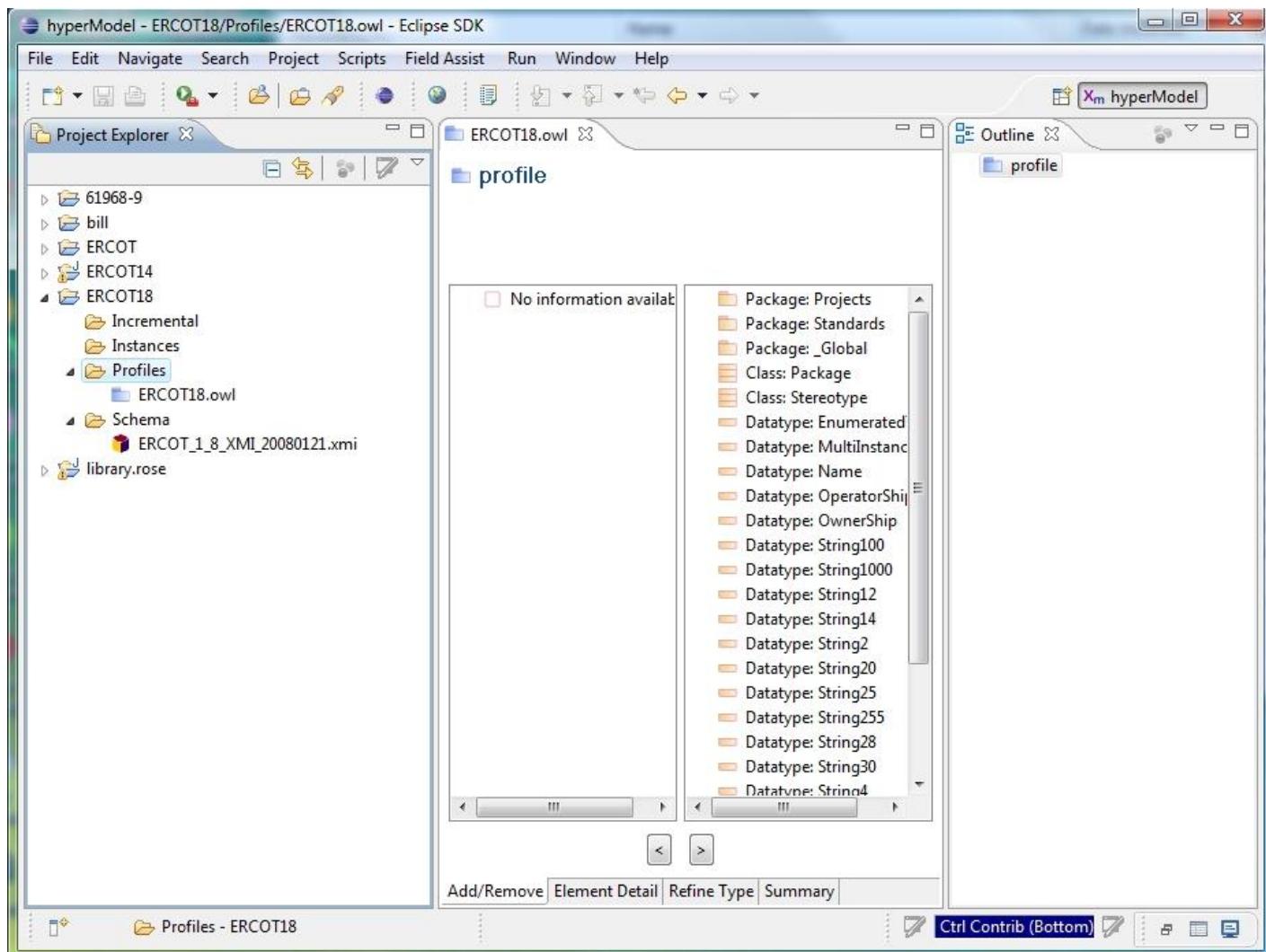
# Creating a New Profile

- Click on checkbox for the desired project
- Determine a unique name for the profile that will not conflict with other profile names, then using the name:
  - Set the profile name
  - Set namespace URI
  - Set envelope element name
- Click ‘Finish’



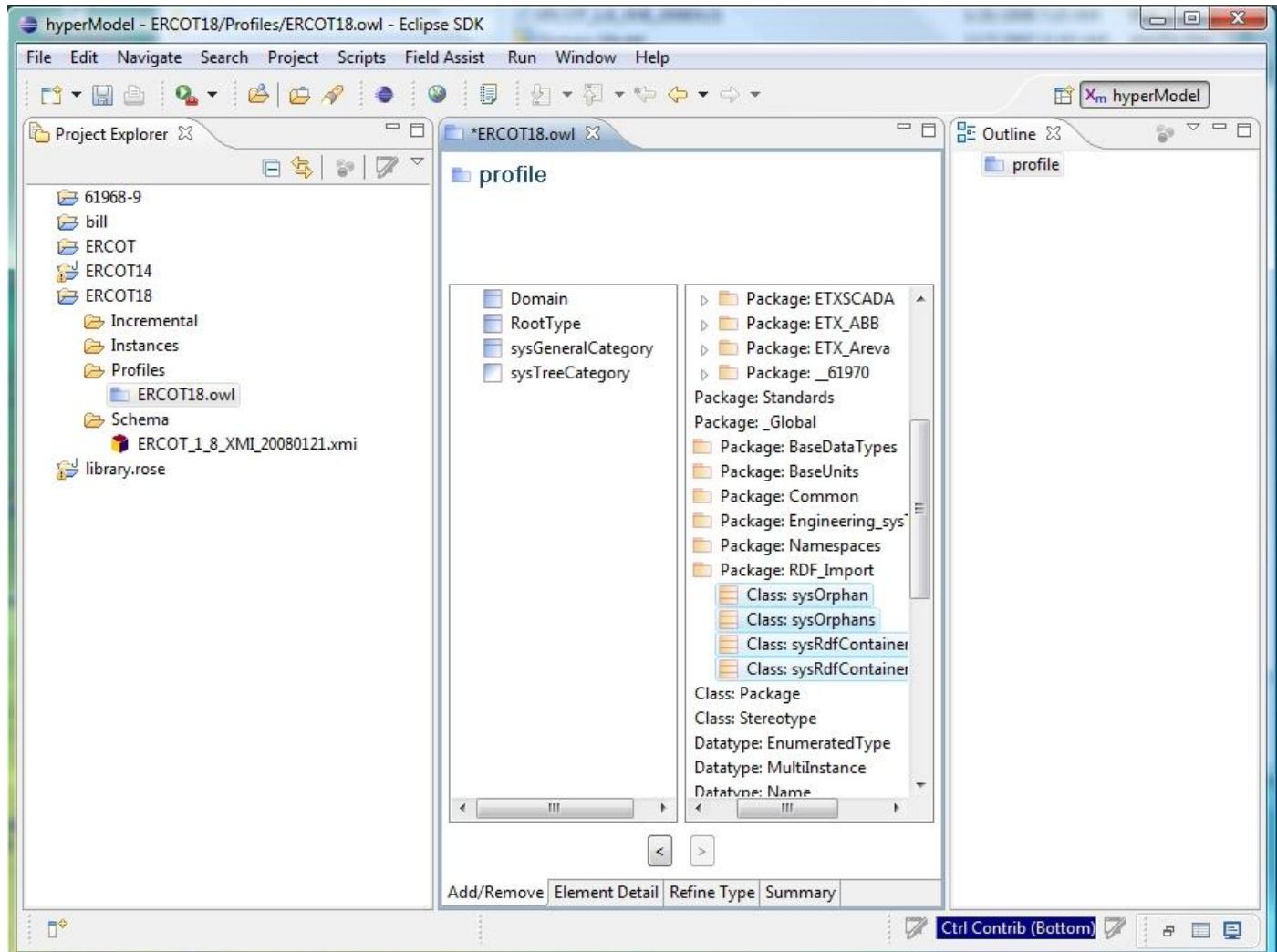
# Browsing the Project

- Click on arrows in Project Explorer to expand folders
- Double click on the .owl profile file name in the to open it
- Click on the profile name in the Outline window
- In the Project Explorer frame you can always right click on a file name to see options



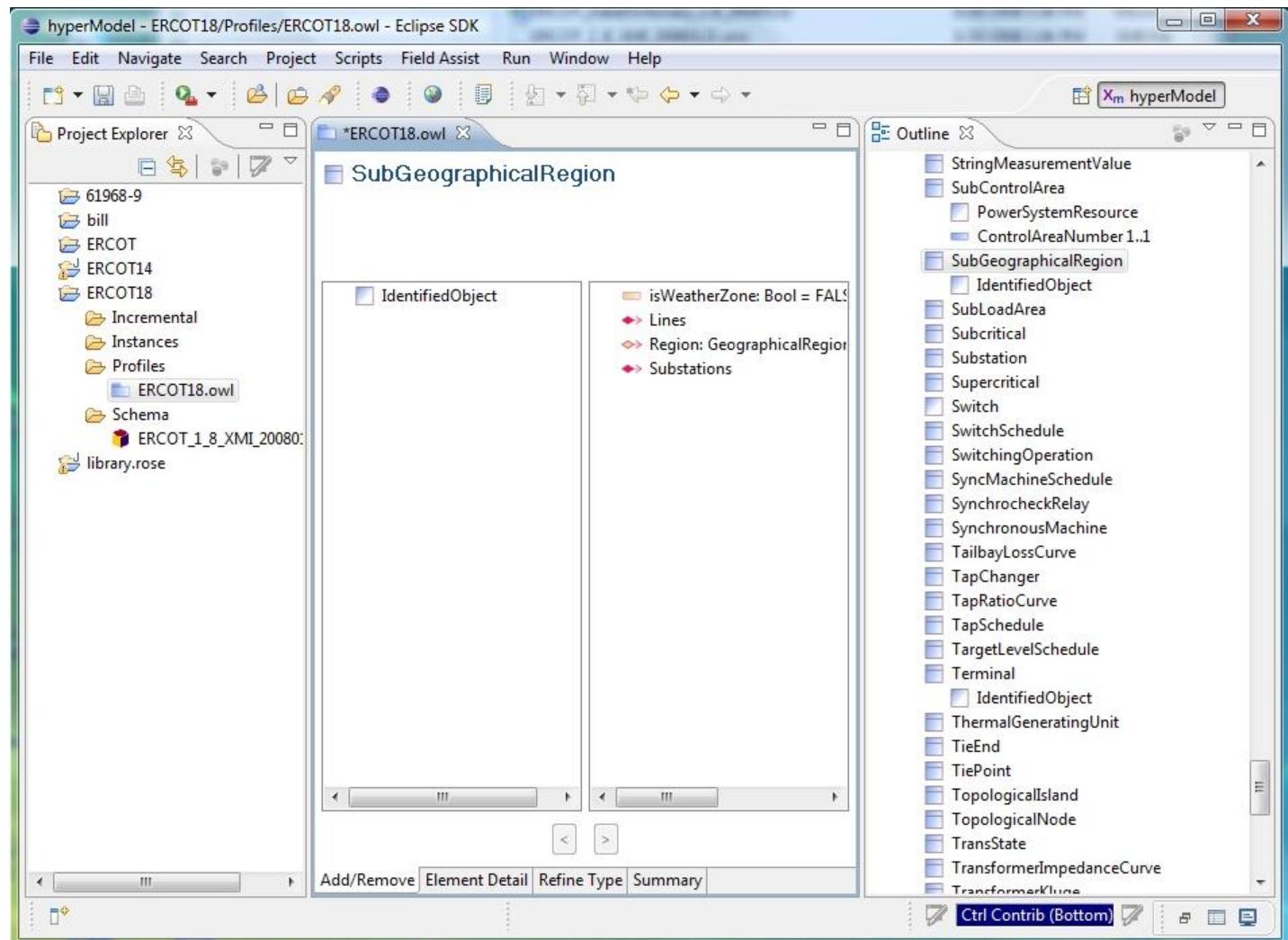
# Adding Classes to Profile

- Browse through model on the right side of Add/Remove tab
- Select one or more classes on right side Add/remove tab
- Classes are moved by clicking on <



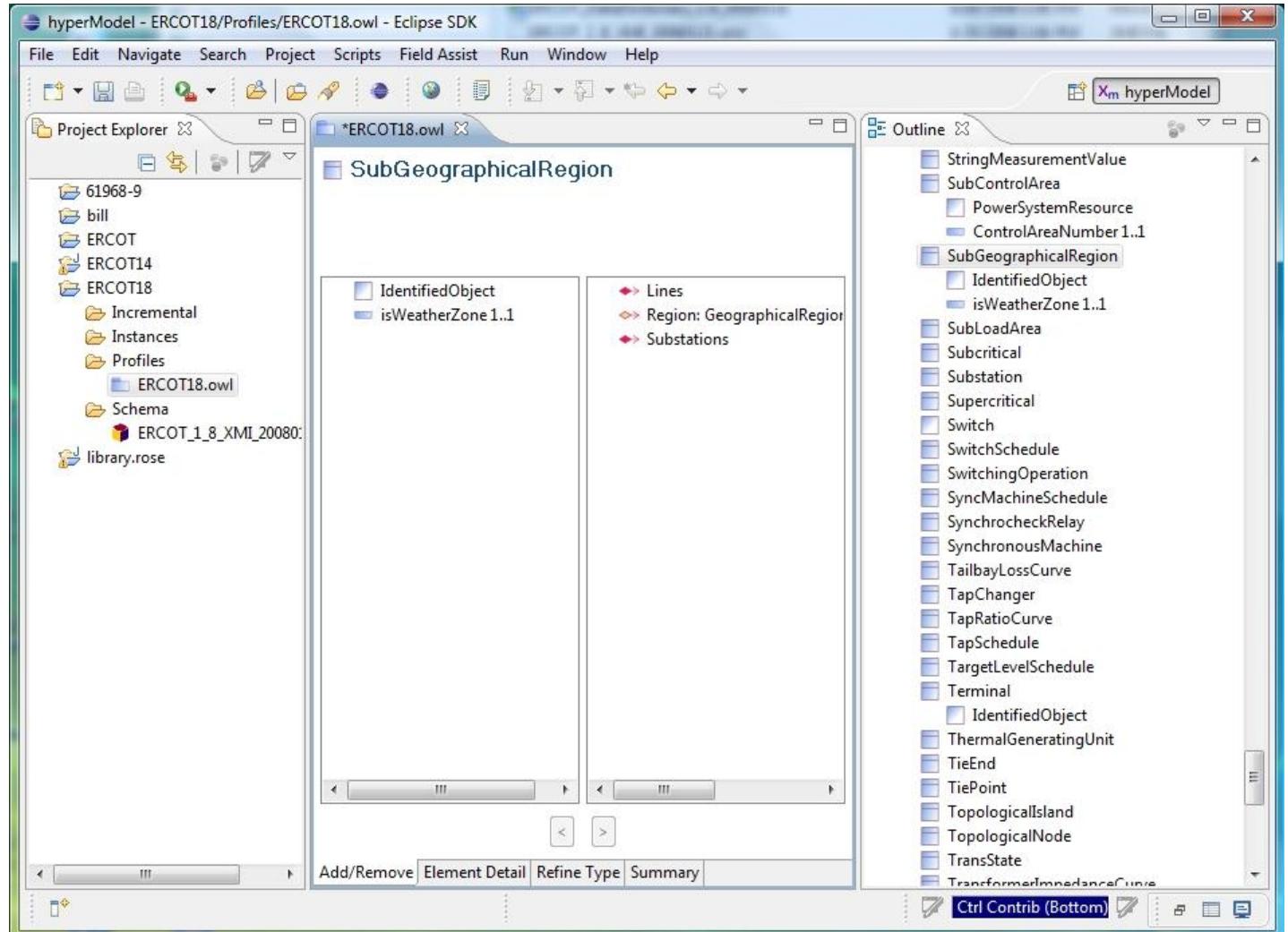
# Adding a Property to Profile

- Click on a class in the Outline
- Properties are shown on the right side of the Profile Add/Remove tab
- Click on property name on right side
- Click on ‘<’ to move property to left side



