SNAP Overview

SAND2015-9560PE

Presented by
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Tokyo, Japan
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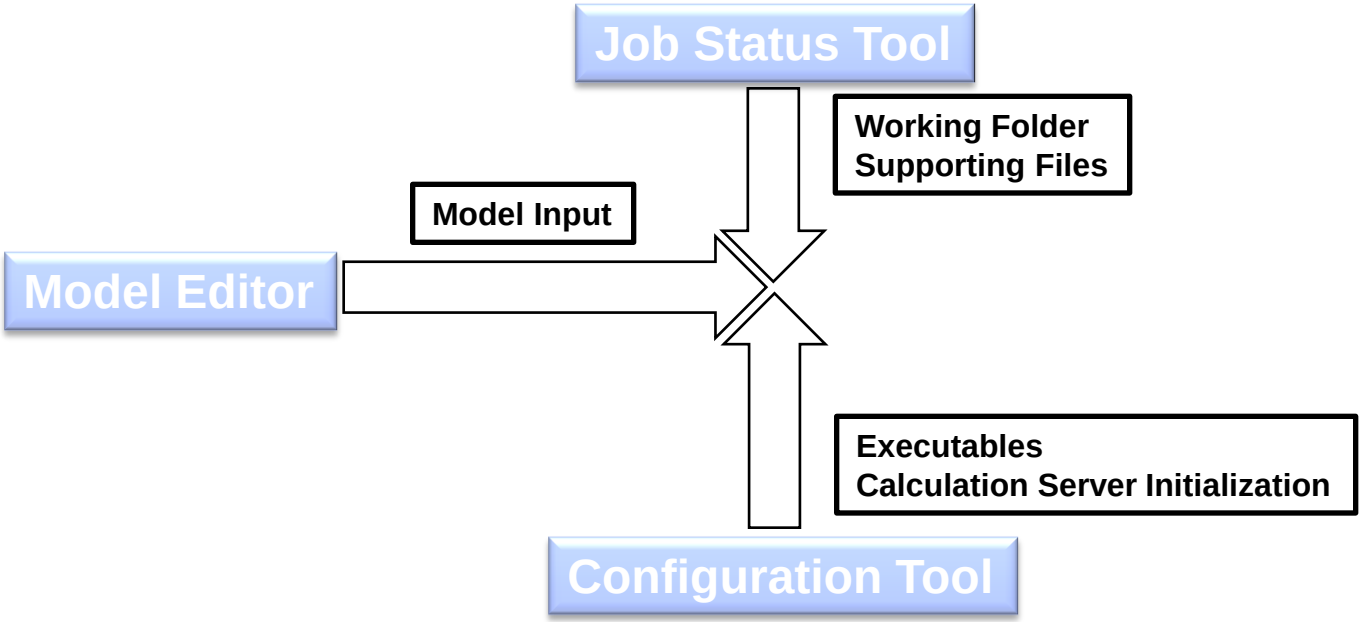
Objective of Presentation

- Introduce SNAP
  - A breakdown of the Model Editor Graphical User Interface (GUI)
  - Discuss the various tools (Job Status, Configuration Tool)
  - General discussion of functionality regarding MELCOR
- Demonstrate user input workflow
  - MELGEN and MELCOR
    - General “Packages” are maintained
    - General User Guide information is accessible
- Demonstrate job submittal
- SNAP is a very feature rich suite
  - Therefore we’ll focus on using it solely to create MELCOR input and perform calculations

Simplistic Idea on Information Flow for Job Submittal

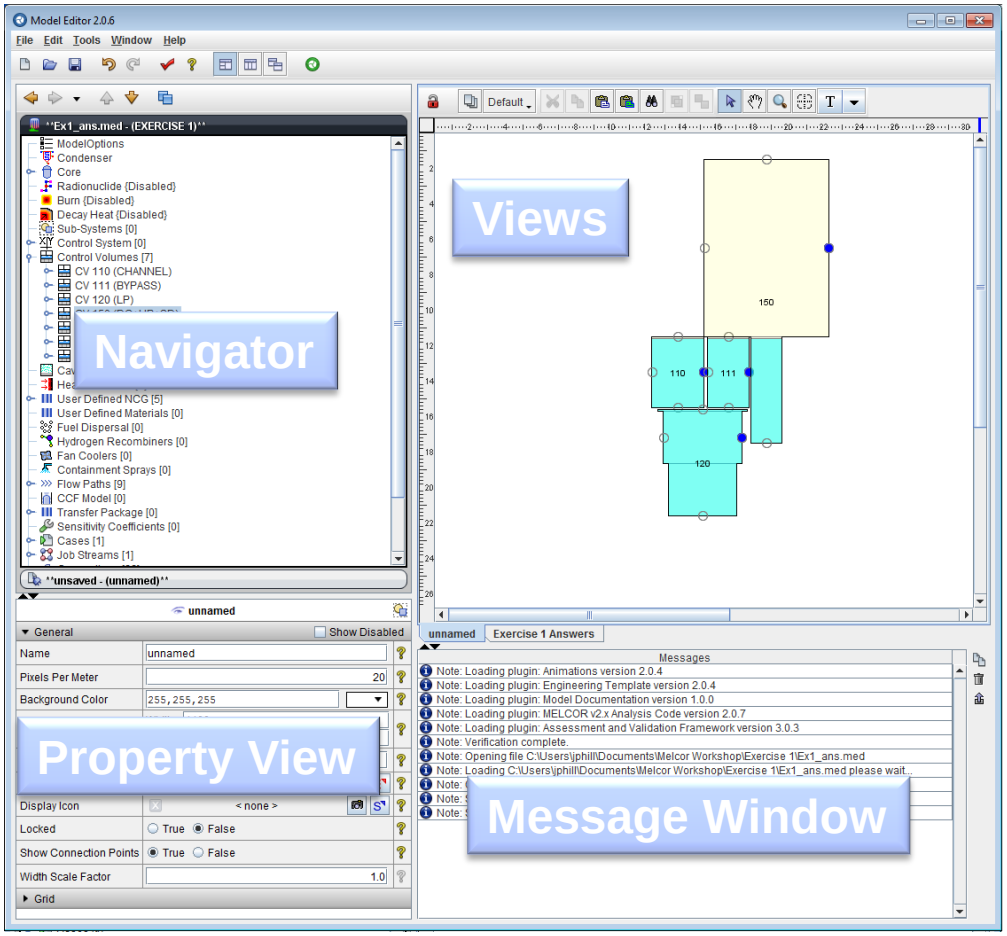
- From a simple user's understanding of information flow



SNAP Model Editor

- **Model Editor**
  - Unique plug-ins handle specific model details for a given code (MELCOR, RELAP, etc.)
  - Stores both MELGEN and/or MELCOR user input
  - Can convert older MELGEN/MELCOR 1.86 input to 2.x
  - Submits input processed by executables (i.e. job submittals)
  - Can create an Animation Model for post processing output
- **Model Editor Advanced**
  - User Defined Numerics
  - Engineering Template
  - Automated Validation Framework
  - And more….

