Hands-On Tutorial: Using 3D Slicer with the Prostate-Diagnosis Data

The following serves as a tutorial to those unfamiliar with 3D Slicer who wish to visualize the 3D segmentation data associated with the PROSTATE-DIAGNOSIS collection in NRRD format. This tutorial assumes you have already downloaded the images and associated NRRD data from The Cancer Imaging Archive (TCIA). If you need assistance obtaining these, please go back to the PROSTATE-DIAGNOSIS wiki page for more information.

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Installing 3D Slicer

Browse http://download.slicer.org/ and install the appropriate pre-compiled binary for your system (Windows, Mac, Linux - 32 or 64bit). The stable release is preferred to the nightly build.

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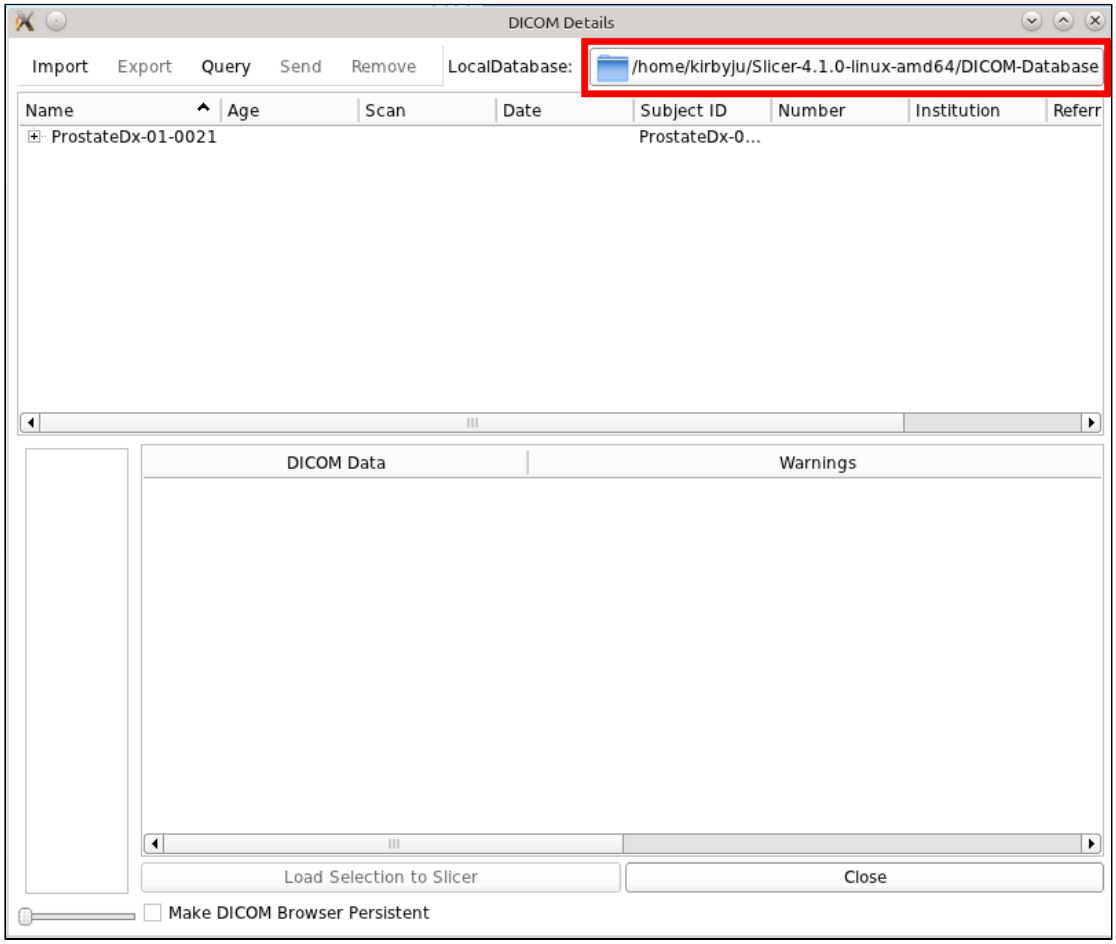
Loading the Digital Imaging and Communications in Medicine (DICOM) Data

Upon starting Slicer you will be presented with the **Welcome to Slicer** module and the **Conventional** viewing layout. From here, click the **Load DICOM Data** button.