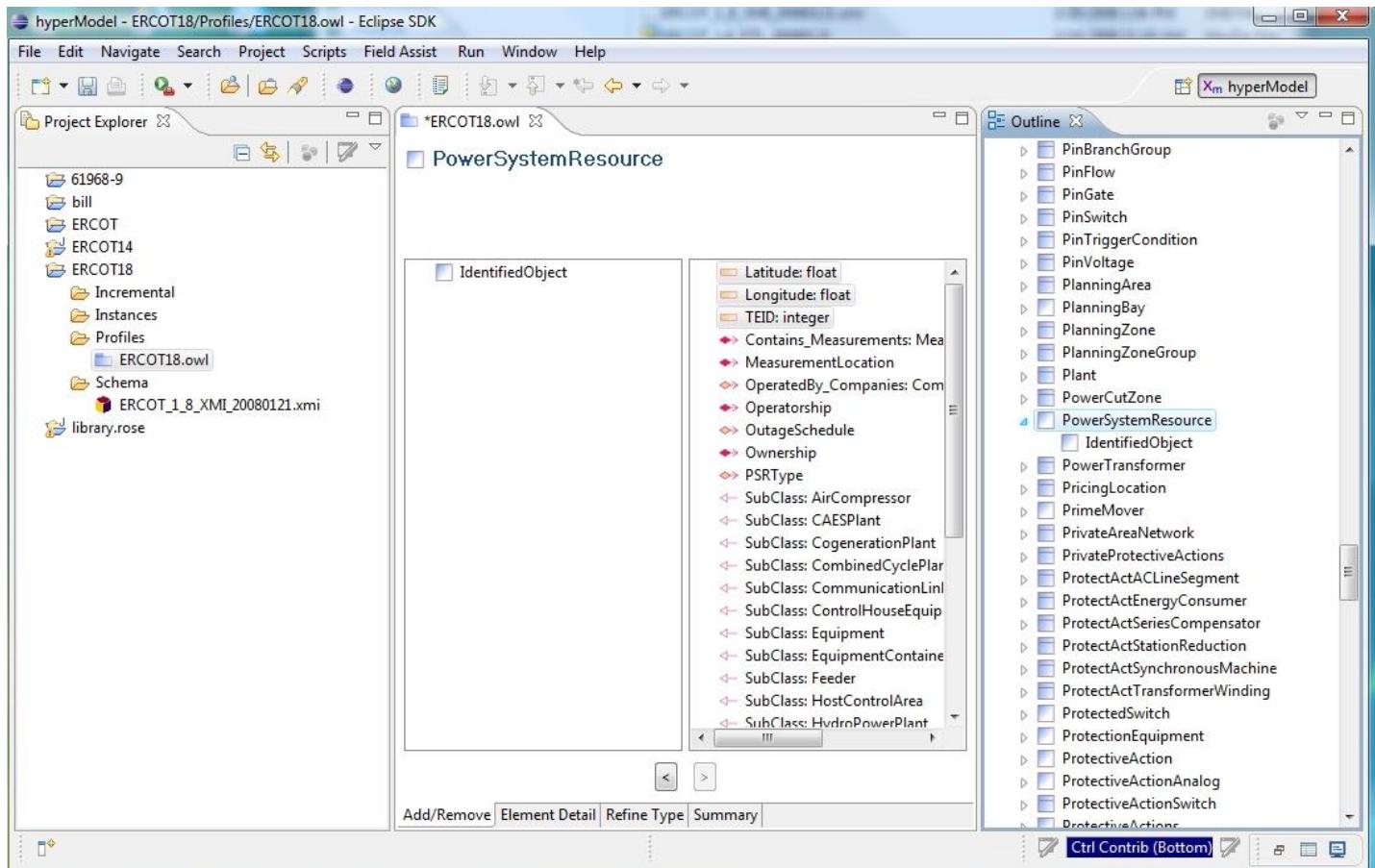
# View After Adding a Property to profile

- New profile property is seen on Outline view and the left side of the Add/Remove tab
- You can remove properties by using the > button



# Adding Properties to Profile

- Can move more than one property at a time



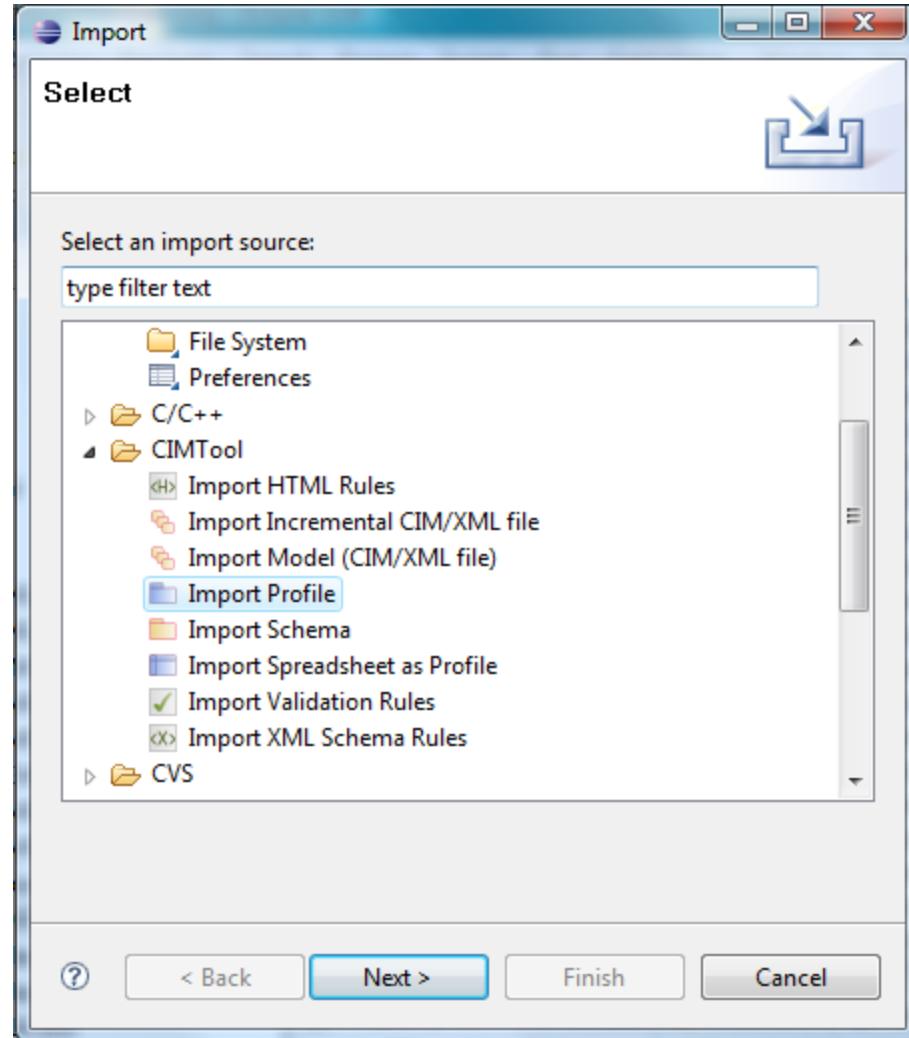
# Importing A Profile

# Importing a Profile

- Sometimes it is desirable to use another profile definition as a starting point for a profile definition
- CIMTool saves profile definitions in an OWL format
- Profile definitions from another project or workspace can be imported to create new profiles

# Importing Profiles into CIMTool

- Select ‘File > Import’
- ***Note the different import options under CIMTool***
- On ‘Import’ dialog select ‘CIMTool – Import Profile’ option
- Check the project to import into
- Browse to find the file to import
- Click ‘Next’



# Importing a Profile from Data Dictionary

# Importing Profiles

- Some products can generate a Data Dictionary in the form of an Excel spreadsheet
- The spreadsheet can define one or more profiles
- Note that the spreadsheet can be maintained independently of any particular product
- The Data Dictionary defines the classes, attributes and relationships that comprise one or more profiles
- This can be imported into CIMTool to define a profile

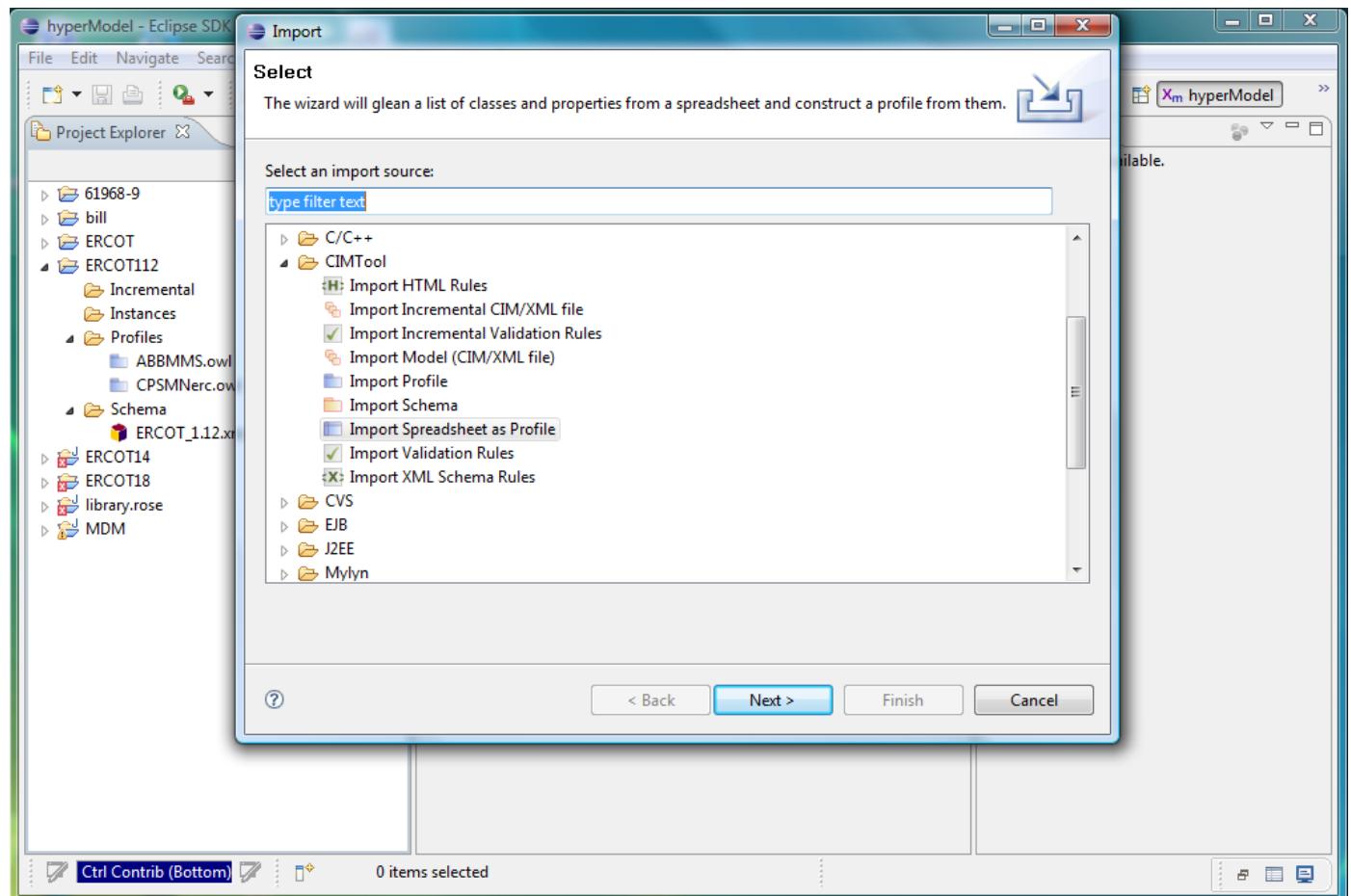
# Data Dictionary

- An Excel spreadsheet that describes the contents of one or more profiles
- Tabs exist for Classes, Attributes, Associations, Data types, Enumerations and Units

A	C	D	E	F
56 CIMProduction	EmissionCurve	Curve; IdentifiedObject	cim	Relationship between the unit's emission rate in units of m
57 CIMProduction	FossilFuel	IdentifiedObject	cim	The fossil fuel consumed by the non-nuclear thermal gene
58 CIMProduction	FuelAllocationSchedule	Curve; IdentifiedObject	cim	The amount of fuel of a given type which is allocated for co
59 CIMProduction	GenUnitOpCostCurve	Curve; IdentifiedObject	cim	Relationship between unit operating cost in.
60 CIMProduction	HeatInputCurve	Curve; IdentifiedObject	cim	Relationship between unit heat input in MBtu per hour for
61 CIMProduction	HeatRateCurve	Curve; IdentifiedObject	cim	Relationship between unit heat rate in MBtu/hour per MW
62 CIMProduction	HydroGeneratingEfficiencyCurve	Curve; IdentifiedObject	cim	Relationship between unit efficiency in percent and unit ou
63 CIMProduction	HydroPump	PowerSystemResource; IdentifiedObject	cim	A synchronous motor-driven pump, typically associated w
64 CIMProduction	HydroPumpOpSchedule	RegularIntervalSchedule; BasicInterv	cim	The hydro pump's Operator-approved current operating sc
65 CIMProduction	IncrementalHeatRateCurve	Curve; IdentifiedObject	cim	Relationship between unit incremental heat rate in (delta I
66 CIMProduction	PenstockLossCurve	Curve; IdentifiedObject	cim	Relationship between penstock head loss (in meters) and
67 CIMProduction	ShutdownCurve	Curve; IdentifiedObject	cim	Relationship between the rate in gross MW/minute (Y-axi
68 CIMProduction	StartIgnFuelCurve	Curve; IdentifiedObject	cim	The quantity of ignition fuel (Y-axis) used to restart and re
69 CIMProduction	StartMainFuelCurve	Curve; IdentifiedObject	cim	The quantity of main fuel (Y-axis) used to restart and repa
70 CIMProduction	StartRampCurve	Curve; IdentifiedObject	cim	Rate in gross MW/minute (Y-axis) at which a unit can be
71 CIMProduction	InflowForecast	RegularIntervalSchedule; BasicInterv	cim	Natural water inflow to a reservoir, usually forecasted from
72 CIMGenerationDynam	PrimeMover	PowerSystemResource; IdentifiedObject	cim	The machine used to develop mechanical energy used to
73 CIMGenerationDynam	CombustionTurbine	PrimeMover; PowerSystemResour	cim	A prime mover that is typically fueled by gas or light oil.
74 CIMGenerationDynam	SteamSupply	PowerSystemResource; IdentifiedObject	cim	Steam supply for steam turbine.
75 CIMGenerationDynam	SteamTurbine	PrimeMover; PowerSystemResour	cim	Steam turbine
76 CIMGenerationDynam	HydroTurbine	PrimeMover; PowerSystemResour	cim	A water driven prime mover. Typical turbine types are: Fra
77 CIMGenerationDynam	Supercritical	FossilSteamSupply; SteamSupply	cim	Once-through supercritical boiler.
78 CIMGenerationDynam	Subcritical	FossilSteamSupply; SteamSupply	cim	Once-through subcritical boiler.
79 CIMGenerationDynam	DrumBoiler	FossilSteamSupply; SteamSupply	cim	Drum boiler.
80 CIMGenerationDynam	FossilSteamSupply	SteamSupply; PowerSystemReso	cim	Fossil fueled boiler (e.g., coal, oil, gas)
81 CIMGenerationDynam	PWRSteamSupply	SteamSupply; PowerSystemReso	cim	Pressurized water reactor used as a steam supply to a st
82 CIMGenerationDynam	BWRSteamSupply	SteamSupply; PowerSystemReso	cim	Boiling water reactor used as a steam supply to a steam
83 CIMGenerationDynam	CTTEMPMWCurve	Domain	cim	Relationship between the combustion turbine's power outp
84 CIMGenerationDynam	HeatRecoveryBoiler	FossilSteamSupply; SteamSupply	cim	The heat recovery system associated with combustion tur