Model Editor Interface



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Navigator View

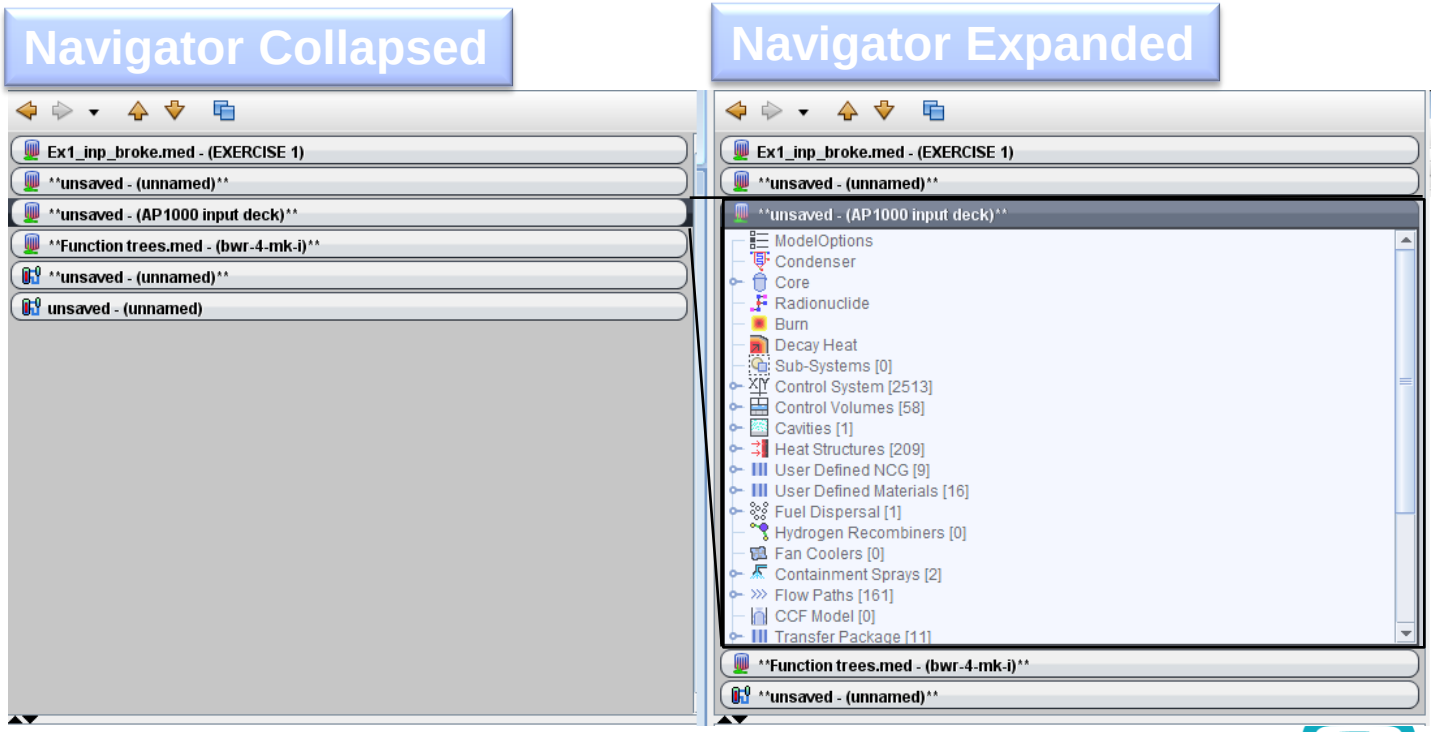
- **Nodal based tree for each package**
  - **Blue node can be clicked to expand the tree** 
  - **Select the MELCOR component to view its properties in the Property view (Components can be selected in either the Navigator or the View port.)**
  - **Packages with different names**
    - **Model/Options == EXEC package**
    - **Control Systems == CF/EDF/TF packages**
  - **Internal Controls**
    - **Cases – Where the MELCOR input is treated**
    - **Job Streams – Identifies MELCOR input files and executables using an information flow map**
    - **Connections – list component dependencies**
    - **Numerics – user defined substitutions to input**
    - **Views – List of views available in the View port**

Sub-Systems

- **Sub-Systems allows user input to be grouped logically into system sets**
  - **Components can be added to a sub-system from the currently available component**
  - **Exporting a text files will maintain sub-systems in independent files (a typical practice for MELCOR file organization where components are stored in unique files)**
    - **Example**
      - **RHR components may include**
        - **Pumps, reservoir water sources, heat exchangers, etc.**
        - **Their associated flow paths, controls volumes, controlling logic are often kept primarily in one input file for book-keeping purposes**

Navigator View

- **Multiple models can be open in one SNAP instance**
  - **Accordion Display**



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Properties and Message View

- **Properties View**
  - Where all user input is accepted
    - Both MELCOR and/or SNAP components
  - Editable fields
  - Drop down menu
  - Editable window pop-ups
  - Selectable elements
  - Model notes
  - User guidance
- **Message**
  - Where error messages associated with SNAP are placed.
  - MELCOR error messages are still written to the MELCOR files
    - Message file, diagnostic file, output file, etc.

View Port

- New Views are created in the Navigator tree
  - Right click View, select new to create a new view component
- View components have several internal drawing methods for various components
  - Components can be placed in the view by right clicking on the component in the navigator tree and selecting add to view
  - Control Volumes utilize the CV_VAT information (Volume and Altitude Table) when determining the depiction
  - Flow paths utilize Connections (see Navigator tree) to determine which Control Volumes to connect. Location of the connecting line is taken from the FL_FT record versus the CV_VAT input
  - Core, Control Functions, Database Variables, etc.

Drawing in the View Port

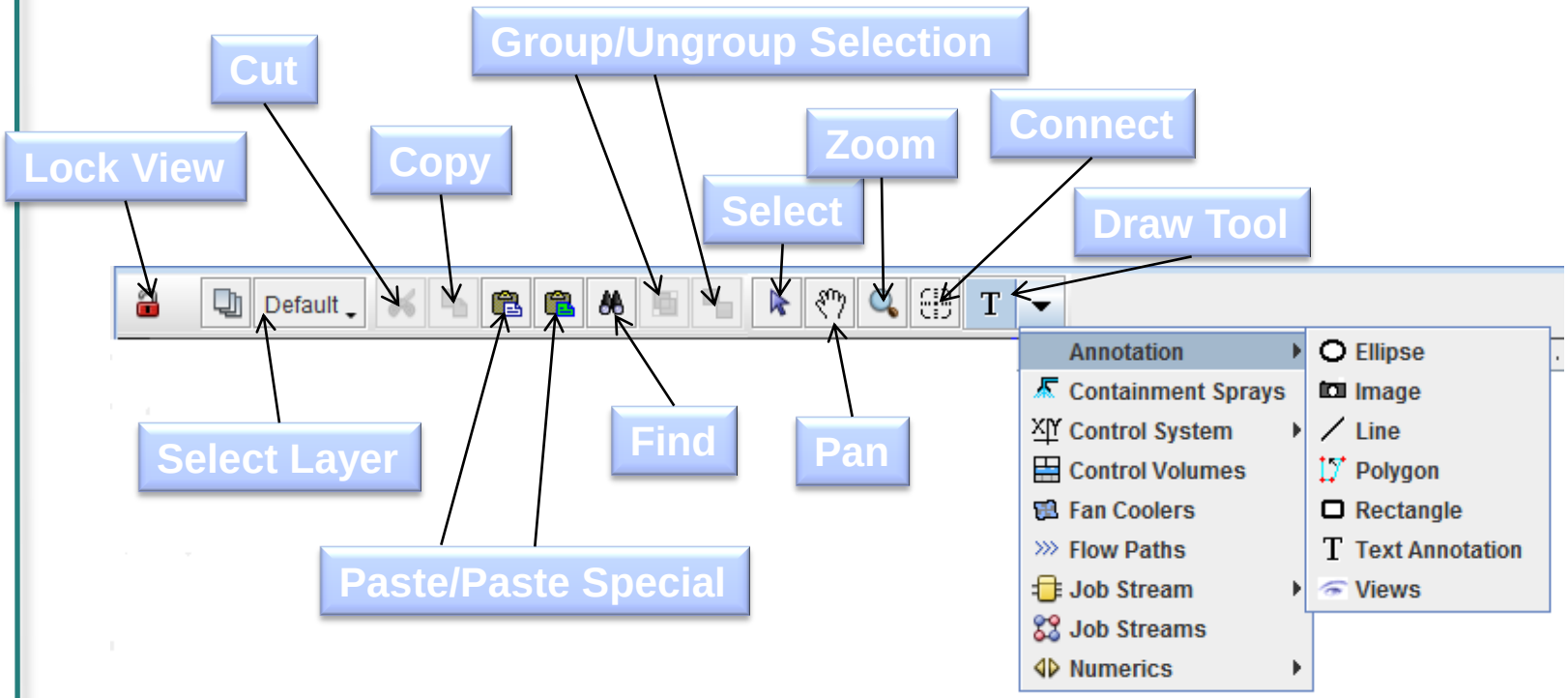
- **Drawing is very straight forward. Experiment to learn**
  - **Tools available**
    - **Layers**
      - **Drawn components are assigned to a given layer**
      - **Layers can be made visible or invisible making editing easier**
    - **Docking**
      - **View can be detached from the view port and moved about the desktop**
        - **Right click the view in the Navigator>Undock View**
    - **Standard copy/cut/past/zoom/pan controls**
      - **CNT+C / CNT+X / CNT+P / CNT+MouseWheel / MouseWheel(Shift+MouseWheel)**
    - **Grouping components, found in tool bar**
    - **Lasso select (left click hold and drag)**