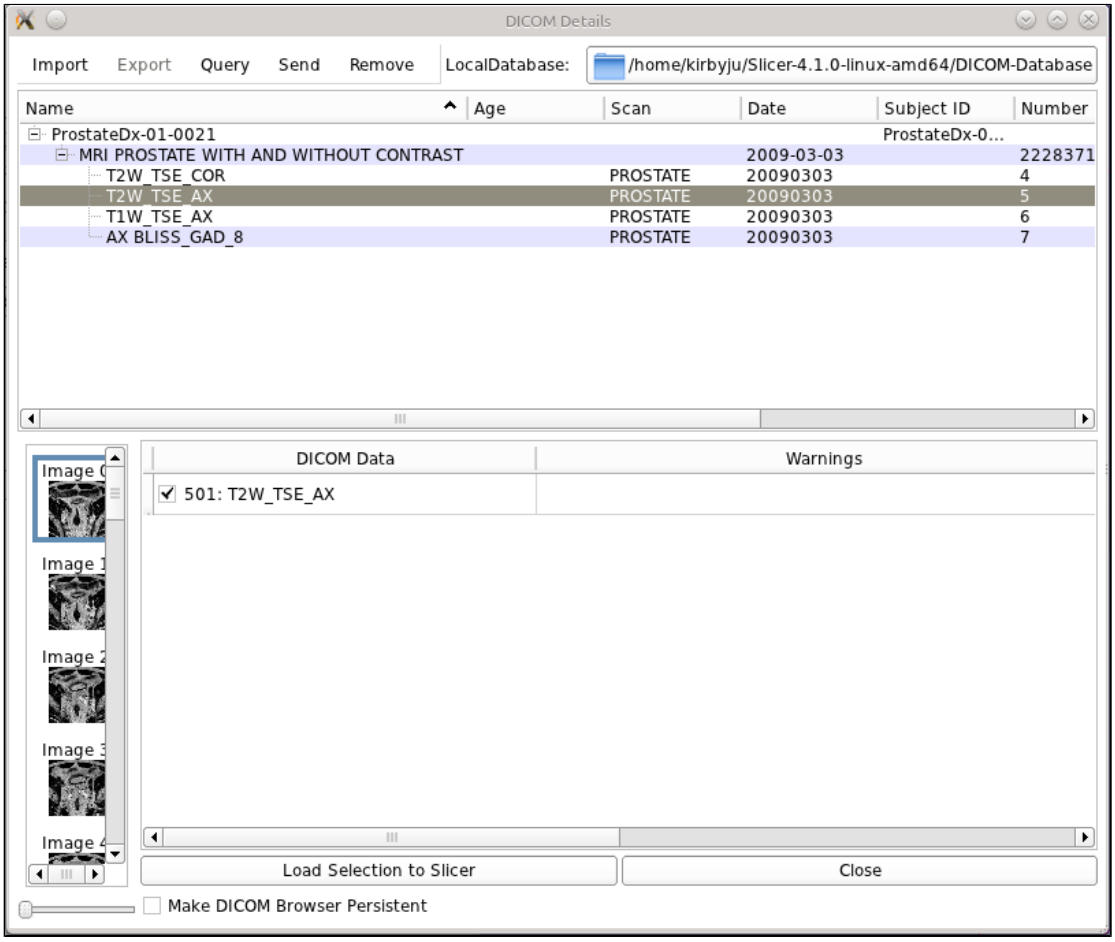
You will be presented with the **DICOM Details** window. Click the button next to **LocalDatabase** and select a folder for **Slicer** to use for keeping track of your DICOM data. Then click the **Import** button.