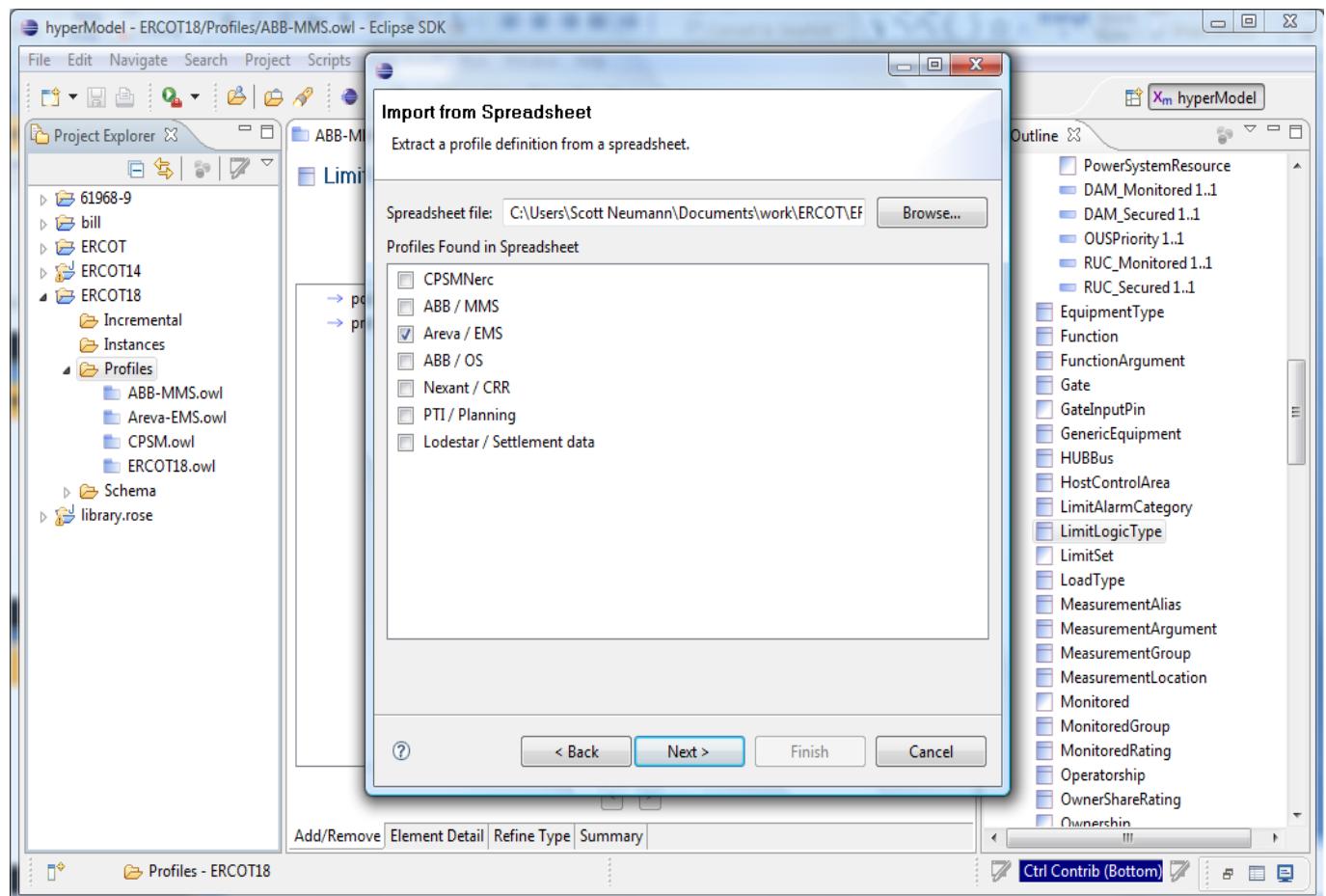
# Importing Spreadsheet

- Can import the Data Dictionary spreadsheet as a profile
- File>Import
- Select ‘Import Spreadsheet as Profile’ option



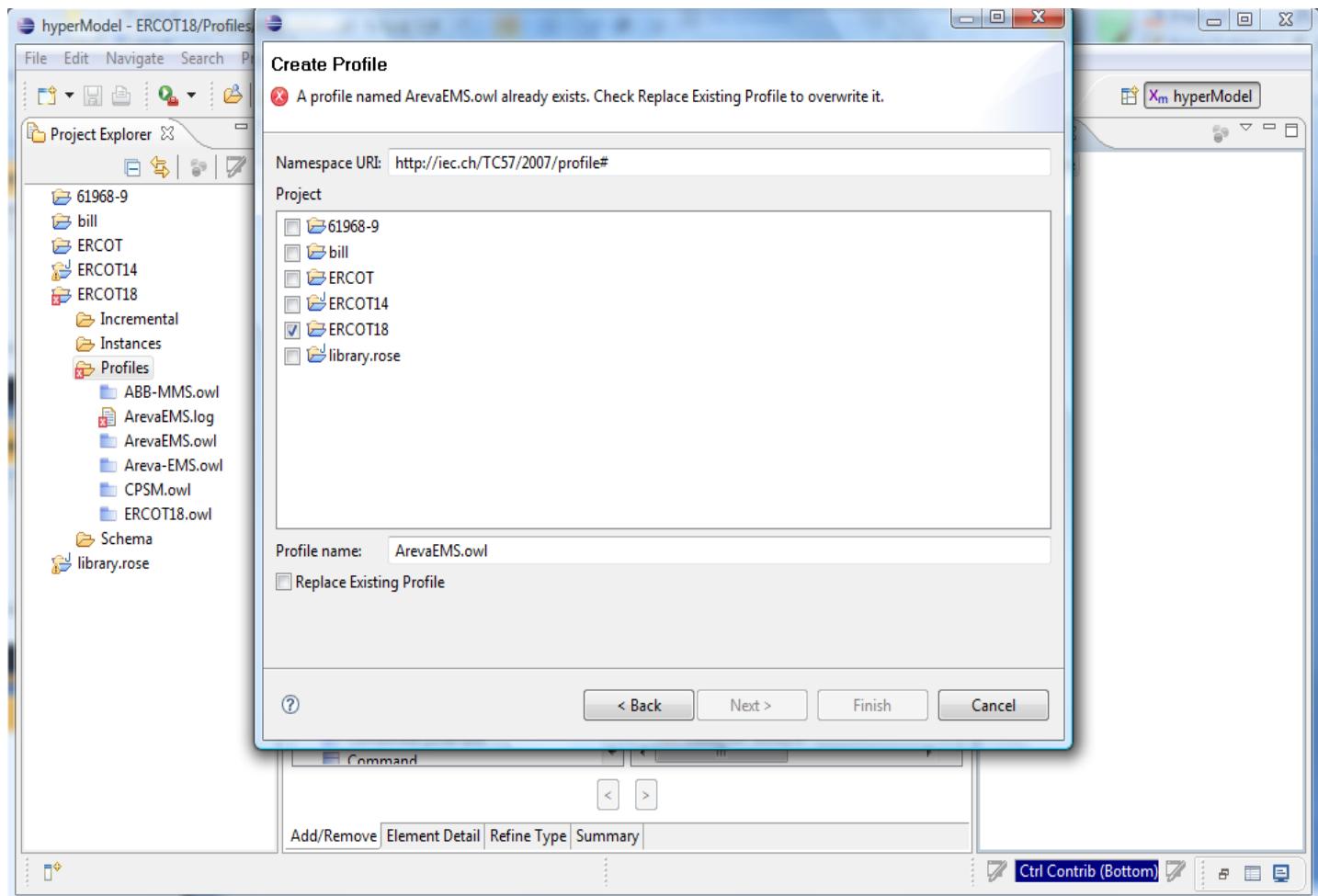
# Importing Spreadsheet

- The spreadsheet may identify one or more profiles
- Can select which profiles to construct
- Can only construct one at a time



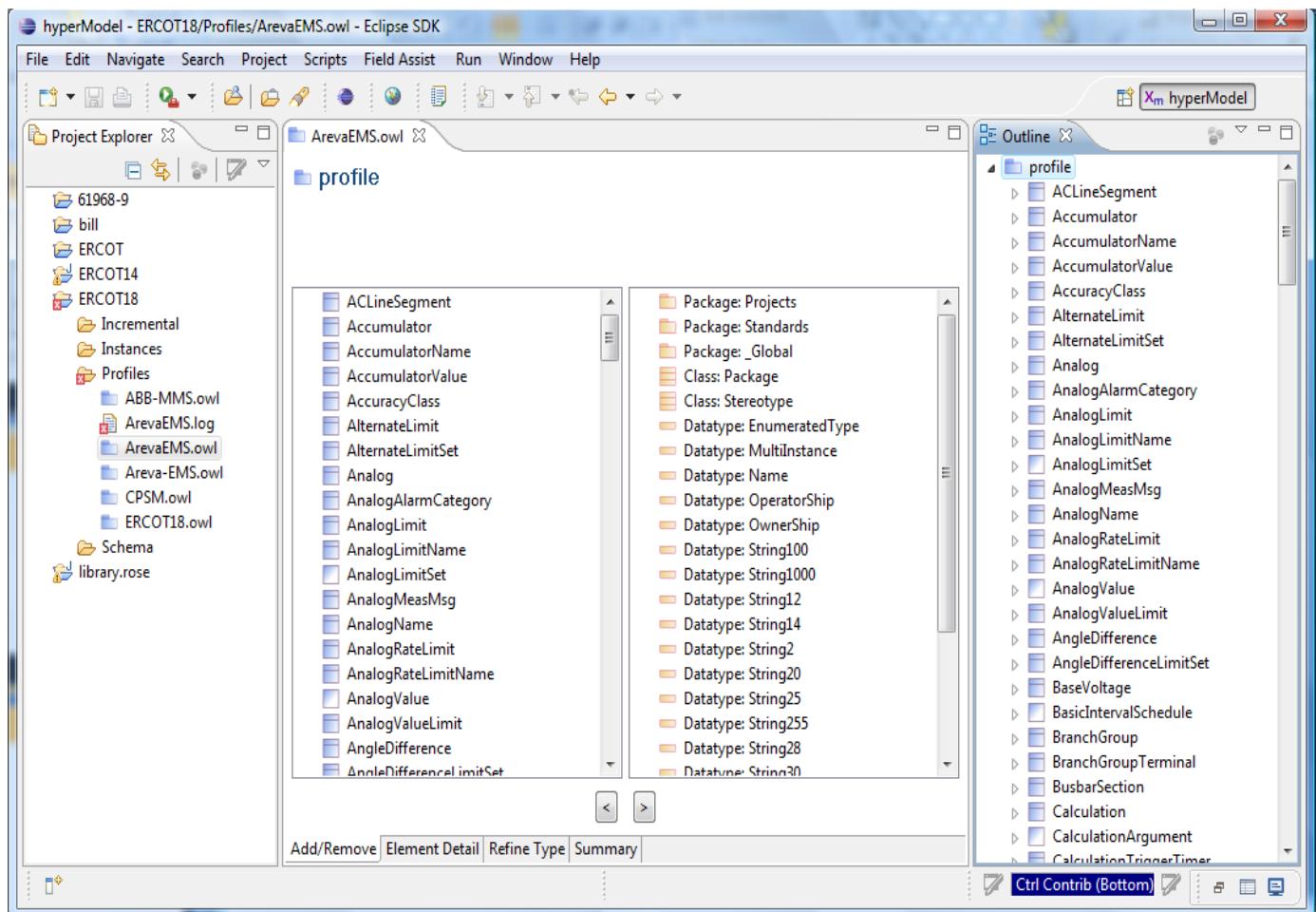
# Importing Spreadsheet

- Need to identify the project in which the profile will be created
- The name of the profile is set by default, but can be modified



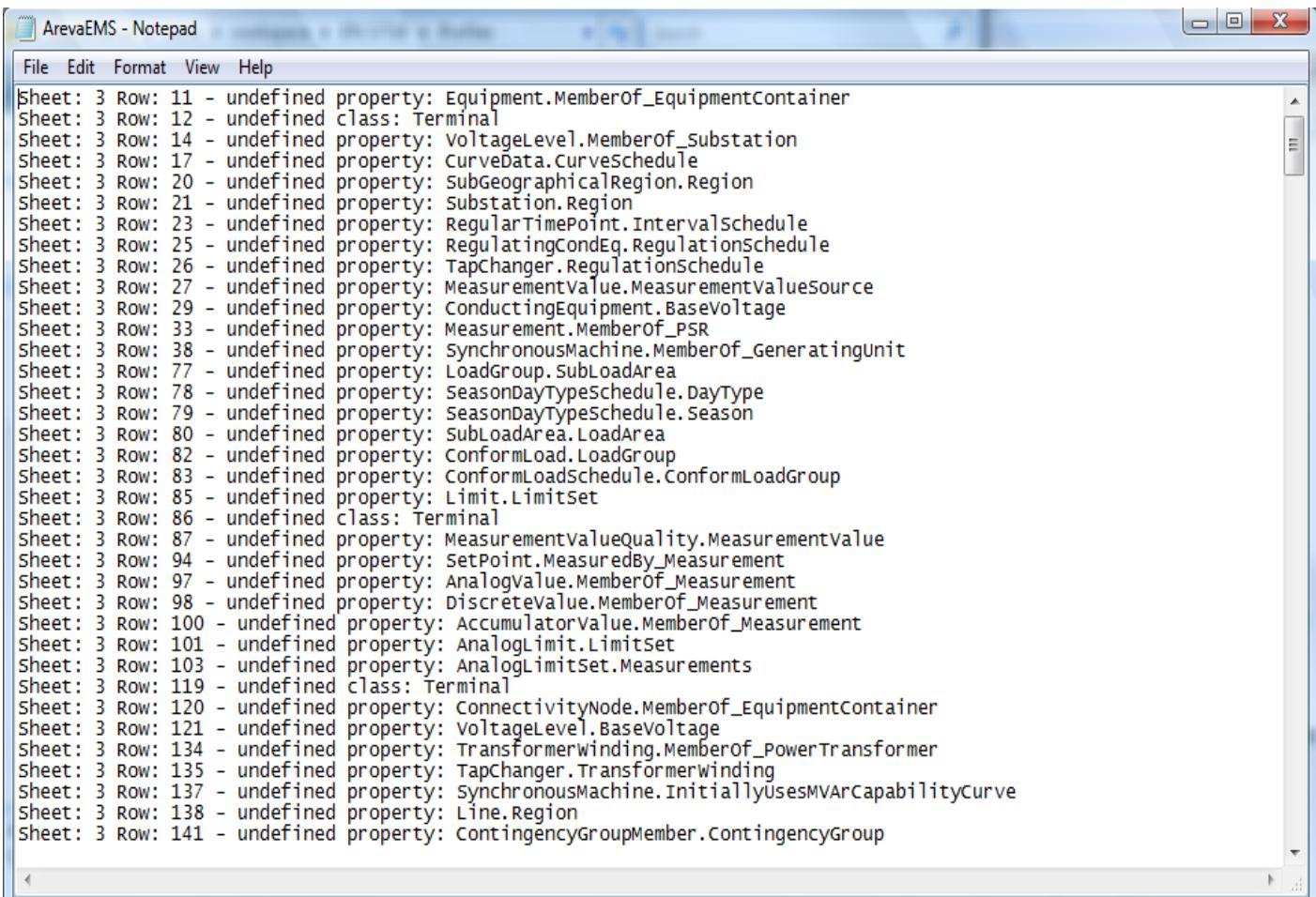
# Importing Spreadsheet

- New profile (.owl file) is created if there are no fatal errors
- A log file is created that identifies any errors