(Continued)

Drawing in the View Port

- Tools available (continued)
  - Connection Tool
    - Components (Control Volumes, Flow Paths, and a few others can be initiated in the view port, likewise connections can be created between such components with the connection tool)
  - Drawing Tools
    - Annotate
      - Add text, lines, shapes, etc.
    - MELCOR components
      - Sprays, Control Volumes, Flow Paths, etc.
    - Job Stream information flow maps
- Toolbar

View Port Toolbar



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View Port Notes

- **Interactive elements can only be selected from the View Port if the view is locked**
  - **This is to prevent accidental interactions while editing the view components**
- **If the screen is locked you cannot edit any of the components**
- **Individual layers can be locked to prevent editing certain components**
- **Connections can only be made in the View Port for the following**
  - **Flowpaths to Control Volumes, Sprays to Control Volumes, and Fan Coolers to Control Volumes**

Example: Import MELGEN File

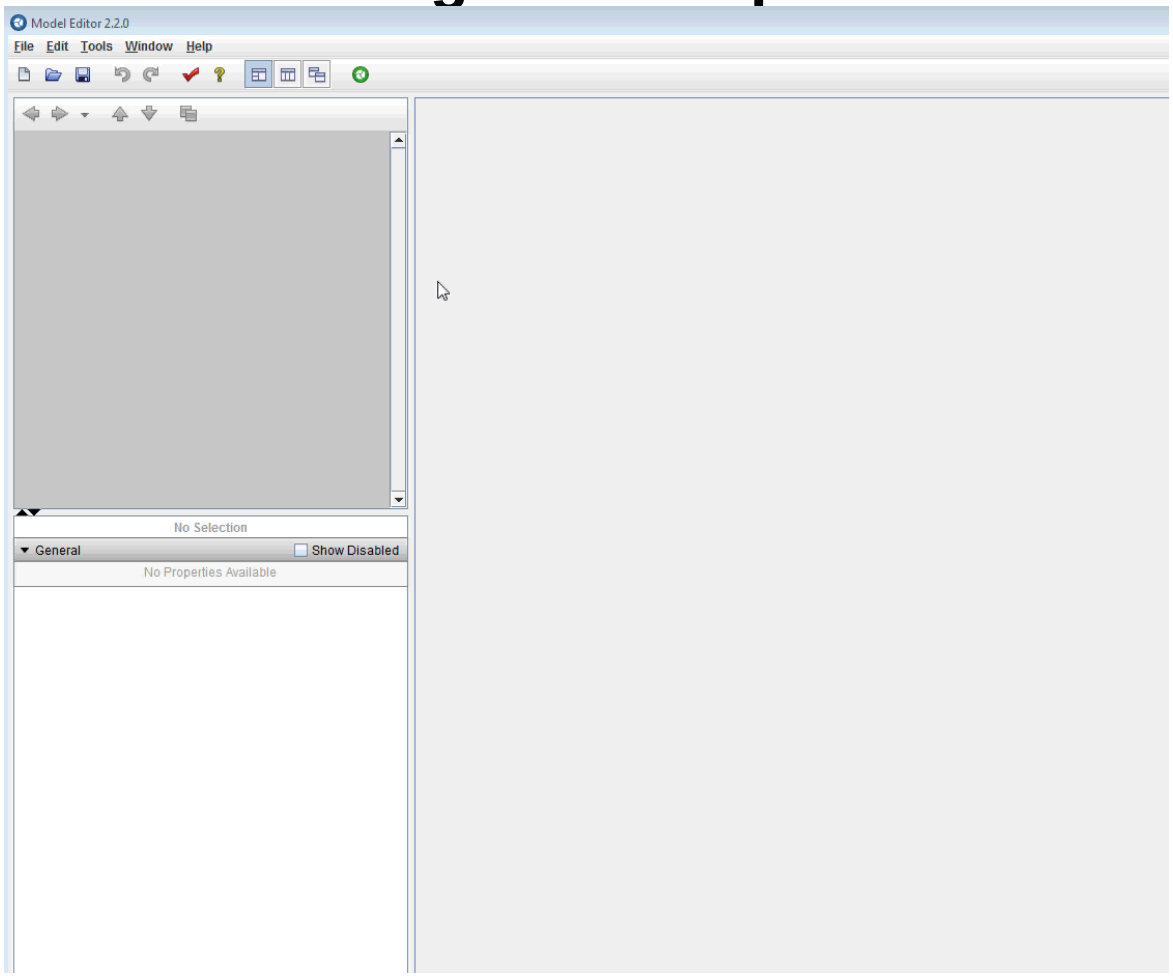
- **Importing a pre-existing MELCOR model**
  - **File > Import > MELGEN 2X**
    - **Make sure the Code Version is correct**
    - **Select the root file**
      - **Note R*I*F or INCLUDE files are read with regard to their hosting file not the main root file. (MELCOR performs these functions with regard to the root file only.)**
        - **Hosting file is the file with the R*I*F or INCLUDE file location**
        - **Root file has the main MELGEN or MELCOR block**
        - **Include block names have caused issues in the past. If nothing imports try adjusting the block names to remedy issue. Remove quotes, spaces, etc.**
    - **Name options can be specified by the user**
      - **Preserve existing component names as reasonable (16 character limit and repeated names will have an _# appended to the end of the name)**
      - **Generate with number**
        - **With package prefix i.e. CV###**
        - **Without prefix i.e. #####**

Example: Import MELCOR File

- **Within the Navigator Tree**
  - **Add a Case if none exists (right click case select new)**
    - **This will create a MELCOR Case**
  - **Right Click the newly created MELCOR Case and select Import Case**
  - **Navigate to file location**
    - **If error Messages are overwhelming**
      - **The "Code Version" didn't match the file type**
        - **1.86 vs 2.x mismatch**