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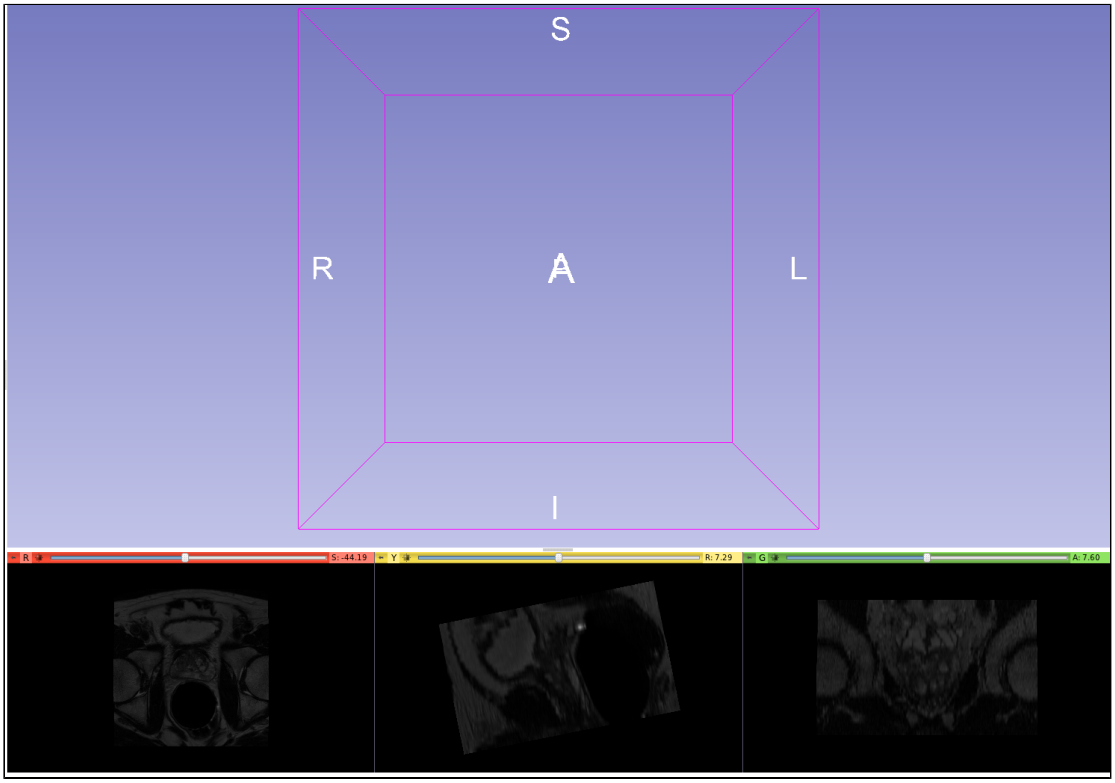
Navigate to the file where you saved the DICOM data from TCIA. Select the **Prostate-Diagnosis** directory and click **Imp ort**. You should now see the DICOM data in your **DICOM Details** screen. Drill down into the available data and select the T2W_TSE_AX from the patient you wish to analyze. To import, click the **Load Selection to Slicer** button.

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The DICOM data will shot up in the 3 smaller viewing areas. Adjust the window level by clicking and holding the left mouse button and moving your mouse. Zoom in or out in the same way with the right mouse button.

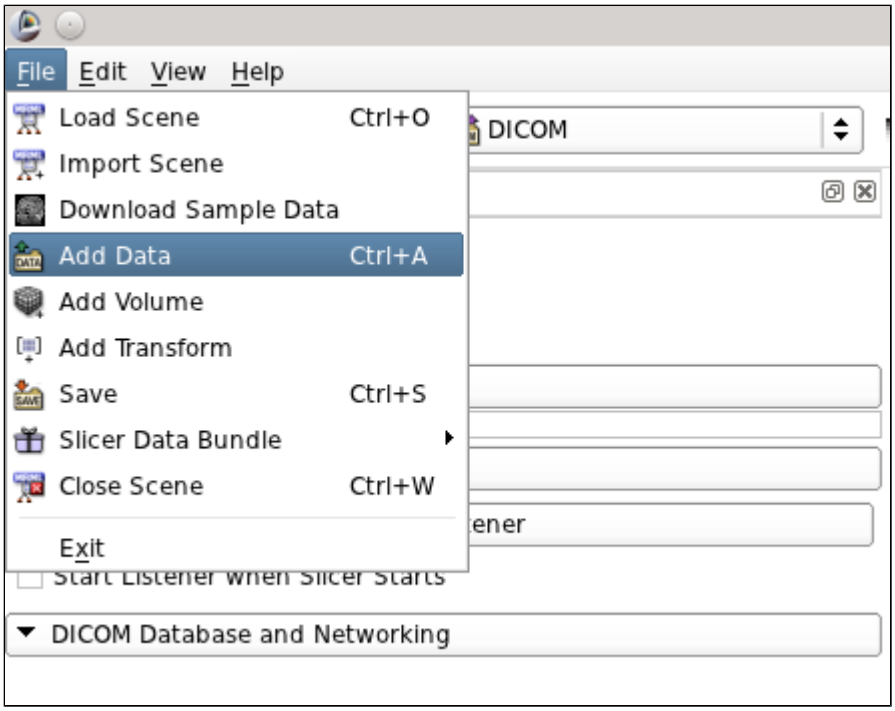
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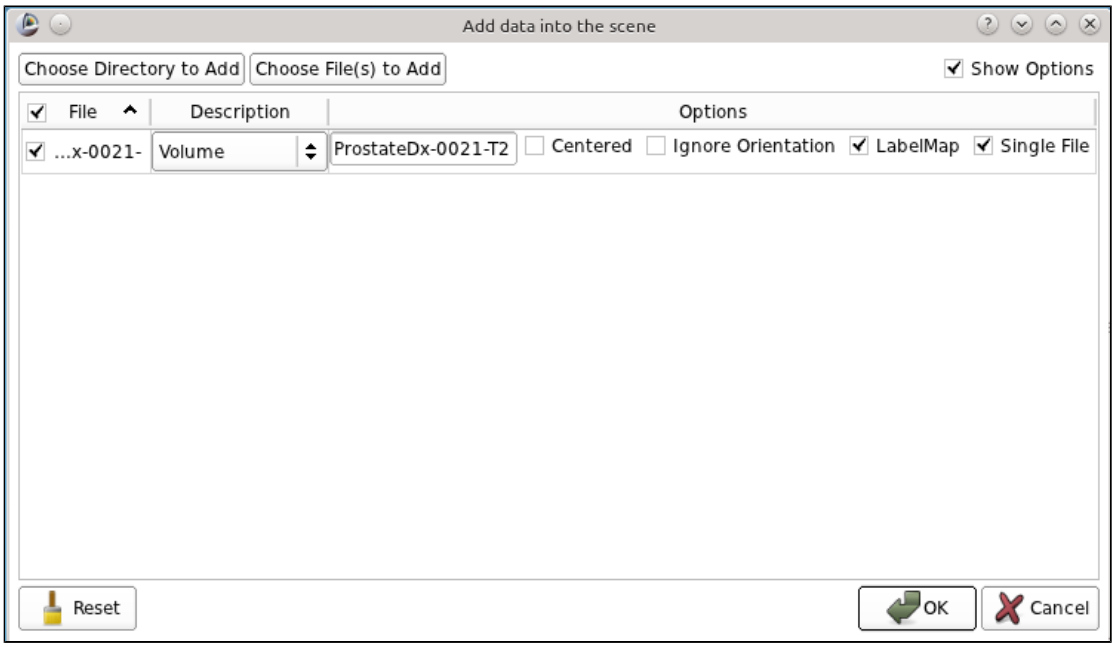
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Loading the NRRD Segmentation