# Importing Spreadsheet

- A log file (.log) is generated with the profile to identify errors, if any
- The log file identifies what could not be found for inclusion into the profile definition



The screenshot shows a Windows Notepad window with the title "ArevaEMS - Notepad". The menu bar includes File, Edit, Format, View, and Help. The main content area displays a log file with numerous entries, each consisting of "Sheet: 3 Row: <number> - undefined <property>" followed by the class name or measurement value. The log entries are as follows:

```
Sheet: 3 Row: 11 - undefined property: Equipment.MemberOf_EquipmentContainer
Sheet: 3 Row: 12 - undefined class: Terminal
Sheet: 3 Row: 14 - undefined property: VoltageLevel.MemberOf_Substation
Sheet: 3 Row: 17 - undefined property: CurveData.Curveschedule
Sheet: 3 Row: 20 - undefined property: SubGeographicalRegion.Region
Sheet: 3 Row: 21 - undefined property: Substation.Region
Sheet: 3 Row: 23 - undefined property: RegularTimePoint.Intervalschedule
Sheet: 3 Row: 25 - undefined property: RegulatingCondEq.Regulationschedule
Sheet: 3 Row: 26 - undefined property: TapChanger.Regulationschedule
Sheet: 3 Row: 27 - undefined property: MeasurementValue.Measurementvaluesource
Sheet: 3 Row: 29 - undefined property: ConductingEquipment.BaseVoltage
Sheet: 3 Row: 33 - undefined property: Measurement.Memberof_PSR
Sheet: 3 Row: 38 - undefined property: SynchronousMachine.MemberOf_Generatingunit
Sheet: 3 Row: 77 - undefined property: LoadGroup.SubLoadArea
Sheet: 3 Row: 78 - undefined property: SeasonDayTypeschedule.DayType
Sheet: 3 Row: 79 - undefined property: SeasonDayTypeschedule.Season
Sheet: 3 Row: 80 - undefined property: SubLoadArea.LoadArea
Sheet: 3 Row: 82 - undefined property: ConformLoad.LoadGroup
Sheet: 3 Row: 83 - undefined property: ConformLoadschedule.ConformLoadGroup
Sheet: 3 Row: 85 - undefined property: Limit.Limitset
Sheet: 3 Row: 86 - undefined class: Terminal
Sheet: 3 Row: 87 - undefined property: MeasurementValuequality.Measurementvalue
Sheet: 3 Row: 94 - undefined property: SetPoint.MeasuredBy_Measurement
Sheet: 3 Row: 97 - undefined property: AnalogValue.MemberOf_Measurement
Sheet: 3 Row: 98 - undefined property: Discretevalue.Memberof_Measurement
Sheet: 3 Row: 100 - undefined property: AccumulatorValue.Memberof_Measurement
Sheet: 3 Row: 101 - undefined property: AnalogLimit.Limitset
Sheet: 3 Row: 103 - undefined property: Analoglimitset.Measurements
Sheet: 3 Row: 119 - undefined class: Terminal
Sheet: 3 Row: 120 - undefined property: ConnectivityNode.MemberOf_EquipmentContainer
Sheet: 3 Row: 121 - undefined property: VoltageLevel.BaseVoltage
Sheet: 3 Row: 134 - undefined property: Transformerwinding.Memberof_PowerTransformer
Sheet: 3 Row: 135 - undefined property: Tapchanger.Transformerwinding
Sheet: 3 Row: 137 - undefined property: SynchronousMachine.InitiallyusesMVarCapabilitycurve
Sheet: 3 Row: 138 - undefined property: Line.Region
Sheet: 3 Row: 141 - undefined property: ContingencyGroupMember.ContingencyGroup
```

# Extending the Spreadsheet

You can also create a new profile definition in the spreadsheet for import into CIMTool using the following steps:

1. Insert new profile columns into the ‘Classes’, ‘Attributes’ and ‘Associations’ tabs
2. Provide the same profile name on row one of each of the added columns
3. Set the value of each new cell to ‘TRUE’ or ‘FALSE’
4. Run the spreadsheet import process as described previously
5. Look for errors in the log file

# Creating a Profile Using the Copy/Paste Function

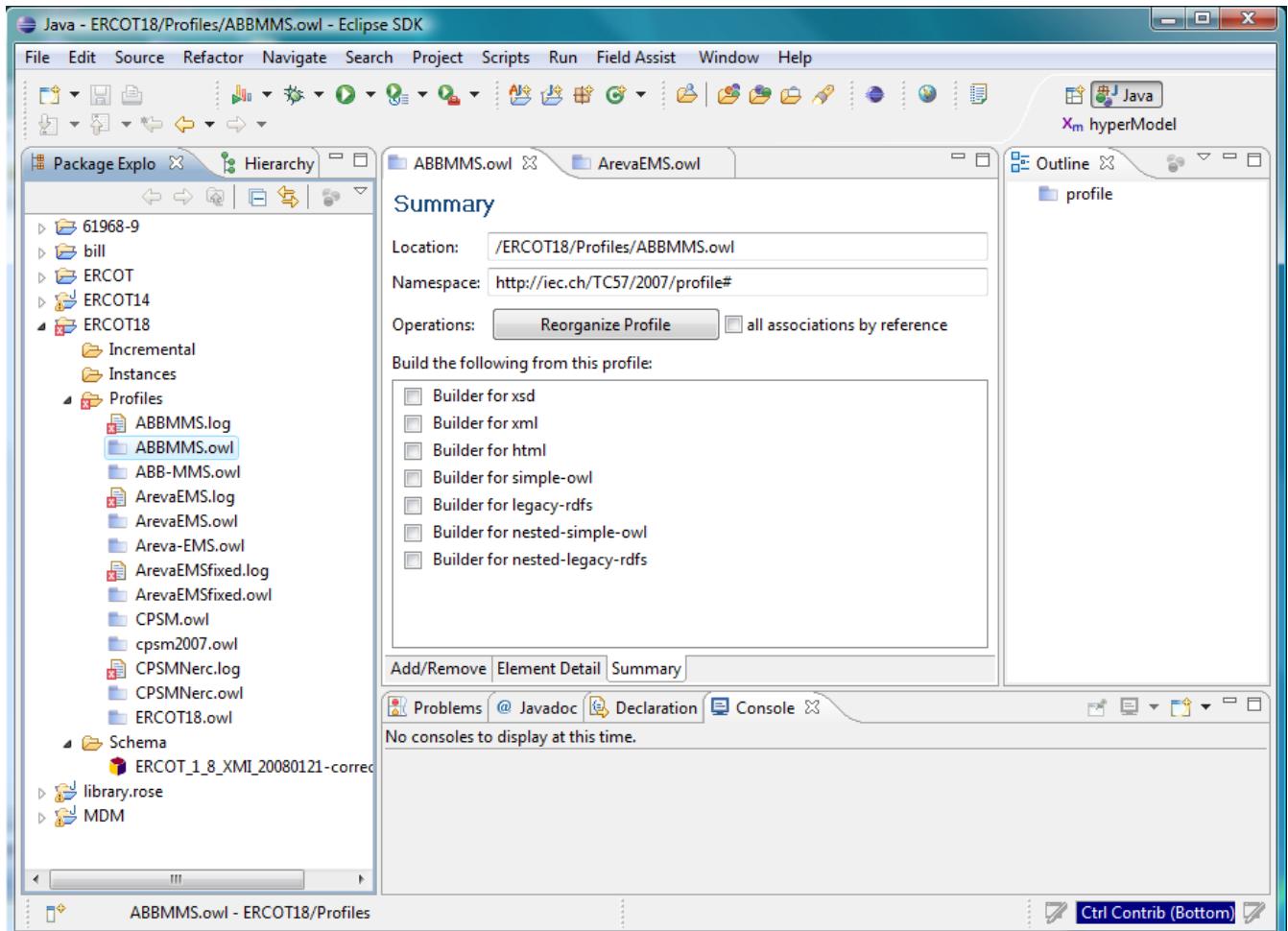
# Create a Profile Using Copy/Paste

- Select the Profile you wish to copy
- Right click on the .Owl file and select ‘Copy’
- Right click again and select ‘Paste’
- Enter the name of the new Profile to be created in the Dialog
- The set of Profile files will be generated
- Right click on the new .Owl file and select Properties
- Enter the new Profile namespace in the dialog
- *This method will be demonstrated after the presentation*