Example: Importing MELGEN/MELCOR Input

- **Performed during workshop**



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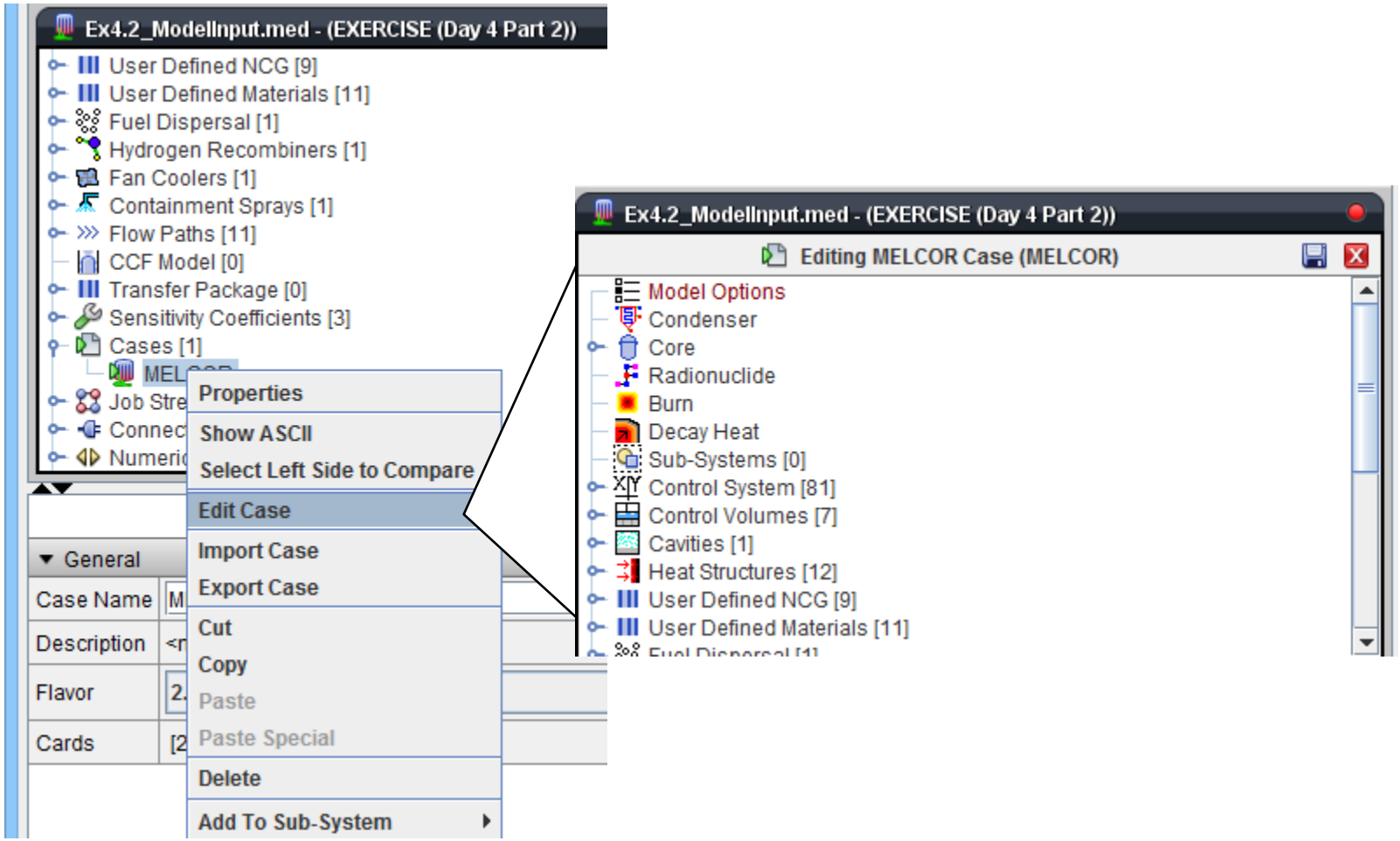
Notes on Importing

- **Review the Message View for import errors**
  - **May require some corrections**
  - **Once again if the error messages are overwhelming**
    - **1.86 vs 2.x mismatch likely occurred**
- **Import the MELCOR case BEFORE changing the "Code Flavor" i.e. from 1.86 to 2.x or reverse**
  - **SNAP is anticipating like versions**

MELCOR Navigator Tree

- MELCOR input is stored under Cases in the MELGEN navigator tree
- To see the MELCOR input right click on one of the MELCOR inputs under Cases and select Edit Case
- A new MELCOR Navigator Tree will be created
- Similar to the MELGEN Navigator Tree, under Model/Option you can convert the code flavor or makes changes to the MELCOR input.
- NOTE: Code Flavor found in the MELGEN Navigator Tree under Cases->MELCOR, DOES NOT DO ANYTHING. See for your self by changing the value.

MELCOR Navigator Tree



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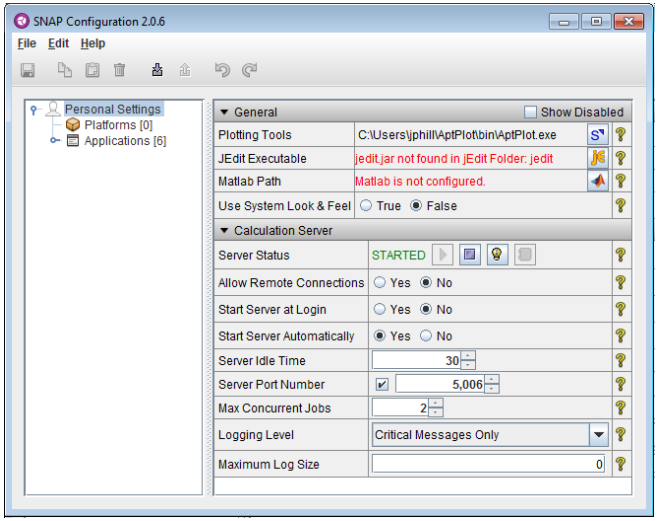
Configuration Tool

- **General Use**
  - Lets SNAP know where the executables are located
    - MELGEN/MELCOR
    - APT Plot (Not necessary but useful for Post Processing)
  - Initiates the Calculation Server
    - Calculation Server is where the calculations are performed
    - By default your current machine is assumed to be the calculation server
      - Therefore if your machine is the one to perform the calculations you will not need to adjust this setting



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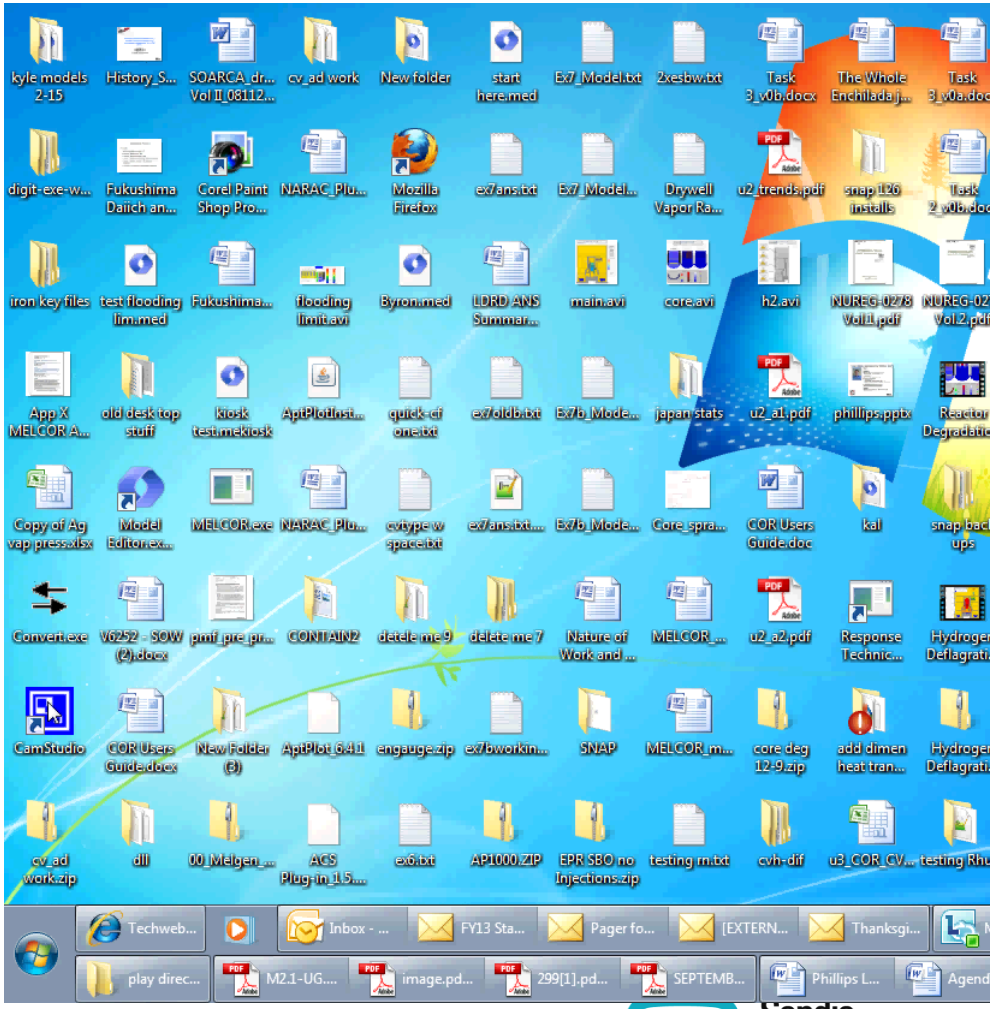
Configuration Tool Setup