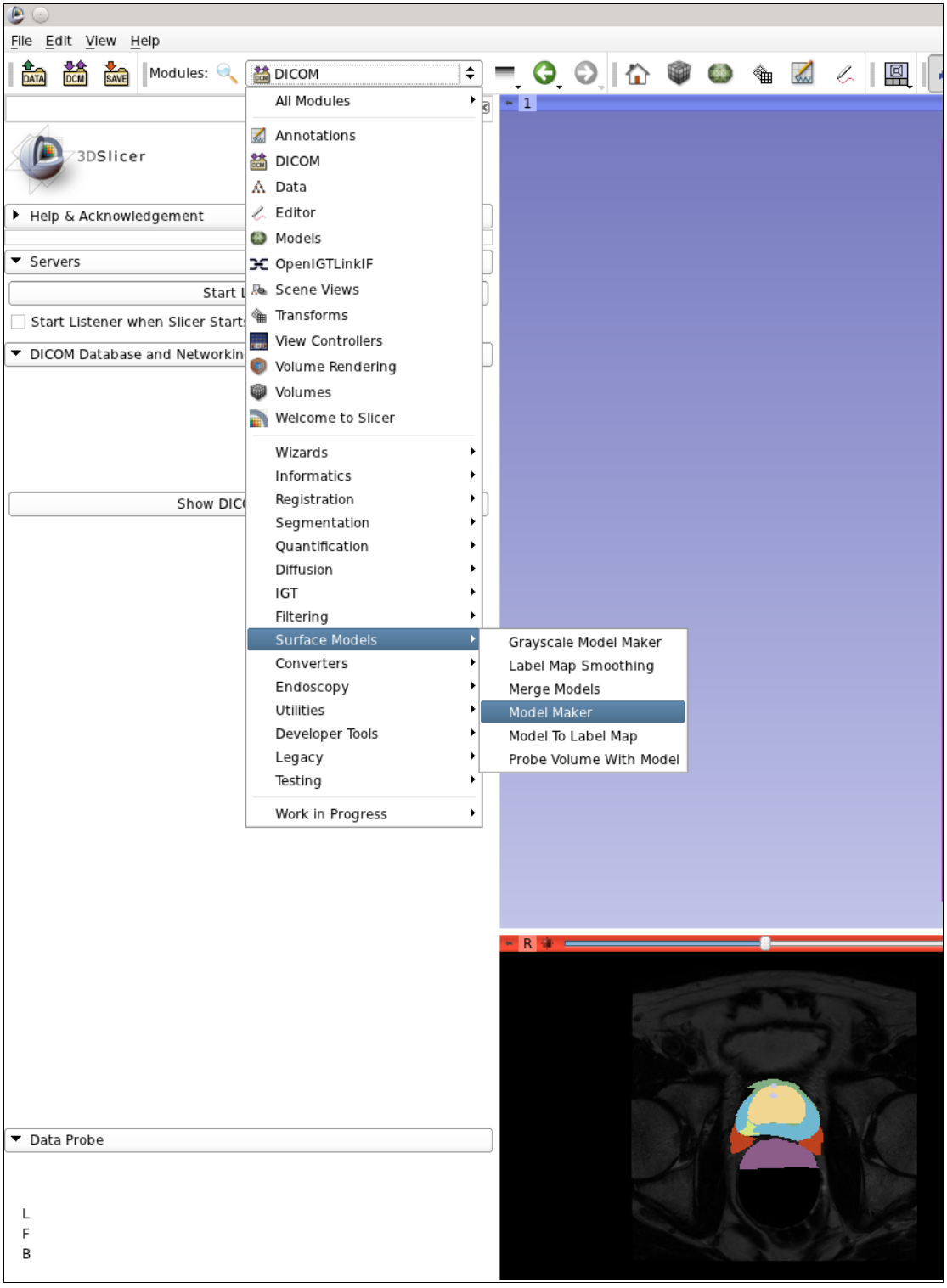
Import the NRRD segmentation and generate a 3D model. To do this, go to the **File** menu and choose **Add Data**.