# Generating RDF Schemas

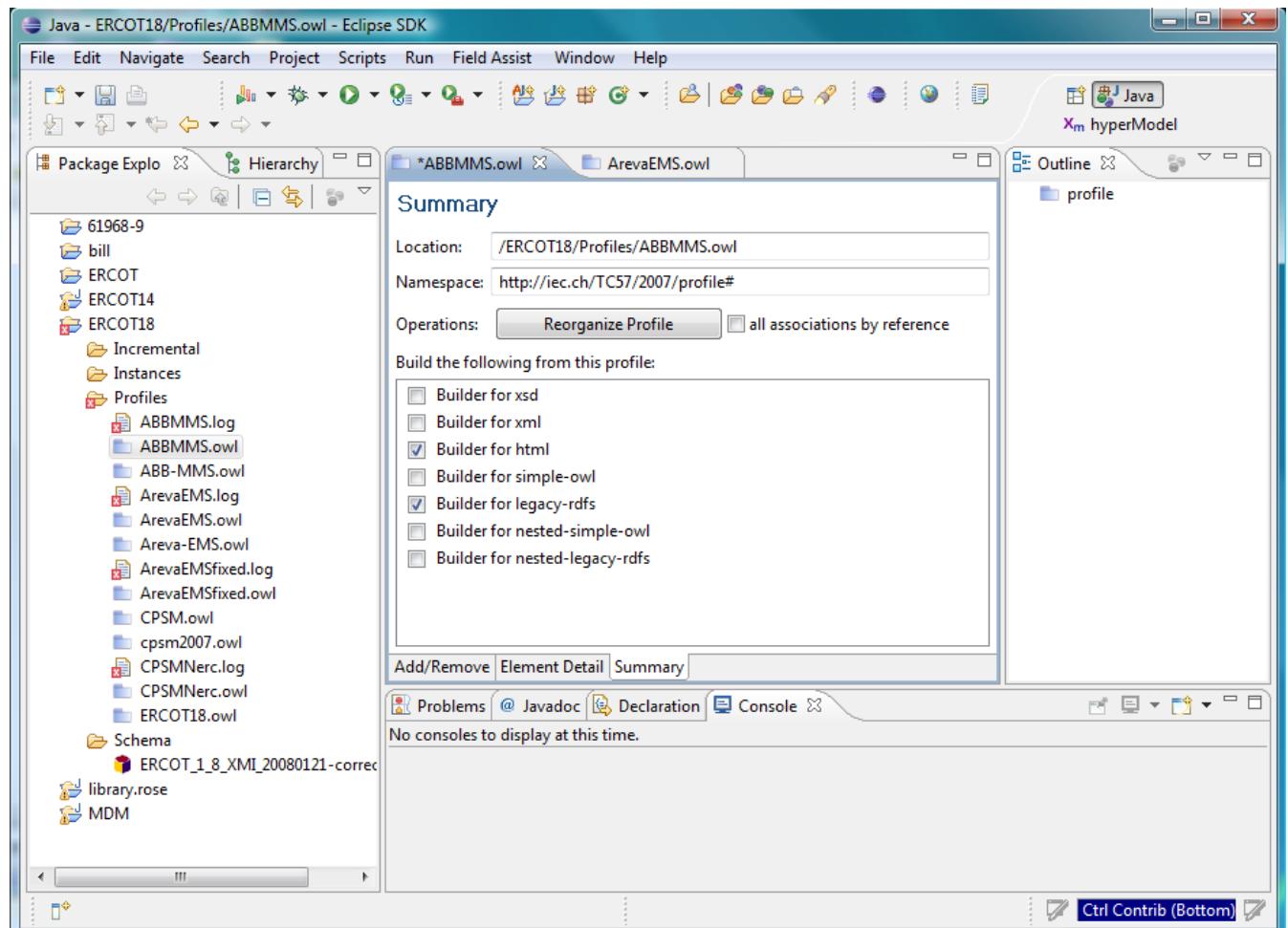
# Generating RDF Schemas

- Load the desired profile
- Select the ‘Summary’ tab



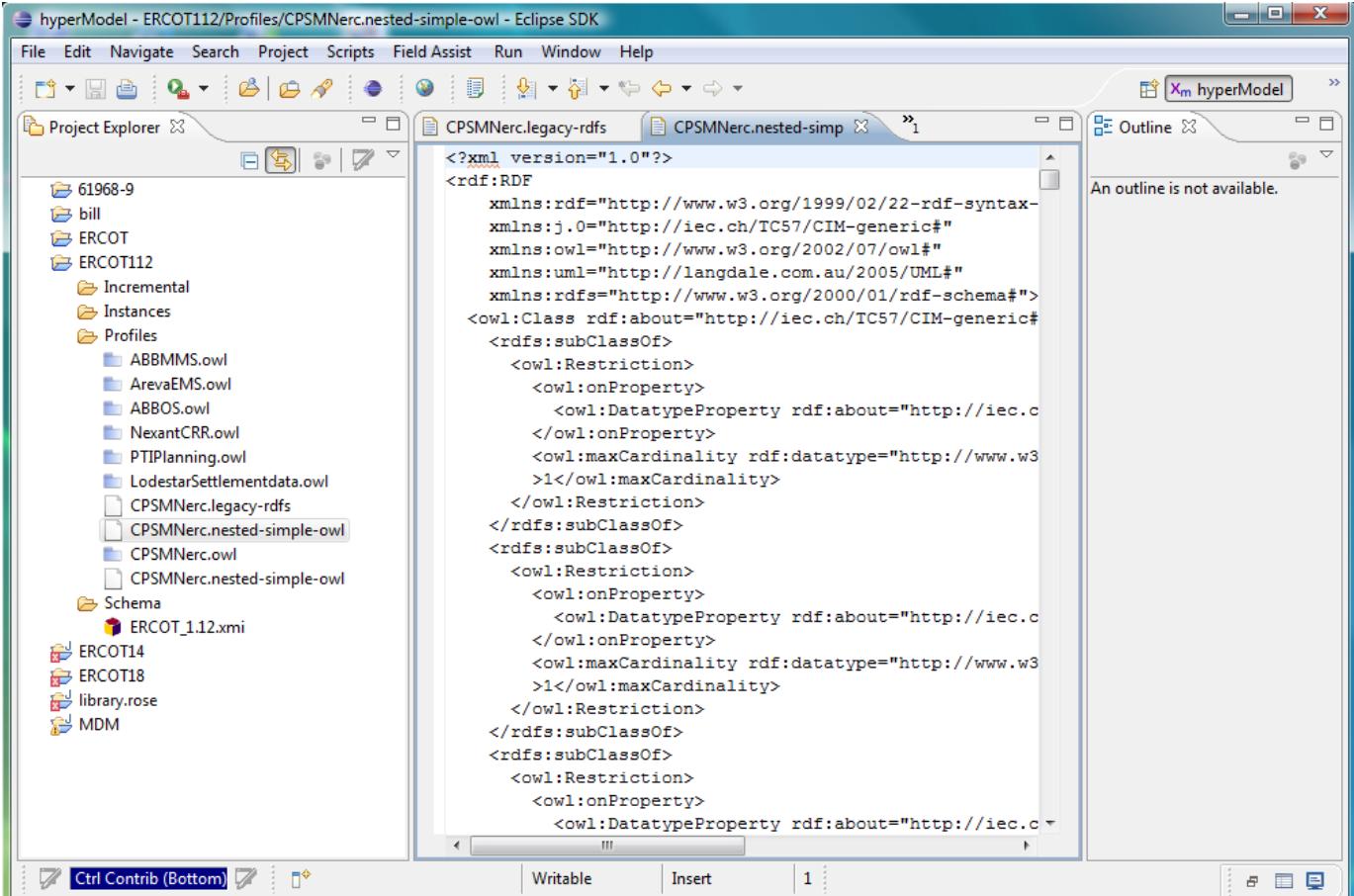
# Generating RDF Schemas

- Check ‘Builder for legacy-rdfs’
- Check any other desired builder options
- Click on ‘File>Save’



# Generated RDF Schema

- To view the actual RDFS, right click file name in Project Explorer
- Then select ‘Open With > Text Editor’ option



The screenshot shows the Eclipse IDE interface with the title bar "hyperModel - ERCOT112/Profiles/CPSMNerc.nested-simple-owl - Eclipse SDK". The menu bar includes File, Edit, Navigate, Search, Project, Scripts, Field Assist, Run, Window, and Help. The toolbar has various icons for file operations. The Project Explorer view on the left lists several projects and files, including "61968-9", "bill", "ERCOT", "ERCOT112" (which contains "Incremental", "Instances", and "Profiles" sub-folders with files like "ABBMMMS.owl", "ArevEMS.owl", etc.), "ERCOT14", "ERCOT18", "library.rose", and "MDM". The central editor area displays the XML code of the RDF schema:

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-
  xmlns:j:0="http://iec.ch/TC57/CIM-generic#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:uml="http://langdale.com.au/2005/UML#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
<owl:Class rdf:about="http://iec.ch/TC57/CIM-generic#>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="http://iec.c
    </owl:onProperty>
    <owl:maxCardinality rdf:datatype="http://www.w3
    >1</owl:maxCardinality>
  </owl:Restriction>
</rdfs:subClassOf>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="http://iec.c
    </owl:onProperty>
    <owl:maxCardinality rdf:datatype="http://www.w3
    >1</owl:maxCardinality>
  </owl:Restriction>
</rdfs:subClassOf>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="http://iec.c
    </owl:onProperty>
    <owl:maxCardinality rdf:datatype="http://www.w3
    >1</owl:maxCardinality>
  </owl:Restriction>
</rdfs:subClassOf>
```

# CIMTool Output Options

- CIMTool can generate several ‘styles’ of RDF or OWL as outputs for profile definitions, including:
  - Legacy RDFS (currently the most commonly used)
  - Legacy nested RDFS
  - Simple OWL
  - Simple nested OWL
- Examples of each style will be displayed upon request
- CIMTool can also generate XML Schemas and HTML as outputs
- Both the form of XSDs and HTML generated can be controlled by stylesheets

# HTML Documentation

- HTML option generates a single HTML file with description of all classes
- Hyperlinks allow navigation between class descriptions and type definitions

Profile Documentation - Windows Internet Explorer  
file:///F:/work/workspace/ERCOT18/Profiles/CPSMNerc.htm

## Concrete Class: TransformerWinding

A winding is associated with each defined terminal of a transformer (or phase shifter).

### Base Classes

[ConductingEquipment](#)

### Members

<b>b</b>	0..1 <a href="#">Susceptance</a>	Magnetizing branch susceptance (B mag).
<b>connectionType</b>	0..1 <a href="#">EnumWindingConnection</a>	The type of connection of the winding (e.g. Delta, Wye, zigzag).
<b>emergencyMVA</b>	0..1 <a href="#">ApparentPower</a>	The MVA that the winding can carry under emergency conditions.
<b>g</b>	0..1 <a href="#">Conductance</a>	Magnetizing branch conductance (G mag).
<b>grounded</b>	0..1 boolean	Set if the winding is grounded.
<b>insulationKV</b>	0..1 <a href="#">Voltage</a>	Basic insulation level voltage rating.
<b>r</b>	0..1 <a href="#">Resistance</a>	Positive sequence series resistance of the winding.
<b>r0</b>	0..1 <a href="#">Resistance</a>	Zero sequence series resistance of the winding.
<b>ratedKV</b>	0..1 <a href="#">Voltage</a>	The rated voltage (phase-to-ground) of the winding, usually the same as the neutral voltage.
<b>ratedMVA</b>	0..1 <a href="#">ApparentPower</a>	The normal rating, in MVA, for the winding.
<b>rground</b>	0..1 <a href="#">Resistance</a>	Ground resistance path through connected grounding transformer.
<b>shortTermMVA</b>	0..1 <a href="#">ApparentPower</a>	MVA that the winding can carry for a short period of time.
<b>windingType</b>	0..1 <a href="#">EnumWindingType</a>	The type of winding, i.e., Primary, Secondary, Tertiary, Quaternary.
<b>x</b>	0..1 <a href="#">Reactance</a>	Positive sequence series reactance of the winding.
<b>x0</b>	0..1 <a href="#">Reactance</a>	Zero sequence series reactance of the winding.
<b>xground</b>	0..1 <a href="#">Reactance</a>	Ground reactance path through connected grounding transformer.

Computer | Protected Mode: Off | 100%

# Importing a Model

# Importing a Model

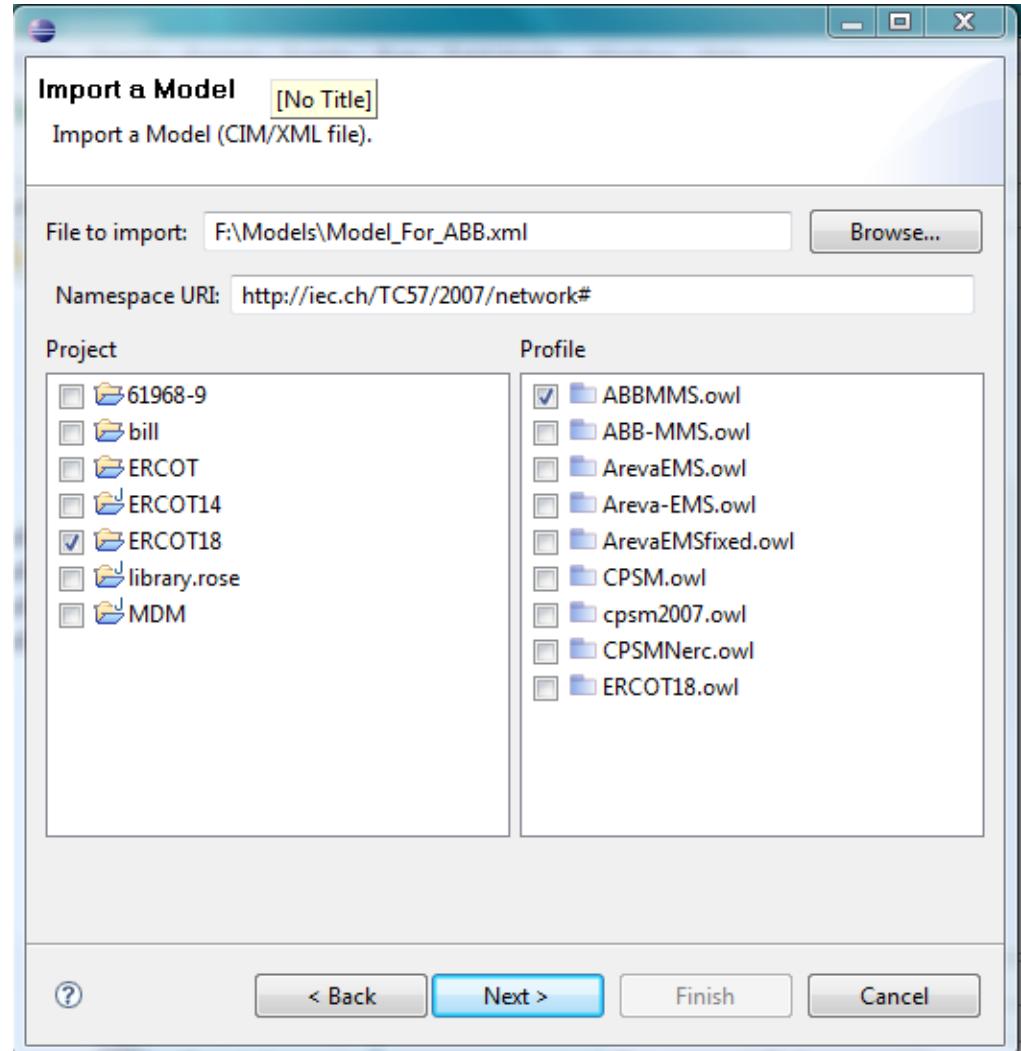
- In order to validate a model, it must first be imported
- Model files to be imported are in a CIM/XML RDF format with a .xml extension
- Model files can be very large, as much as 2GB in size
- The import process can take many minutes
- The resulting model is placed in the ‘Instances’ folder of the project

# Importing a Model

- Select 'File > Import'
- On 'Import' dialog select 'Import Model (CIM/XML file)' option
- Click 'Next'
- Check the project to import into
- Browse to find the file to import
- Select an appropriate profile
- Click 'Next'

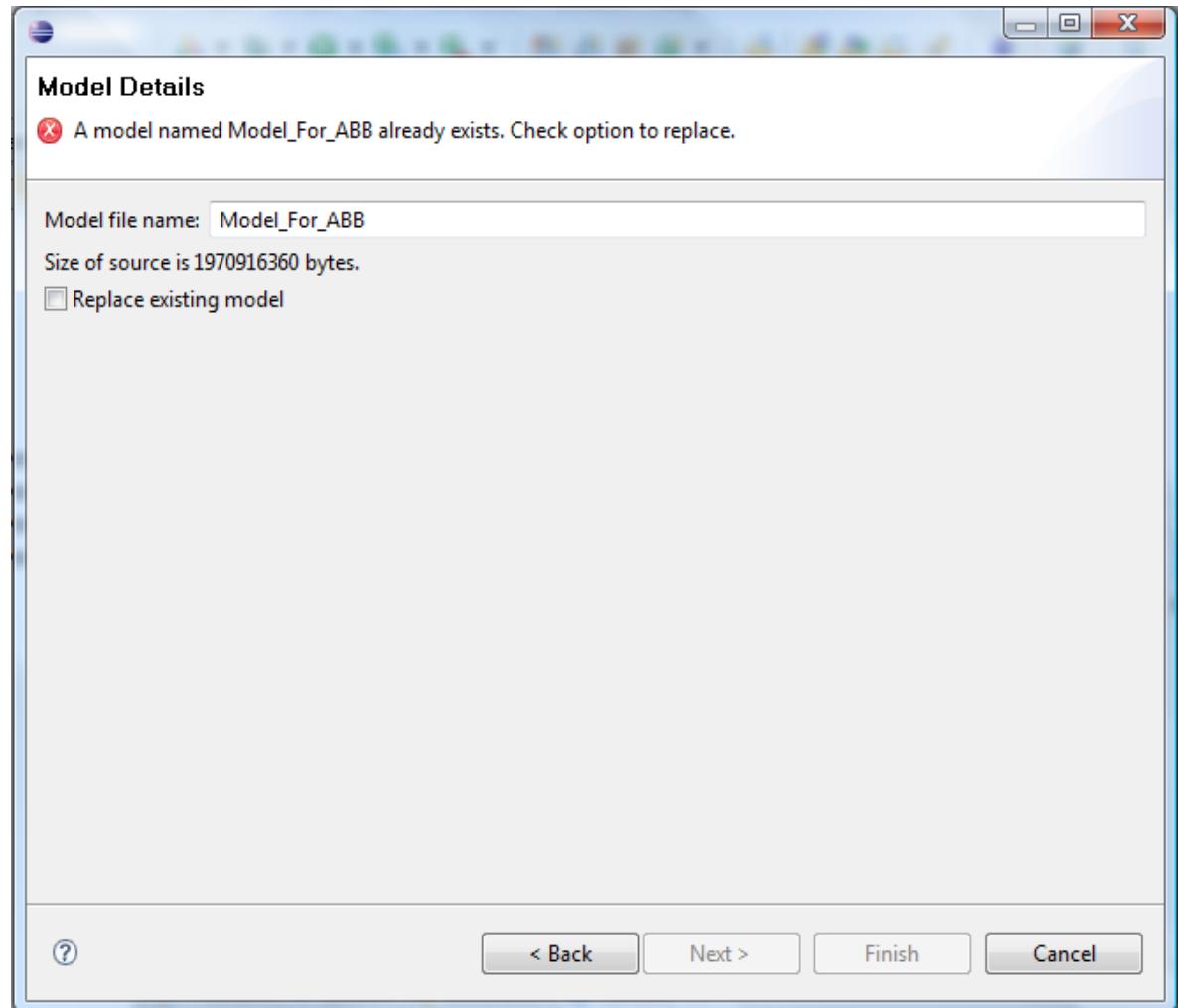
OR

- Select the Model Import ICON on the toolbar and complete the screen shown



# Importing a Model That Already Exists

- Change the file name if you wish to save to a different sub folder
- Check ‘Replace existing model’ if you wish to overwrite
- Click ‘Finish’
- Wait for the import to complete, as it may take several minutes (up to an hour for a very large model)