- **Personal Setting**
  - APT Plot location can be specified
    - As well as other tools if so desired
  - Server Status
    - Click the play button, there are several other user actions that can start the Server.
- **Applications**
  - Right click Applications > New > MELGEN > location of MELGEN
  - MELCOR (same as MELGEN)
  - Specify the Server
    - If your machine will perform the calculations no further work is necessary

Example: Setting Up the Configuration Tool

- **Performed during the workshop**
- **Checklist before setting up a Job Stream**
  - **MELGEN/MELCOR executables setup in the Configuration Tool**
  - **Calculation Server started**
  - **Root Folder present in the Job Status Tool where the resulting files will be located**



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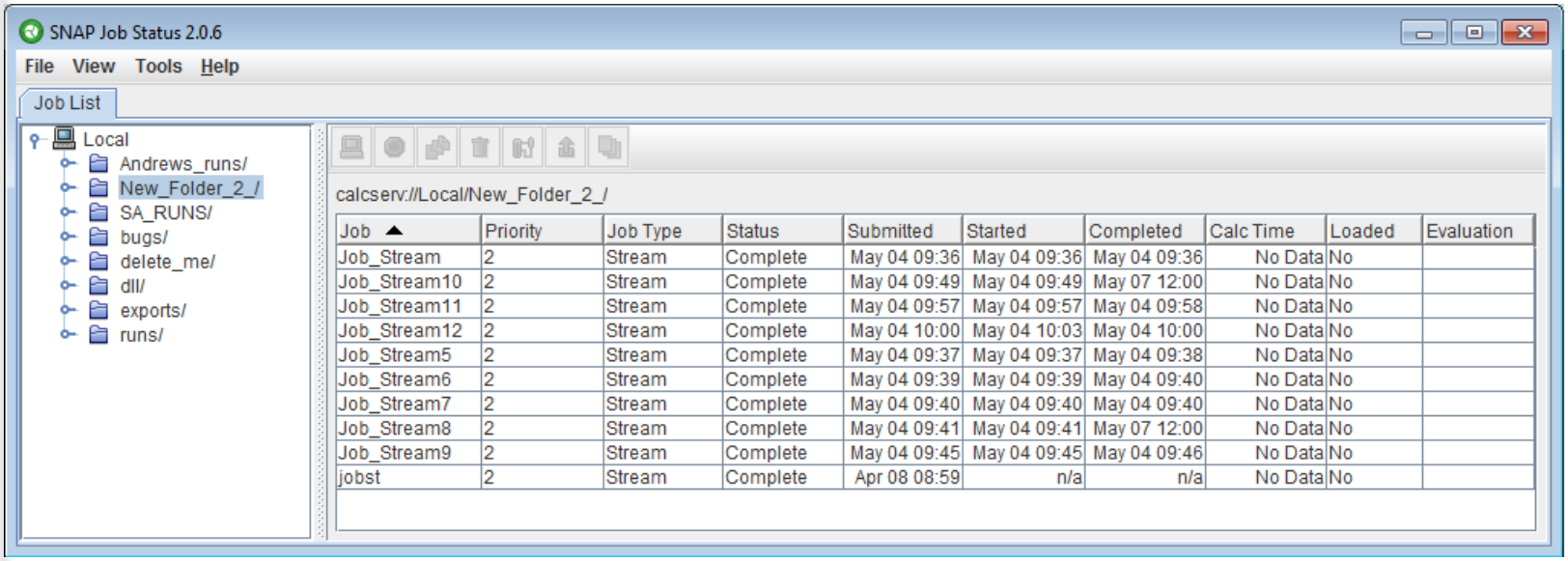
Job Status Tool

- **Job Status Tool**
  - **Keeps track of prior performed jobs**
  - **Only displays the folder list and jobs when the Calculation Server has been started**



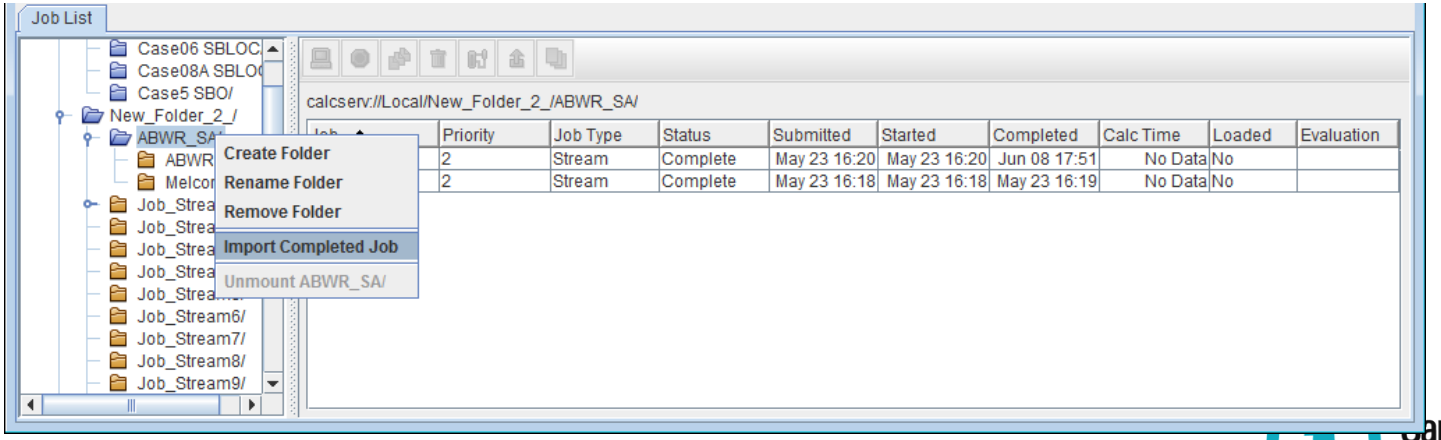
Job	Priority	Job Type	Status	Submitted	Started	Completed	Calc Time	Loaded	Evaluation
Job_Stream	2	Stream	Complete	May 04 09:36	May 04 09:36	May 04 09:36	No Data	No	
Job_Stream10	2	Stream	Complete	May 04 09:49	May 04 09:49	May 07 12:00	No Data	No	
Job_Stream11	2	Stream	Complete	May 04 09:57	May 04 09:57	May 04 09:58	No Data	No	
Job_Stream12	2	Stream	Complete	May 04 10:00	May 04 10:03	May 04 10:00	No Data	No	
Job_Stream5	2	Stream	Complete	May 04 09:37	May 04 09:37	May 04 09:38	No Data	No	
Job_Stream6	2	Stream	Complete	May 04 09:39	May 04 09:39	May 04 09:40	No Data	No	
Job_Stream7	2	Stream	Complete	May 04 09:40	May 04 09:40	May 04 09:40	No Data	No	
Job_Stream8	2	Stream	Complete	May 04 09:41	May 04 09:41	May 07 12:00	No Data	No	
Job_Stream9	2	Stream	Complete	May 04 09:45	May 04 09:45	May 04 09:46	No Data	No	
jobst	2	Stream	Complete	Apr 08 08:59	n/a	n/a	No Data	No	