Next, click **Choose File(s) to Add** and navigate to where the NRRD data is saved. Locate the NRRD file associated with the patient whose DICOM data you loaded in the earlier steps and click **Open**. You should now see the NRRD file listed as a volume. Next, click the **Show Options** box in the top right corner of the dialog box and check the **LabelMap** option that appears. Then click **OK**.

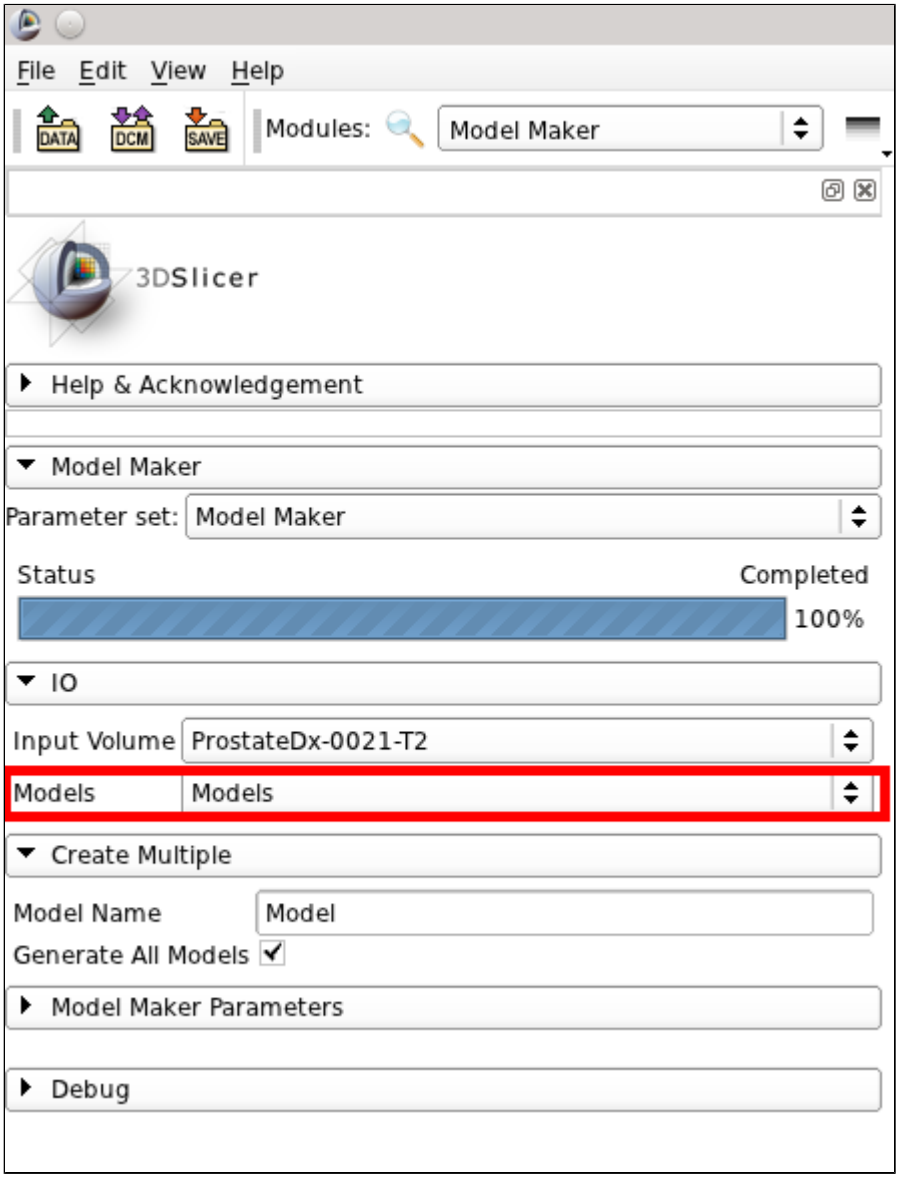


The colorized label maps appear as an overlay on the 2D DICOM images. Next, click the **Modules** menu and highlight **S urface Modules**. Then, select **Model Maker**.