- Watch the progress icon at the bottom of CIMTool where it says ‘Importing model ...’



# Imported Model

- The imported RDF model is stored within the Instances folder of the project
- Errors are recorded in log files
- A folder is created to store the model in typically many smaller files that have a .ttl extension
- The .ttl files are in Terse RDF Triple Language format (more compact than CIM XML)

# Validating A Model

# Validating a Model

- Validation of the model occurs when a model is imported
- Errors are identified in log files in the ‘Instances’ folder of the project with a name in the form *<profile>.log*
- If errors exist, a diagnostic file is created which can be browsed
- CIMTool has a default set of validation rules, where the rule file is named *<profile>.split-rules*
- Rules can be edited and extended

# Example Validation Errors

- Undefined classes
- Undefined properties
- Instantiation of abstract classes
- Illegal cardinality on an association (e.g. more or less associations than expected)
- Range violation for a data item
- Illegal domain of a property
- Base voltages for conducting equipment connected at a connectivity node do not agree
- Isolated nodes
- Untyped objects
- Missing or extra terminal
- Duplicate properties
- Unexpected loop

# Browsing Diagnostic File

The screenshot shows the Eclipse hyperModel interface with the title bar "hyperModel - ERCOT114/Instances/abb7-generic.diagnostic - Eclipse SDK". The menu bar includes File, Edit, Navigate, Search, Project, Run, Window, and Help. The toolbar contains various icons for file operations. The left sidebar is the "Project Explorer" showing a tree structure of projects and files, including "CIM12", "EA import test", "ERCOT113", "ERCOT114" (selected), "IEC61968-9", "library.rose", and "MDM". The central area has two tabs: "ge3diff.diagnostic" and "abb7-generic.diagnos" (selected). The "abb7-generic.diagnos" tab displays a "Diagnostics" section with the following details:

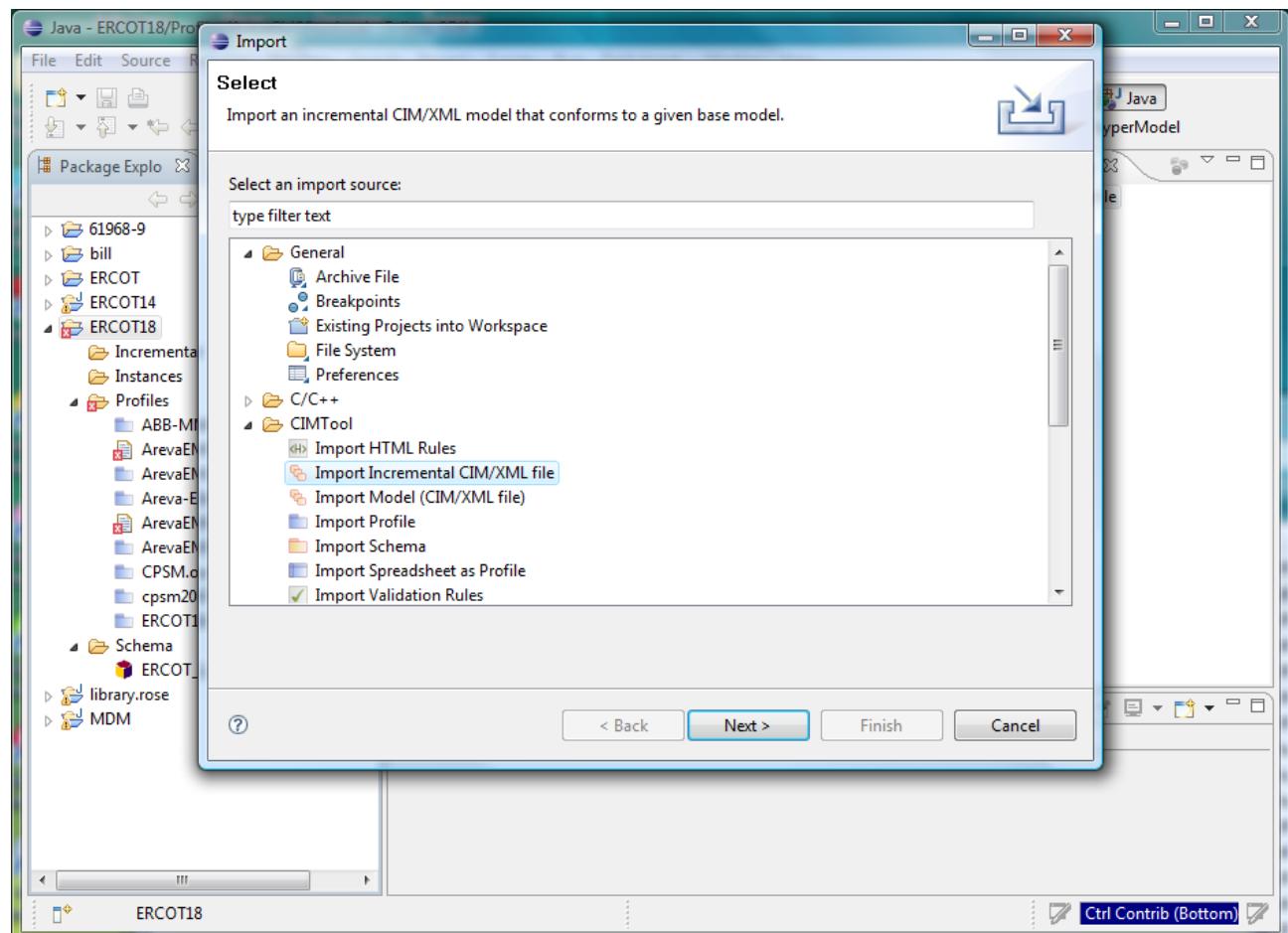
- Name: AnalogLimit.AnalogLimitName
- URI: <http://iec.ch/TC57/CIM-generic#AnalogLimit.AnalogLimitName>
- Minimum cardinality of Property CIM-generic:AnalogLimit.AnalogLimitName in class CIM-generic:AnalogLimit requires 1 value(s). Subject network: \_3319313 has less.

The right side features the "Outline" view which lists various CIM classes and their properties, such as AnalogLimit, AnalogValue, and GeneratingUnit.

# Importing and Validating an Incremental model

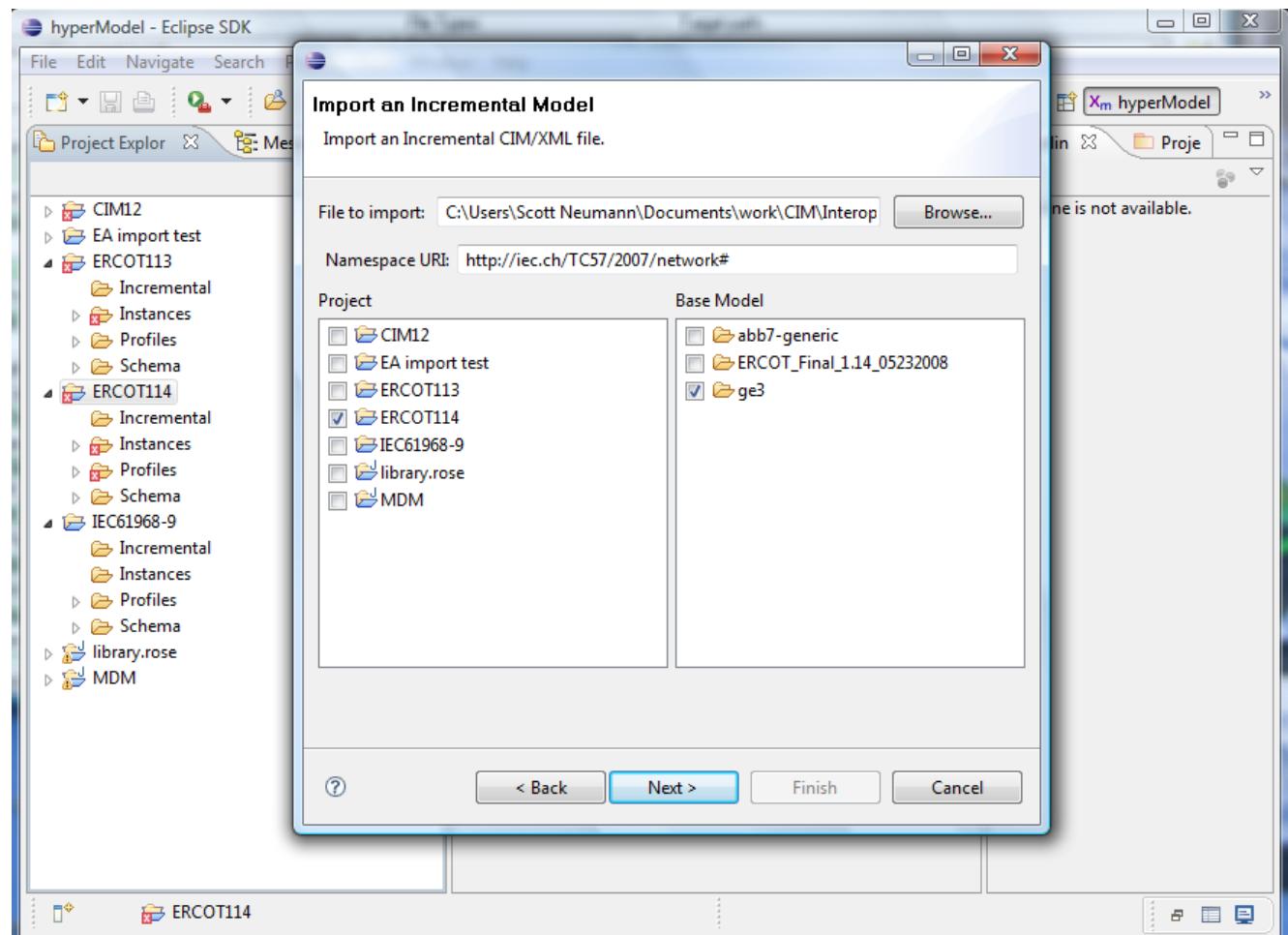
# Importing Incremental CIM/XML

- First step is to import an incremental CIM/XML file using File > Import and select CIMTool/Import Incremental CIM/XML file (or use the ToolBar ICON)



# Importing Incremental CIM/XML

- Must have imported a base instance model BEFORE attempting this
- Need to browse to select file
- Need to select the appropriate base model
- Errors will be reported in a log file



# Validating an Incremental Model

- Validation occurs when the model is imported
- Errors are identified in log files in the ‘Incremental’ folder of the project with a name in the form *<profile>.log*
- If errors exist, a diagnostic file is created which can be browsed

# Browsing Diagnostic File

The screenshot shows the Eclipse IDE interface with the following components:

- Project Explorer:** Shows the project structure. The **ge3diff.diagnostic** folder is selected.
- Diagnostic View:** Displays diagnostic information for the file **ge3diff.log**.
  - Diagnostics:** A section showing a warning:
    - Name: IdentifiedObject.name
    - URI: <http://iec.ch/TC57/2007/CIM-schema-cim12#IdentifiedObject.name>
    - Message: Undefined property CIM-schema-cim12:IdentifiedObject.name for GENS:WAPA2Station666
- Outline View:** Shows the hierarchical structure of diagnostic issues.
  - Conductor.r
    - Missing property
    - Undefined property
  - IdentifiedObject.aliasName
    - Undefined property
  - IdentifiedObject.description
    - Undefined property
  - IdentifiedObject.name
    - Undefined property
  - Substation
    - Undefined class
  - Substation.Region
    - Undefined property
  - Switch.normalOpen
    - Missing property
    - Undefined property
  - type
    - Missing property
- General Diagnostics**

# Updating A Schema

# Updating a Schema in CIMTool

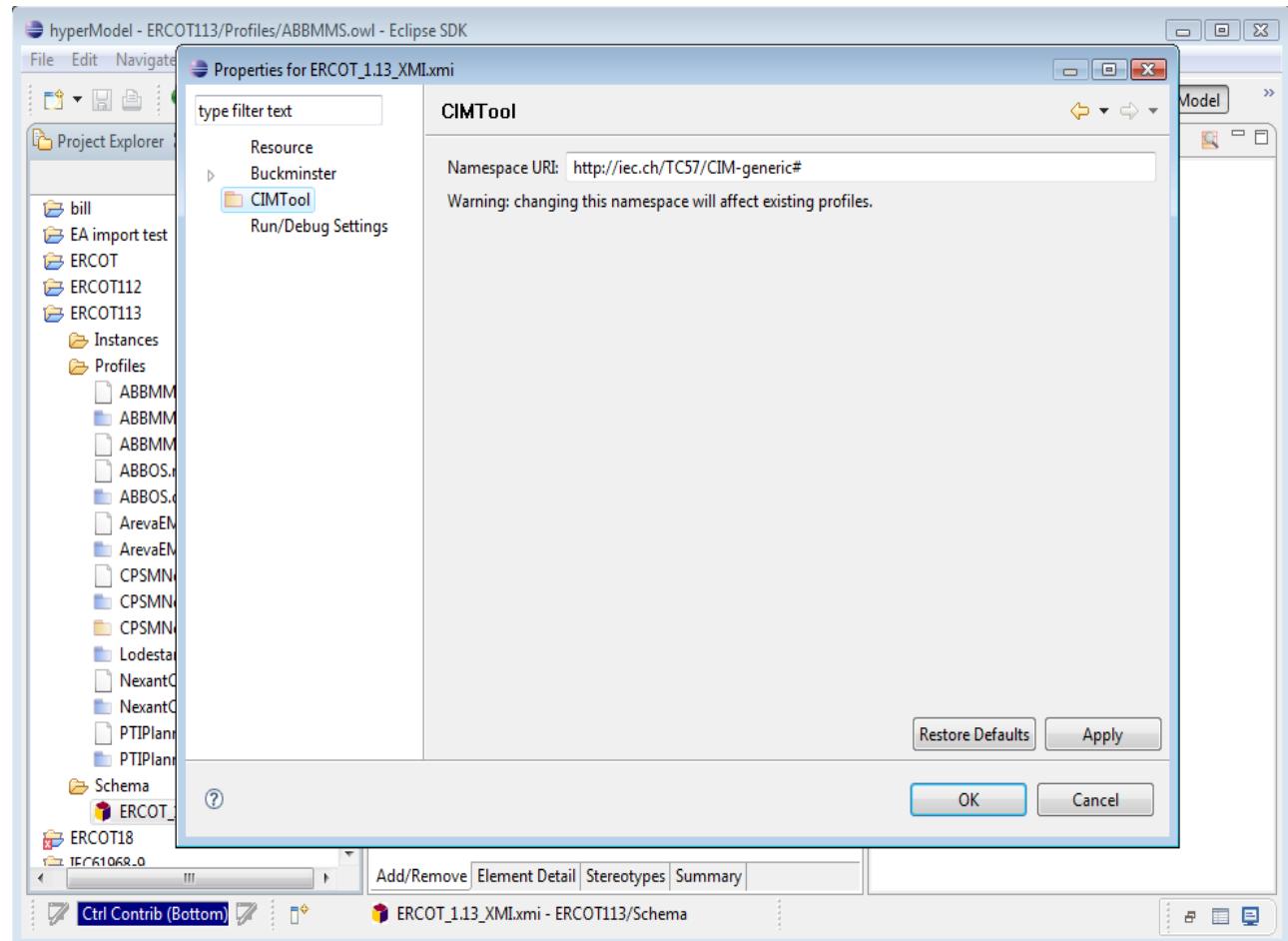
- From time to time, there may be updates to the UML model. These updates will result in a revised XMI file