Job Status Tool Setup

- User will need to create a working folder
  - Right click Local > Mount Root Folder
  - Specify the working folder
- Job Streams can be submitted to any mounted root folder
  - The files submitted and produced by MELGEN and MELCOR will be located in \Root Folder\Job Stream Name
- From an existing Job
  - Files associated with the run can be viewed with the Job Status Tool
  - Data can be plotted with APT Plot from the Job Status Tool
  - Jobs viewable from the Job Status Tool will be available for post processing with an Animation Model from the Model Editor

Importing a Standalone Job with the Job Status Tool

- The Job must reside in a folder within the working directory of a mounted Root Folder
- Navigate down to the folder where the Job files reside
- Right click the folder>Import Completed Job
- Select the applicable application
- Click Next then input a Job Name if desired
- Click Next then select the location of all desired files



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Creating a Job Stream

- **Job Stream**
  - Created within the Model Editor
  - Performs MELGEN and/or MELCOR runs
    - Can be either or both
  - Submits the input files to the MELGEN/MELCOR executables and specifies the folder where the results will be placed
  - Produces a new Job within the Job Status Tool
  - Can specify the post processing tool to generate a set of plots
  - Has several default Job Streams which can be selected to simplify the setup process

Setting Up a Job Stream

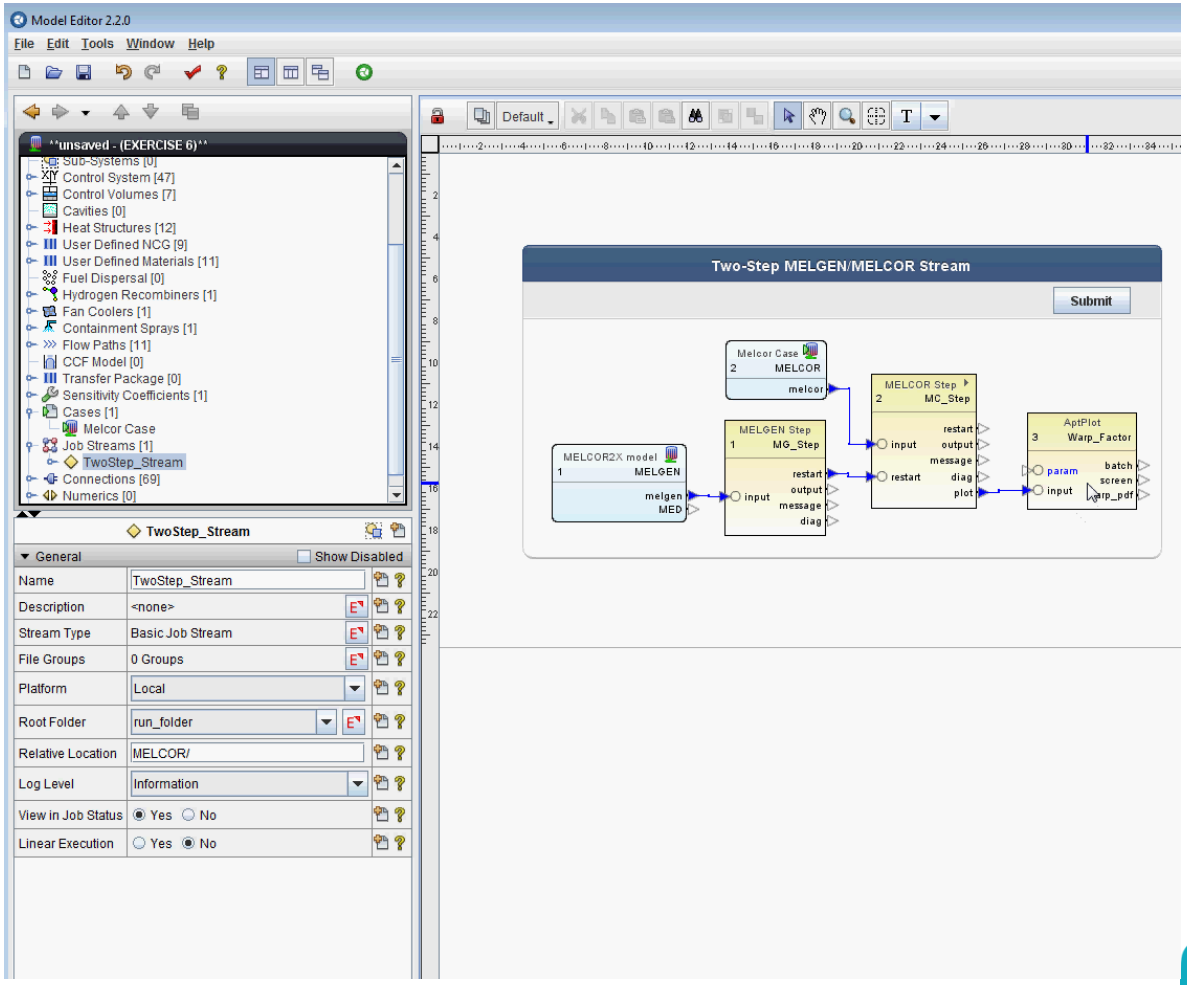
- **Checklist before setting up a Job Stream**
  - MELGEN/MELCOR executables setup in the Configuration Tool
  - Calculation Server started
  - Root Folder present in the Job Status Tool where the resulting files will be located
- **Set-up**
  - In the Navigator right click Job Streams>New
  - Select Basic Stream
  - Select calculation type (Two-Step)
  - A new View will be created containing an information flow diagram
    - The MELGEN input and MELCOR input will be present
    - A MELGEN and MELCOR executable will be selected from the Configuration Tool automatically

Job Stream

- **Independent files can be specified in the Job Stream**
  - Restart Files, ASCII Input Files, etc.
- **Sensitivity cases can be performed**
  - If a Numeric has been included in the model it can be used to perform various like calculation where the Numeric value is varied
    - Create a new numeric by expanding Numeric tree and right clicking desired Numeric type
    - Create a Numeric Job Stream and edit the Parametric Properties
    - Edit the Parametric Tasks