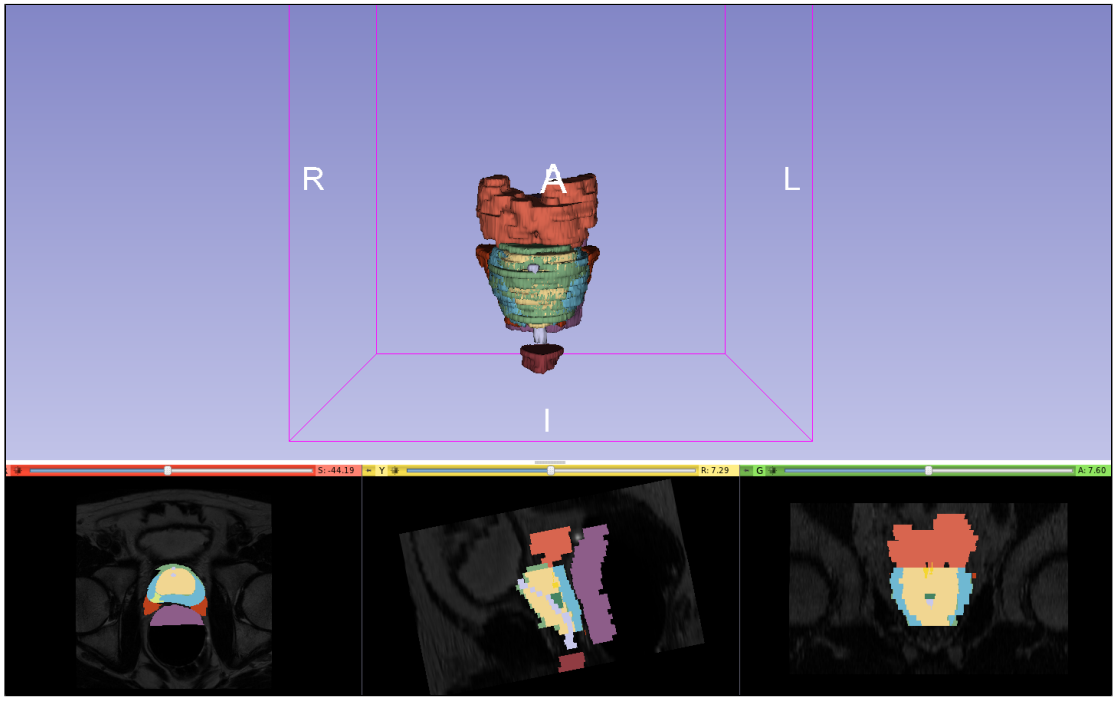
The Model Maker module will appear on the left side of the screen. Under **IO** change the **Models** drop down box to **Crea te New ModelHierarchy**. This will create a new entry called **Models** in this box.

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Click **Apply** at the bottom of the module and should now see a 3D rendering of the NRRD label map in the main viewing window.