- You should not directly replace a file in the CIMTool workspace directory
- You should instead, using CIMTool File menu options:
  1. Delete the old schema
  2. Import the new schema
- Be sure that the correct namespace is entered
- Profiles with errors will be flagged with a red X

# Namespaces

- A commonly used namespace is <http://iec.ch/TC57/CIM-generic#>
- If namespaces do not match between schema, profiles and the model files errors may be encountered
- Default namespaces to be used by CIMTool can be changed using Window > Preferences and selecting CIMTool option
- Most problems encountered in CIMTool surround the namespace.
- It is best to use the default (defined above) for all project files

# Changing Namespaces

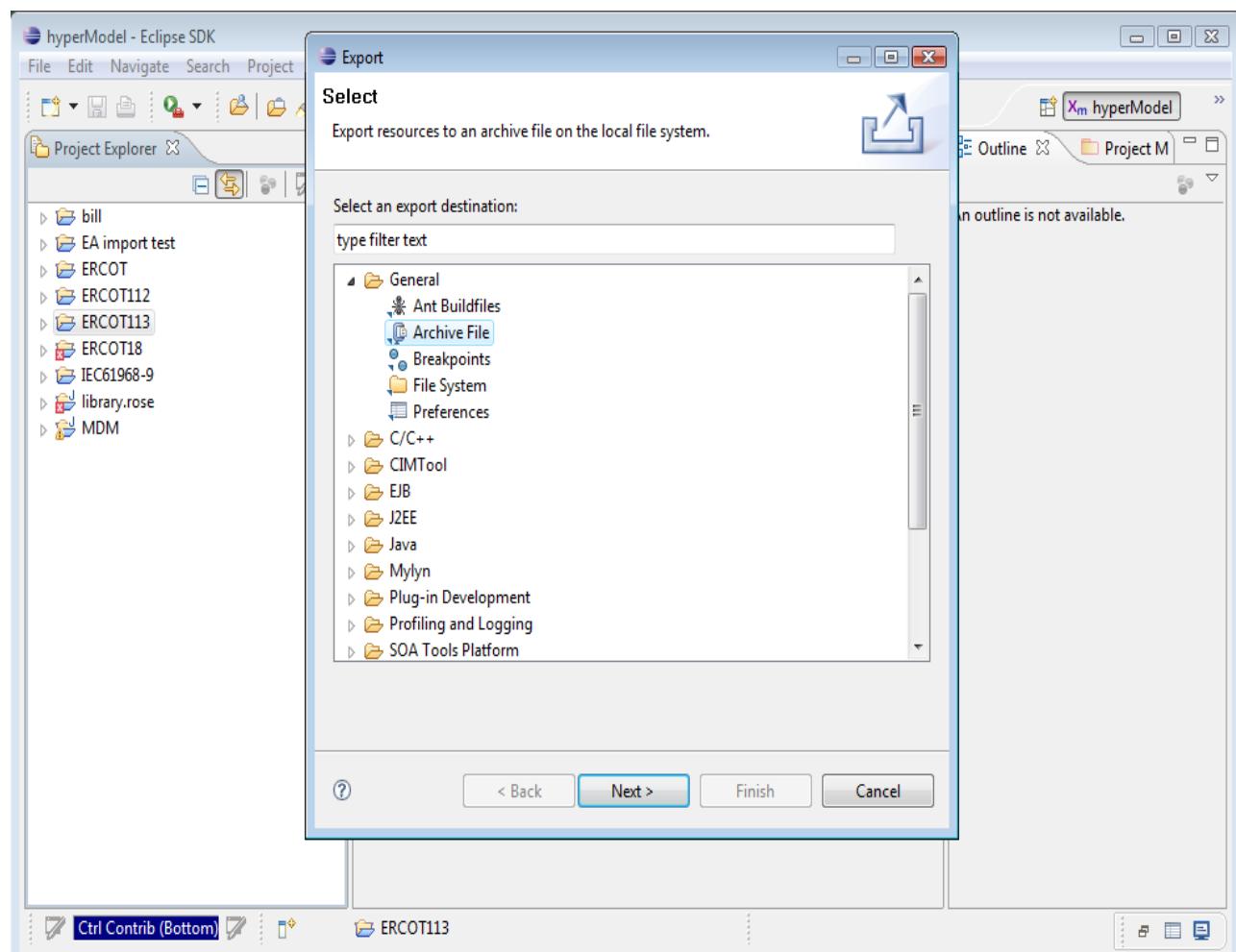
- Namespaces can be changed by right clicking on a file name in the Project Explorer and then selecting ‘properties’
- The namespace is shown on the CIMTool property dialog
- Namespaces can be changed as desired
- Note that this may impact existing profile definitions



# Miscellaneous

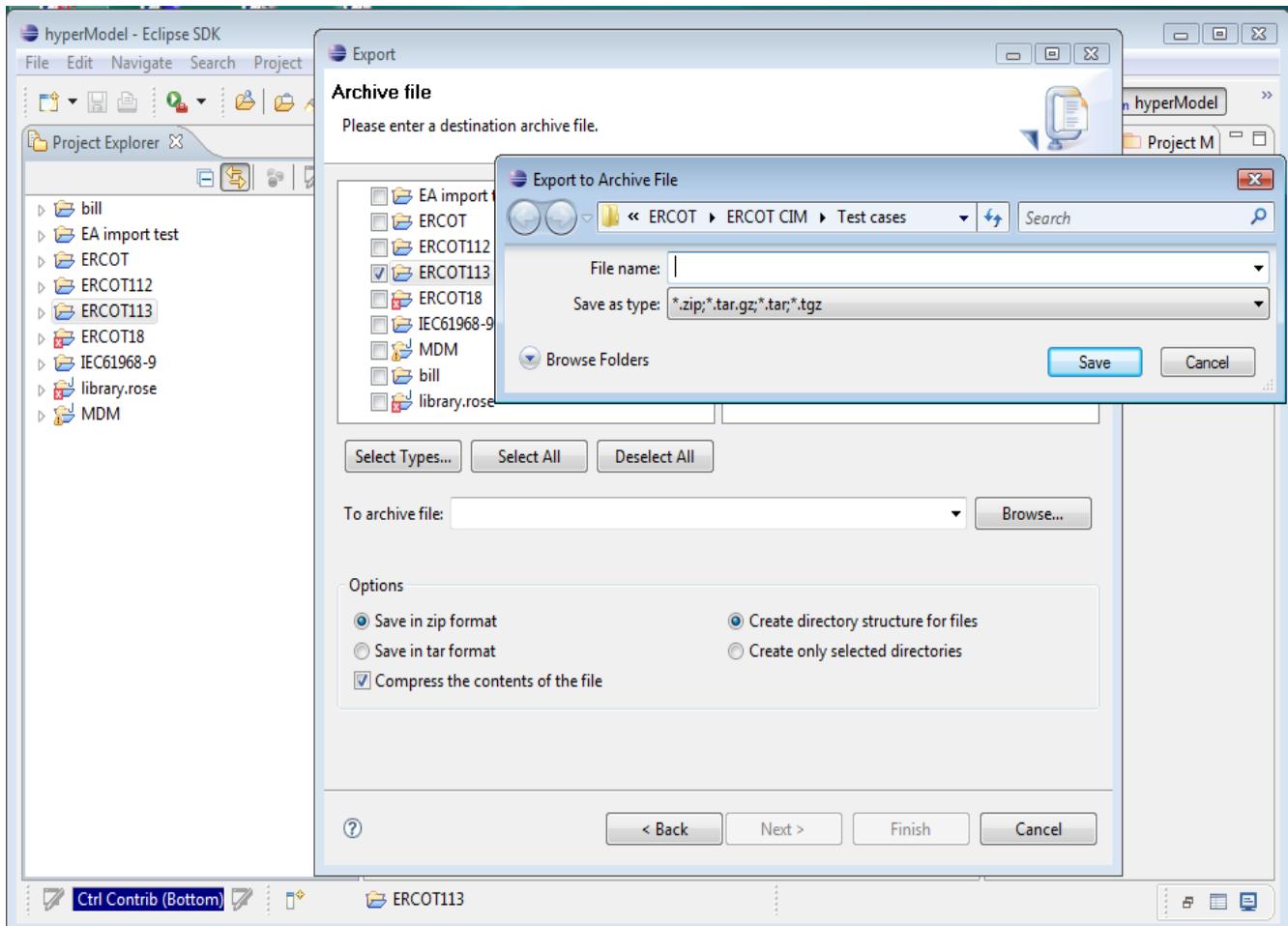
# Exporting a Project

- It is often necessary to export a project for use by others, or to use on other computers
- Use File > Export
- Select Archive File option
- Select Next



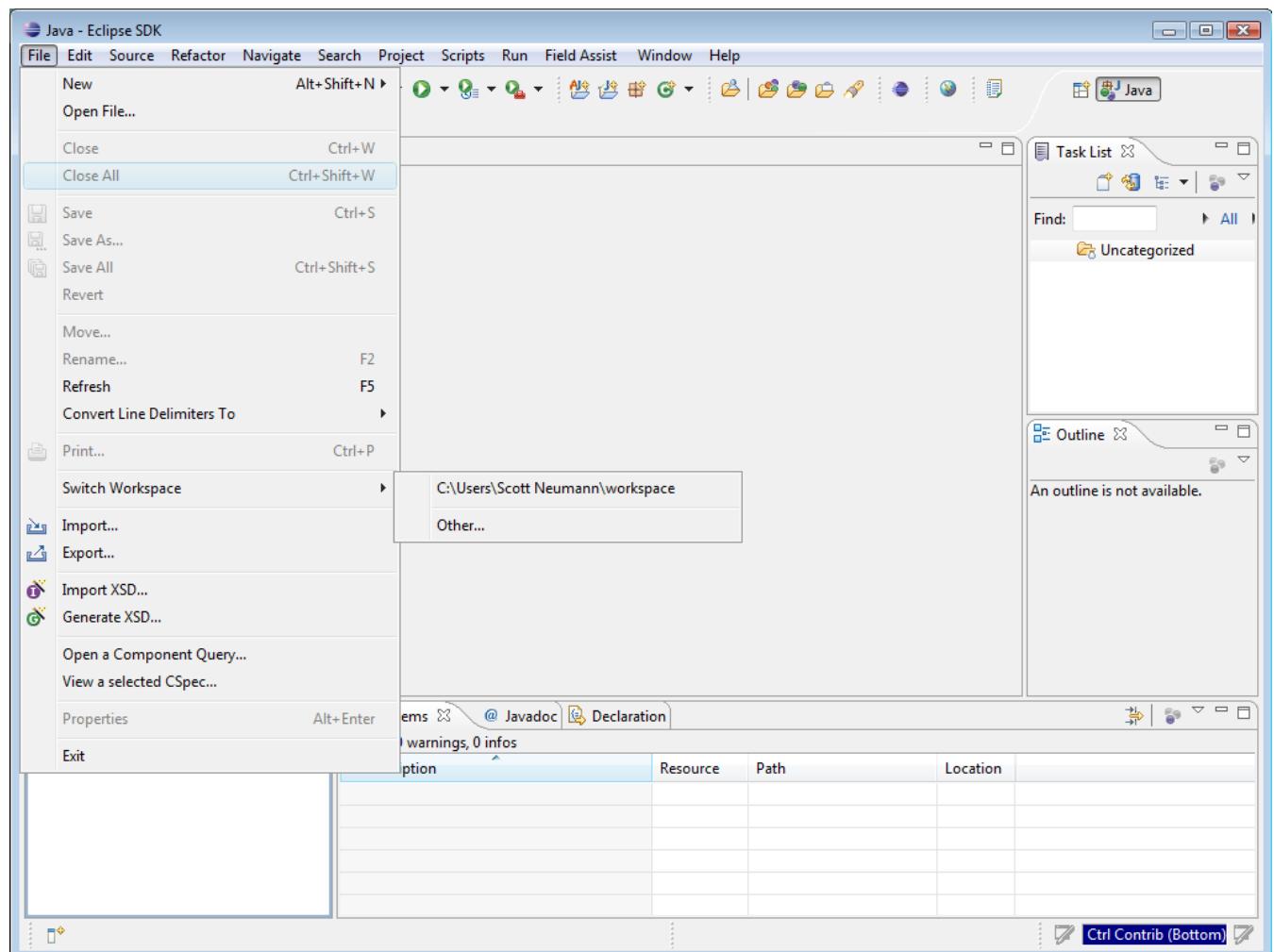
# Exporting a Project

- Need to select output format, ZIP is usually best
- Need to select output file name
- Project can be later imported back into Eclipse using File > Import



# Switching Workspaces

- Sometimes it is necessary to move or change the location of your workspace folder, or use multiple workspaces
- To point Eclipse to the new workspace folder use File > Switch Workspace
- Select the desired workspace folder
- The settings will be updated and Eclipse will restart

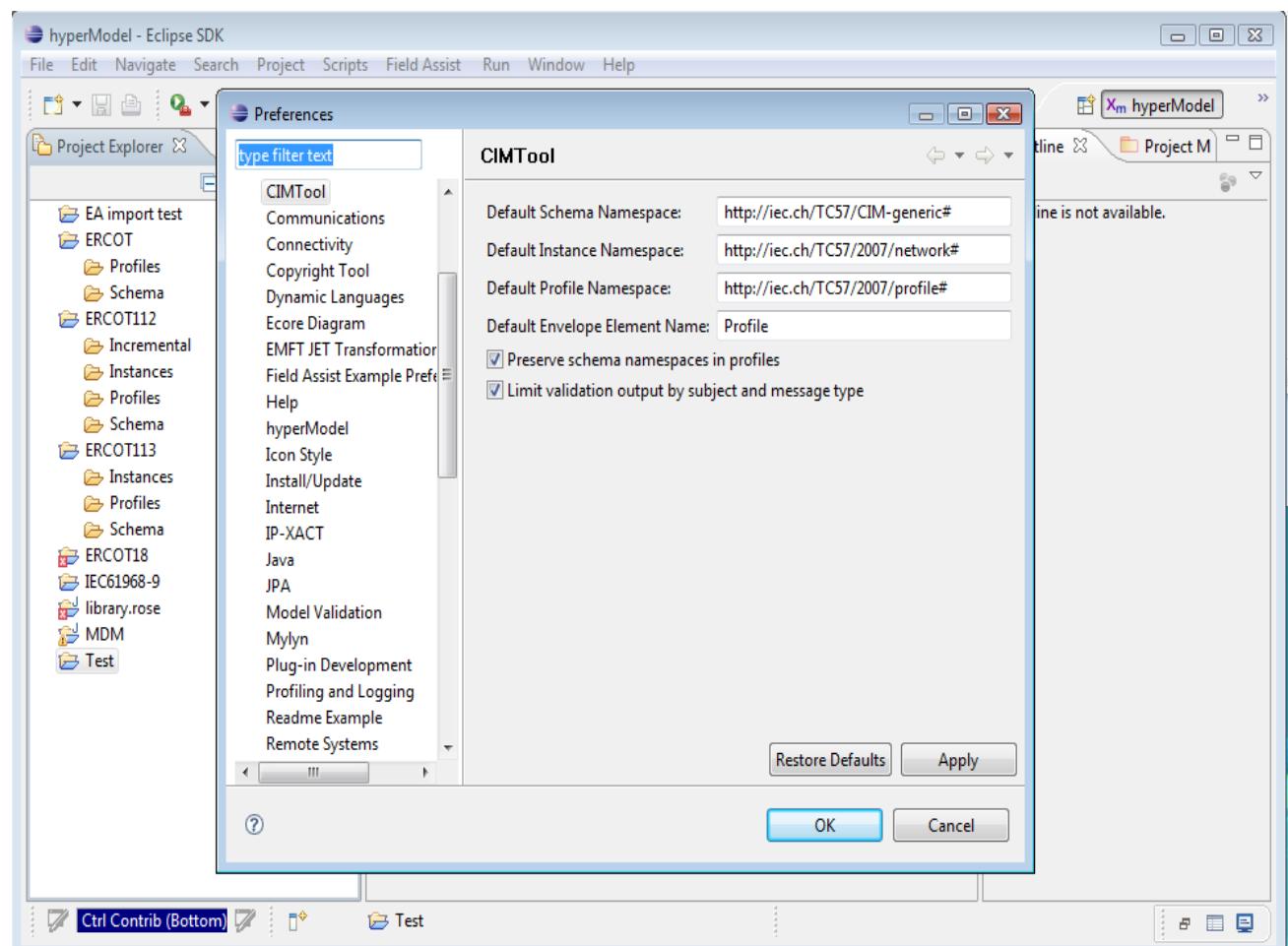


# Renaming Resources

- Sometimes it is necessary to rename projects, folders within a project or files within a folder
- It is important to do this using Eclipse, instead of directly making changes to the resource outside of Eclipse
- To rename, right click on the desired resource in the Project Explorer and select ‘Rename’
- Now you can change the name of the resource

# Changing CIMTool Preferences

- Preferences can be changed using Window > Preferences and selecting CIMTool option
- Select ‘Apply’ and ‘OK’ after editing to save



# Diagnostics

- ▶  **CustomerData**
  - ☒ CustomerData is undefined in the schema
  - ☒ CustomerData.CustomerAccounts is undefined in the schema
  - ☒ CustomerData.kind is undefined in the schema
  - ☒ CustomerData.pucNumber is undefined in the schema
  - ☒ CustomerData.specialNeeds is undefined in the schema
  - ☒ CustomerData.vip is undefined in the schema
- ▶  **ServiceDeliveryPoint**
  - ☒ ServiceDeliveryPoint.consumptionRealEnergy is undefined in the schema
  - ☒ ServiceDeliveryPoint.loadMgmt is undefined in the schema
- ▶  **General Diagnostics**

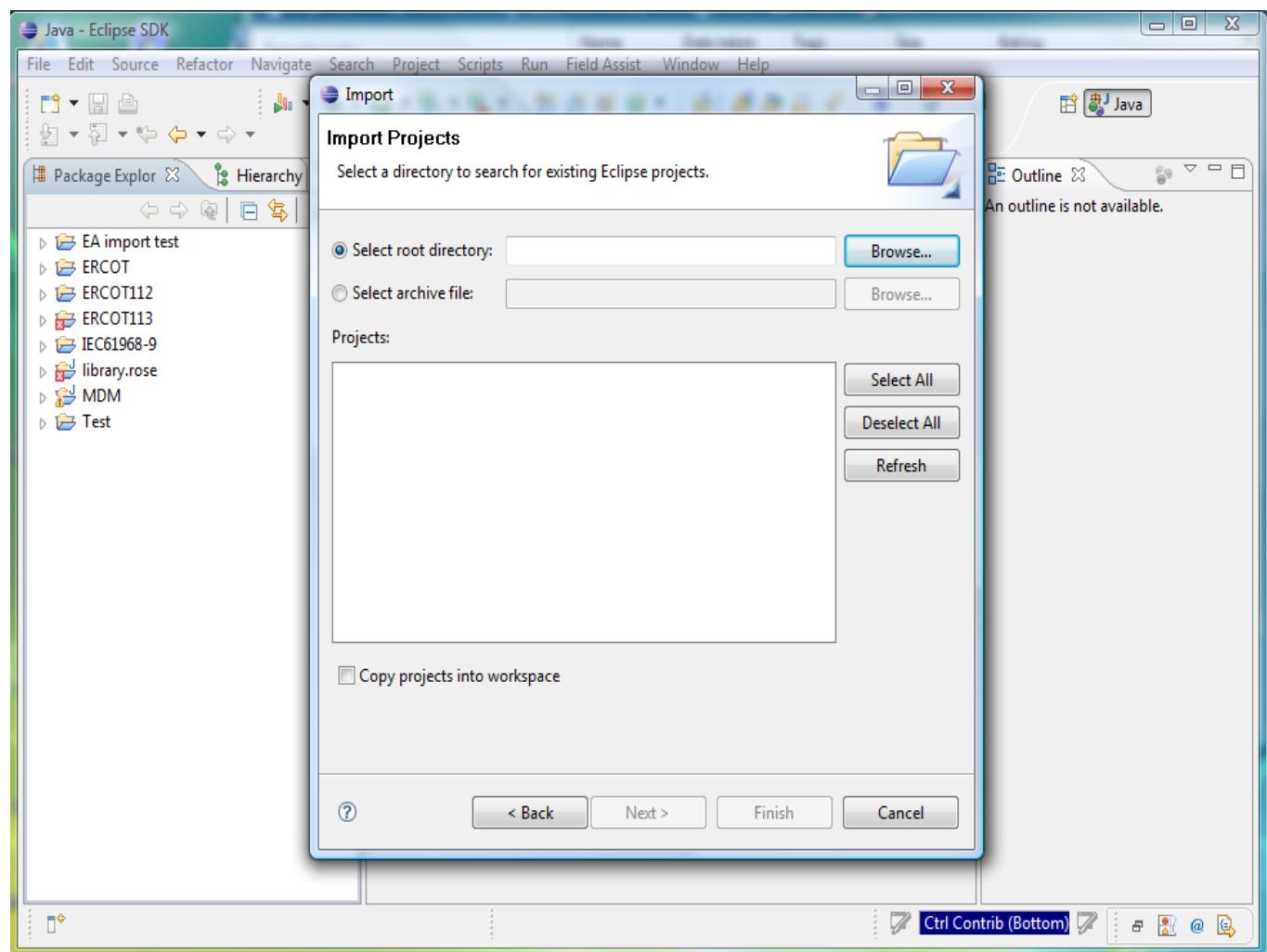
- These are often the consequence of changes in the CIM that have eliminated used classes, relationships or attributes
- Profiles can then be edited to correct the problems

# Backing Up a Project

- Easy way ...
  - Easiest way to back up a project directory is to use WinZip or a similar archive tool
  - Using WinZip (or similar tool), simply create an archive file of the project folder within the workspace
- Using a source repository ...
  - Many commercial source repositories options exist that integrate with Eclipse
  - Plugins can be found for:
    - CVS
    - Visual Source Safe
    - Clear Case

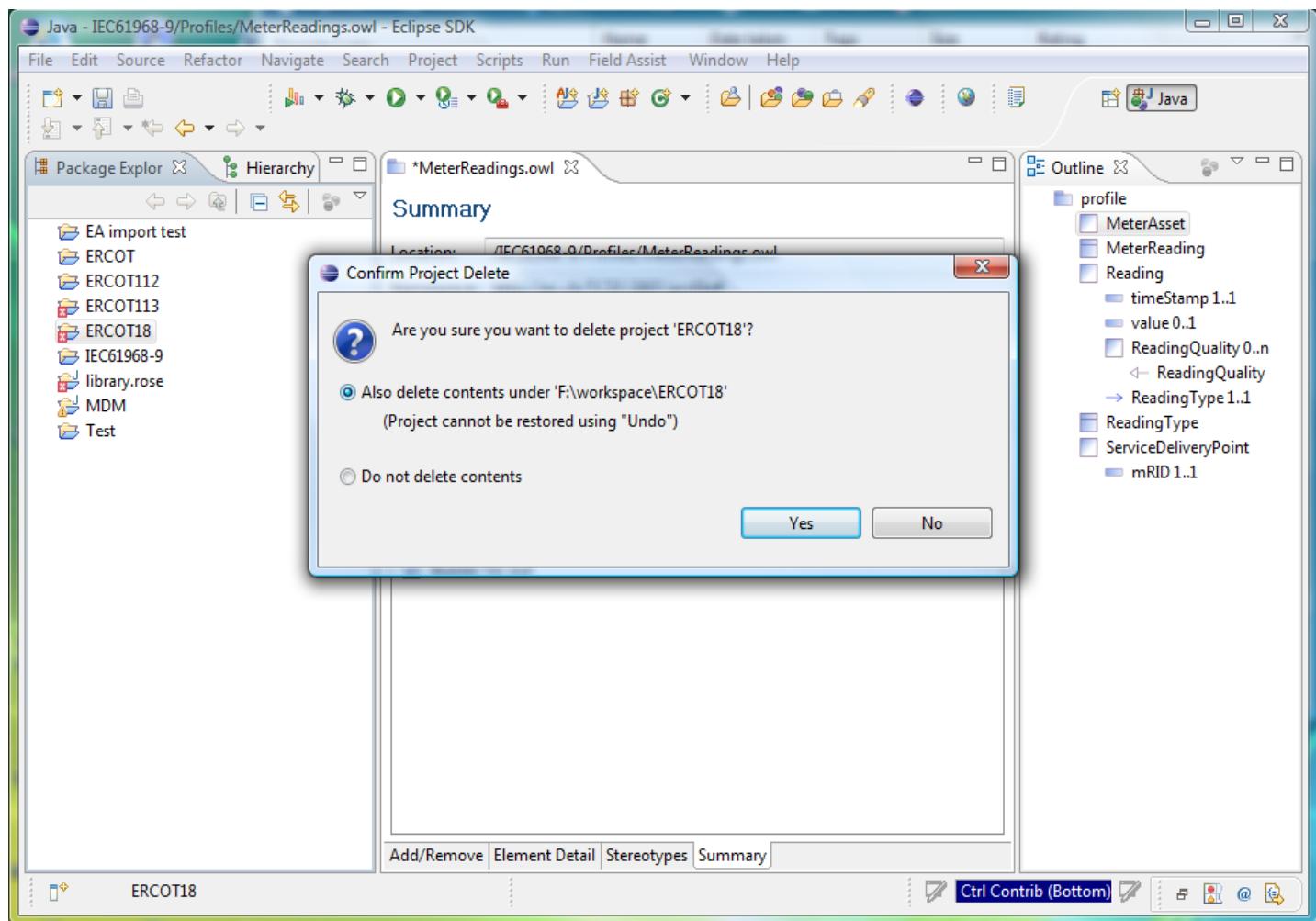
# Importing a Project

- Select File > Import > To import projects into Workspace
- Click Next
- Browse to identify a project directory
- Can use 'Copy projects into workspace' to make a copy of the directory instead of working directly out of the chosen directory



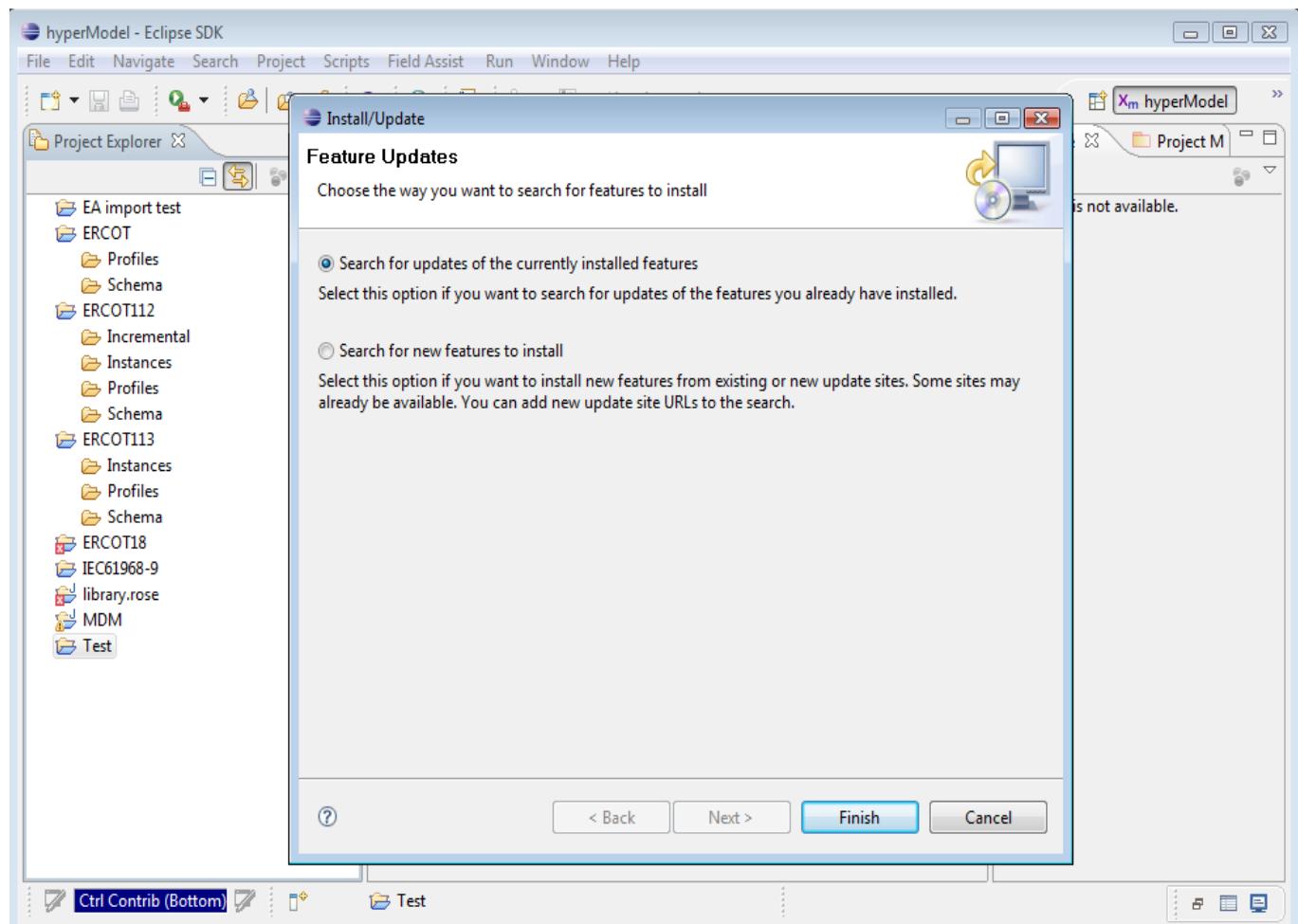
# Deleting a Project

- Right click on name of project in the Project Explorer
- Files will only be deleted if the 'Also delete contents under ...' option is selected
- Click 'Yes'



# CIMTool Updates

- TO obtain updates to Eclipse and CIMTool
- Use Help > Software Updates > CIMTool
- Select ‘Search for New Features to Install’ option



# Where Do I Get ...

- CIMTool and Eclipse:
  - <http://eclipse.org>
  - <http://cimtool.org>
- CIM:
  - <http://www.ucaiug.org/CIMug>
- IEC Standards:
  - <http://www.iec.ch>