Example: Continuation of Import Example with Job Stream Creation

- **Performed during the workshop**



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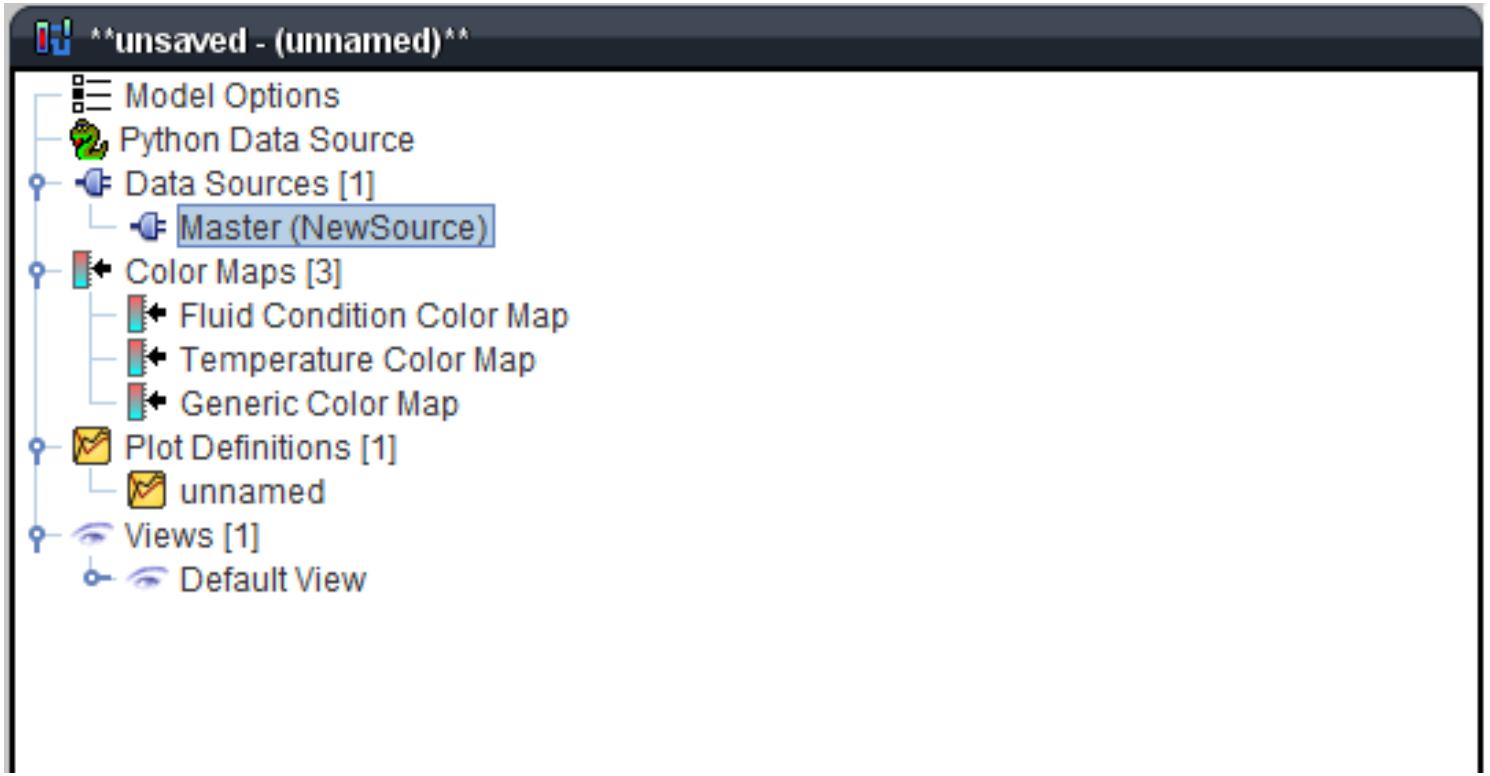
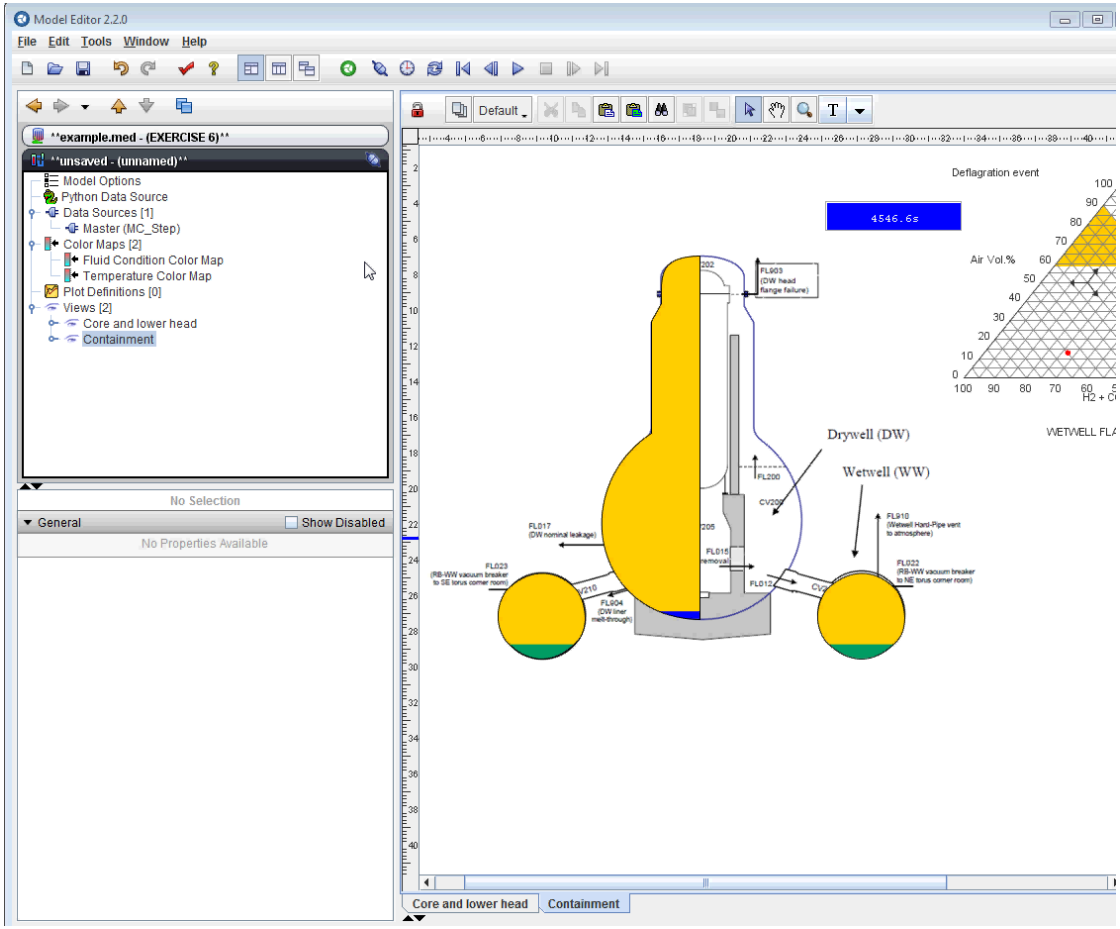
Post Processing with SNAP

- **Animation Model is a separate model from the MELCOR model**
  - **File>New select Animation model**



Creating a Basic Animation Model

- **Create a Color Map**
  1. Right Click Color Maps in the Navigator>New
  2. Right Click the new Generic Color Map>Add To View
  3. Adjust some Properties
     - ✶ Set Color Map Type to Generic
     - ✶ Specify Dynamic as True
     - ✶ Set Channel Name Pattern to MELCOR "CVH-P_%V"
       - Review the MELCOR User's Guide to see all the available plot channels
       - %V is a place holder for the components Control Volume number (see notes for a detailed description on its use)
- **Attaching a plotfile**
  1. Click on Master in the Data Source Tree in the Navigator and set the Source Run URL in the Properties to a completed Job
  2. Click the Data Connector Icon



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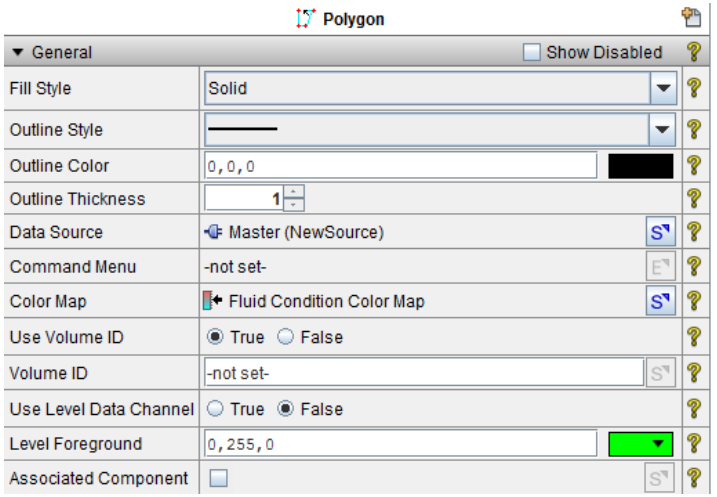
Creating a Basic Animation Element