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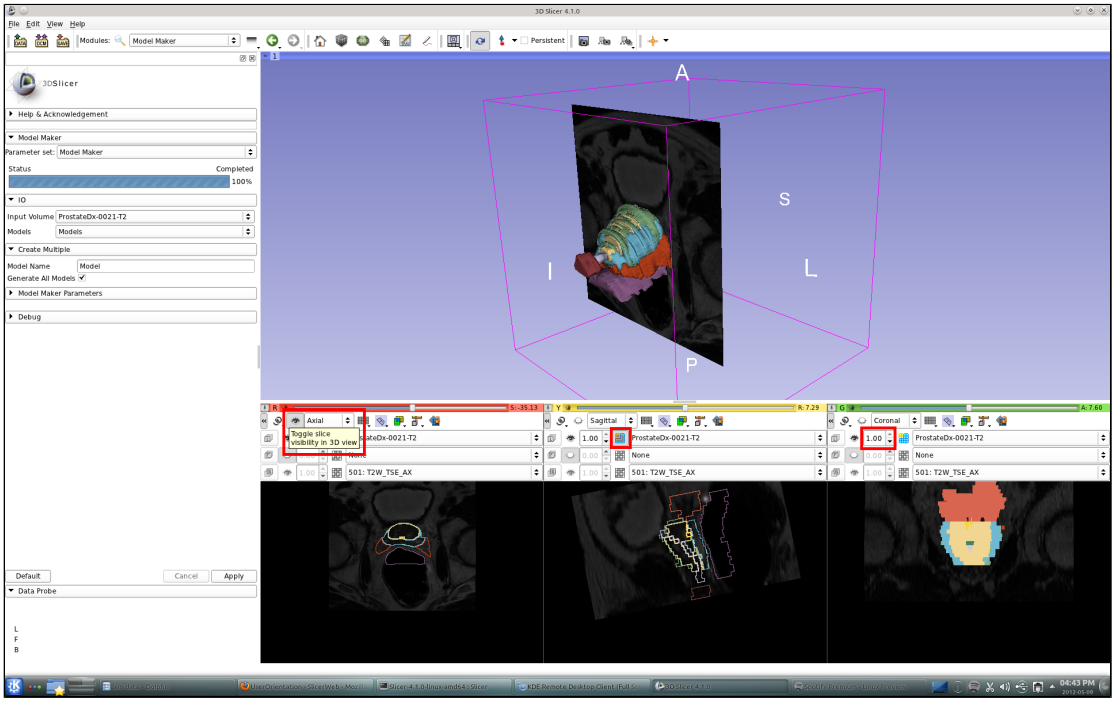


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Visualizing the Combined DICOM and NRRD Data

You can now tweak some settings to further visualize the data. The following settings are shown in the screenshot below:

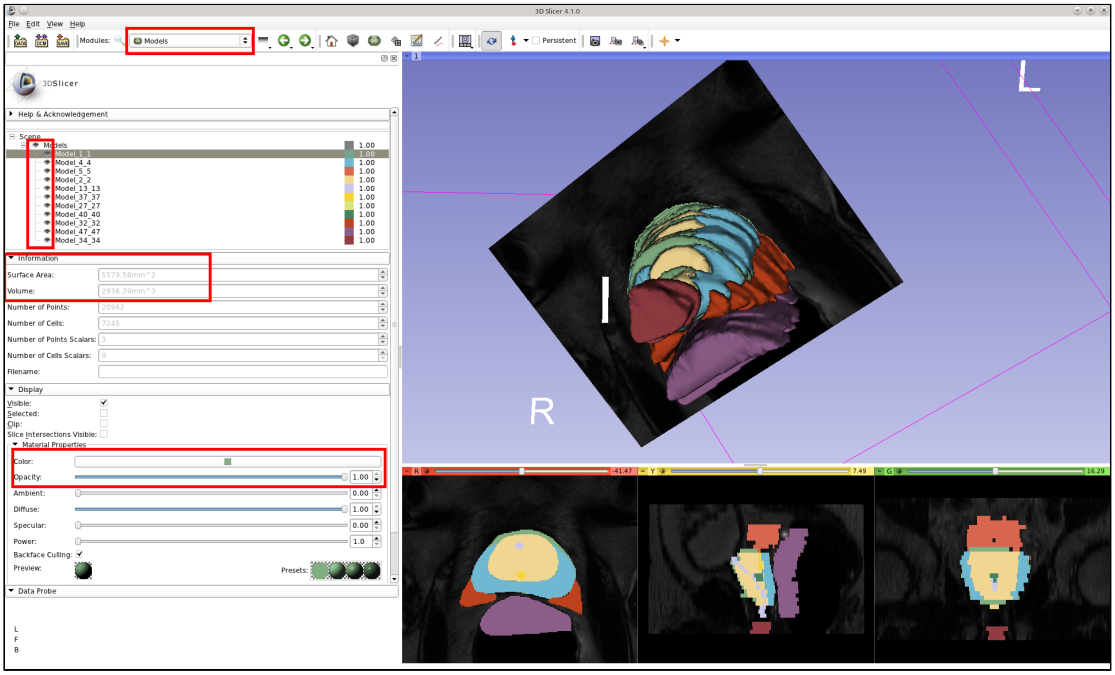
1. Toggle between showing the label map with regions outlined or filled by clicking the small pushpin on each of the 2D views and selecting or deselecting the button next to the label map name.
2. Modify the transparency of the label map by using the up/down arrows next to the label map name. The starting value is 1.00, which is fully opaque.
3. Toggle whether the DICOM slices are visible in the 3D view by clicking the visibility button next to the slice orientation.



Customize the 3D Model view by switching from the Model Maker module to the Models module. Click on each of the model components in the list options to changing the visibility, colors, opacity, etc. View information about each segmentation component such as surface area and volume in this view as well.

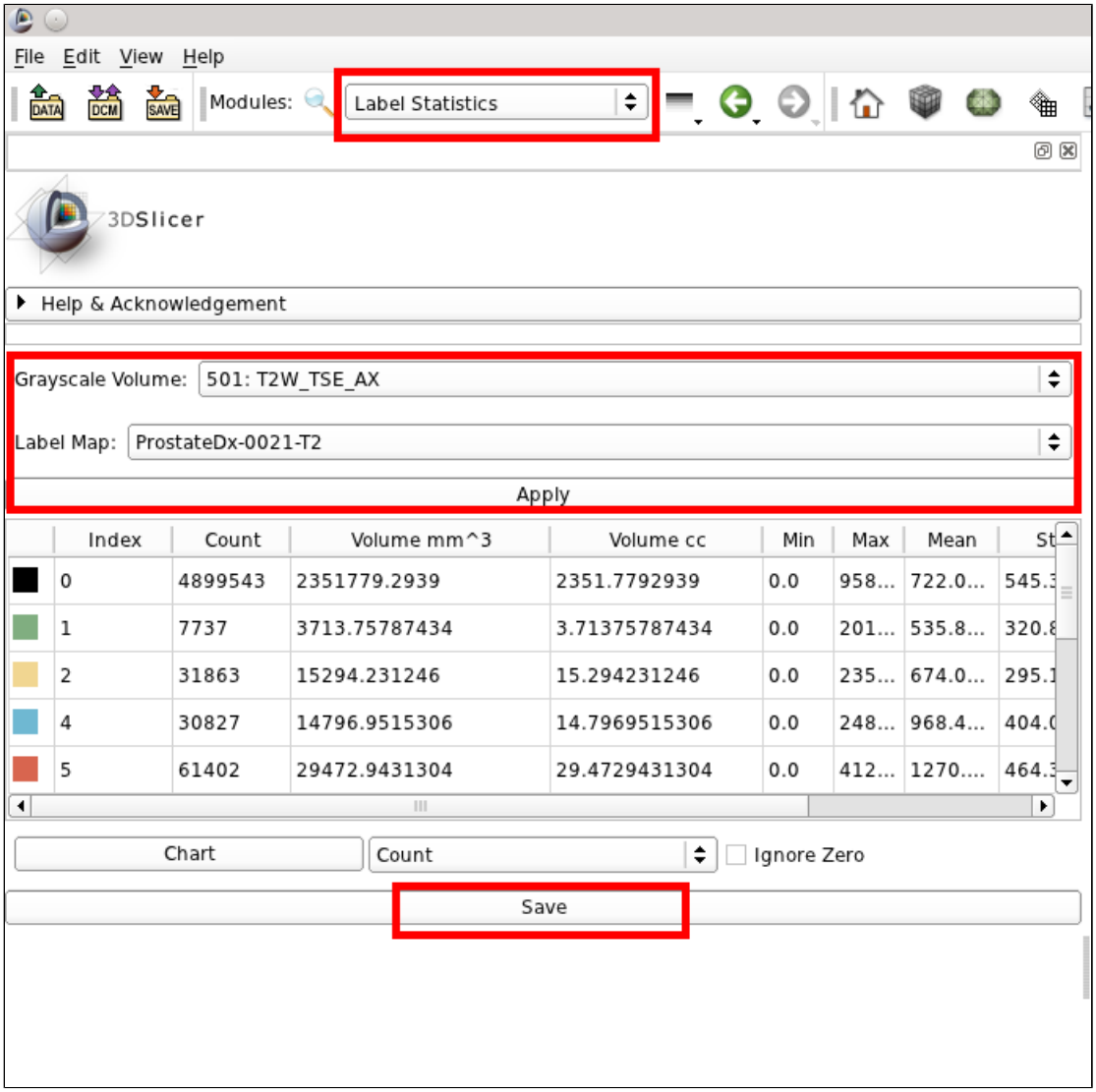
Note relating to surface area and volume values in the Models module

From Steve Pieper on the Slicer-Devel mailing list:
You can get that in the Information section of the Models module (click on the model you want to measure). Note that this method estimates the volume based on the surface triangles and can fail if there are holes or other topological issues with the model. If you created the models from label maps in slicer, you are better off using the Label Statistics module to calculate a volume of a region.



To more accurately calculate volumes and related info use the Label Statistics module, select your DICOM series for the Grayscale Volume, and the associated label map. Click **Apply** to calculate the information, and optionally click **Save** to export this data to a CSV file.

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