- **Creating a Polygon**
  - **Select Polygon from the Annotation section of the View Port Toolbar (review earlier slides if you can't remember what the Toolbar looks like)**
  - **Start clicking in the View port and the drawing logic will become clear (left click to set a point, right click to remove the last point)**
  - **If you click on top of an old point it will close the polygon and the instance will be complete.**



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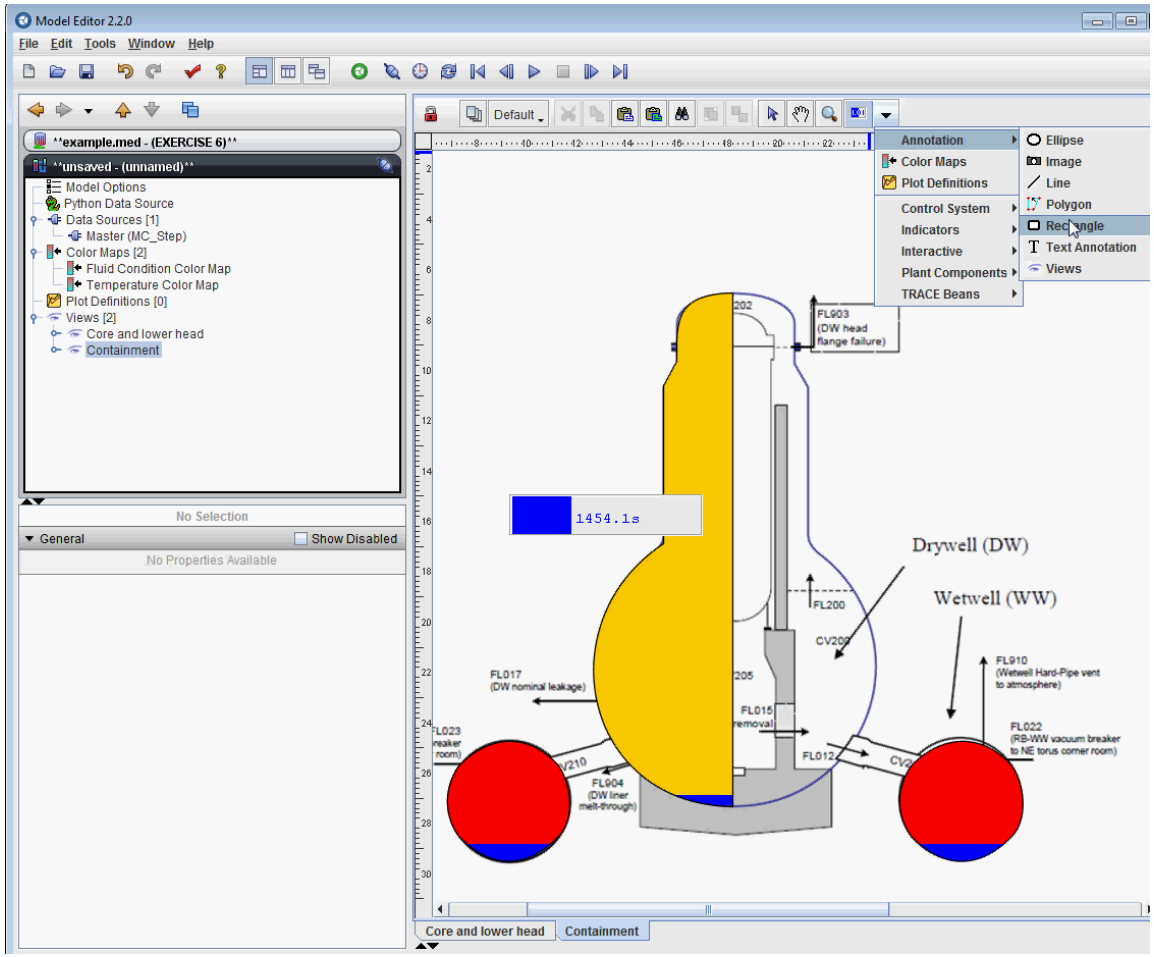
CVH-FL Example Problem: Drawing the Wetwell

- **Set the following**
  - **Color Maps**
  - **Liquid Level Data Channel**
  - **Volume IDs**
  - **Max and Min Levels**
  - **Upper Phase Mode to One Phase**



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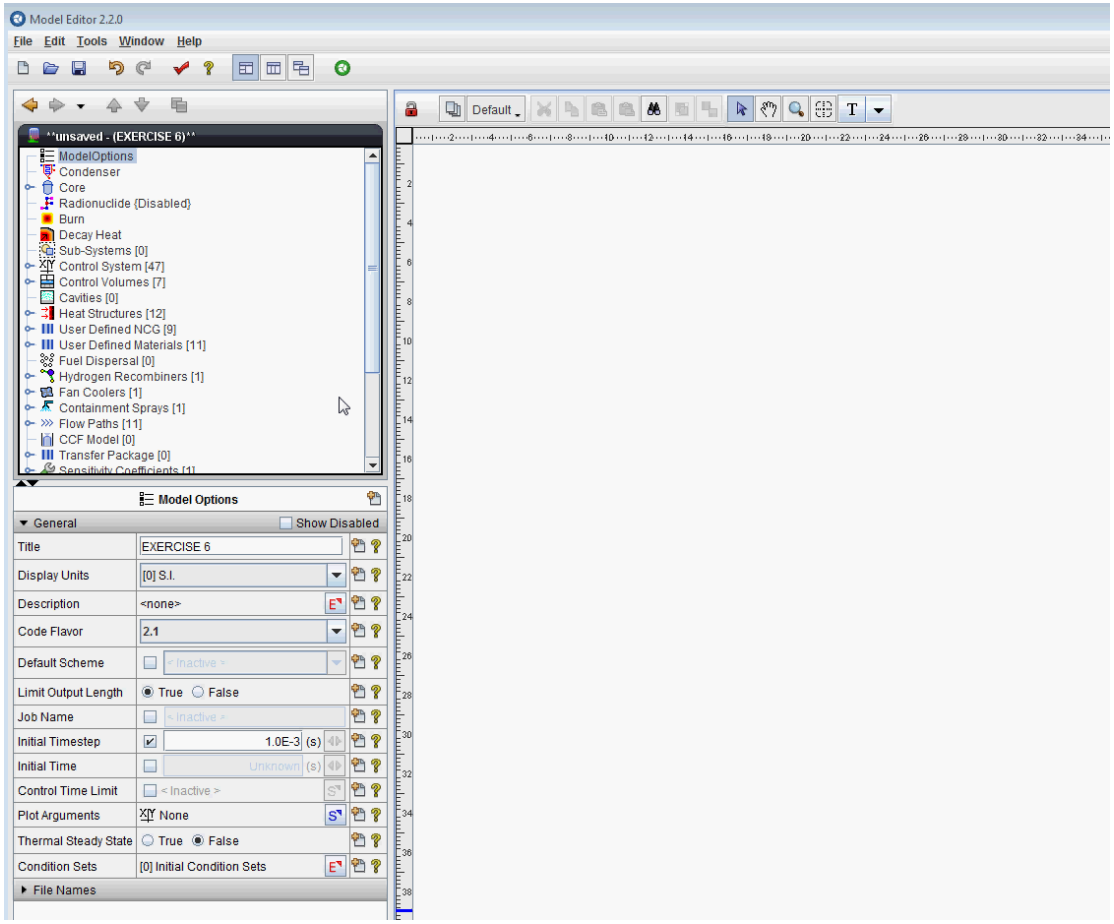
Converting from MELCOR 2.1 version to MELCOR 1.8.6 version

- **SNAP provides simple conversion between MELCOR 1.8.6 and MELCOR 2.1 input**
  - **M1.8.6 => M2.1**
  - **M2.1 => M1.8.6**
    - **New models in M2.1 cannot be back-converted**
- **Conversion between M1.8.6 and M1.8.6 requires user interface**
  - **Geometry for spherical lower head**



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