# Design Studio I - Vizualization

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## Topography with Autodesk Infraworks

**DESCRIPTION**  Modeling a context model with complex topography can take a great deal of time, but using GIS DEM information and Autodesk Infraworks it is a relatively straight forward process.

Autodesk Infraworks is a schematic design software for civil engineers and planners, but at its core it creates 3D models from GIS information. For the purposes of this tutorial, we will focus on the Infraworks' ability to create topography infromation from DEM files and to map aerials onto the topography.

**SOFTWARE**  Autodesk Infraworks is free to use for students for non-commercial purposes and using and Autodesk Education Community account, one can be downloaded the software at http://www.autodesk.com/education/free-software/infraworks.

**CREATING A MODEL**  To create a new Infraworks model and add GIS data do the following:
1. Open Autodesk Infraworks -> Click "New" in the menu on the upper left
2. In the "New Model" dialog, select the folder icon to the right of the "Location" field and navigate to the location you want to store the model. Infraworks can have issues with long file paths, so choose something short.
3. Type in the name of the model in the "Name" field and accept all the other default settings by clicking "OK"
4. Place your GIS information in a location with a short file path. Infraworks can sometimes have issues with long file names. I suggest C:\GIS
5. Verify that your GIS information is not zipped.
6. Click on the Infraworks icon (the big 'I') in the upper left -> In the horizontally expanded menu, select "Create and manage your model" -> In the vertically expanded menu, select "Data Sources"
7. In the "Data Sources" palette that opens on the the right side of the screen, select the more options pulldown arrow to the right of the first button in the upper left of the palette -> Select the format of the information you wish to import. See below for specific steps for aerial imagery and elevation data.
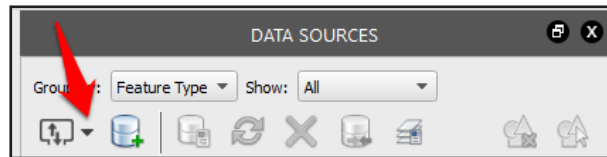


**IMPORTING AERIALS**  If you have aerial images and wish to drape the aerials onto the topography, you can do the following:
1. You will need GIS orthoimagery to do this workflow. This can not be any aerial image, but one that includes GIS projection and coordinate information.
2. In the "Data Sources" palette that opens on the right side of the screen, select the more options pulldown arrow to the right of the first button in the upper left of the palette -> Select "Raster"
3. In the "Select Files" dialog, navigate to the location where you stored the GIS orthoimagery. You can use SHIFT or CTRL (Control on Macs) to select multiple image files. It is suggested you group like files together into a batch import unless it is a very large data set.
4. The file will be imported but nothing will display yet.
5. Right click on the newly displayed file in the "Data Sources" palette -> Select "Configure"

from the context menu

6. In the "Data Source Configuration" dialog, verify that the "type" in the upper right is set to "Ground Imagery" -> Click "Close & Refresh -> Your computer will process the images. This may take some time so be patient.

7. After the refresh is done, the images may still take a few minutes to fully display, please be patient.

**CREATING TOPOGRAPHY** To create a topography model for use in your favorite modeling software, please do the following:

1. You will need GIS DEM to create the topography model. The resolution of the DEM information will determine the quality and detail of the topography model as well as how difficult it is to work with. Pick your GIS information carefully.

2. In the "Data Sources" palette that opens on the the right side of the screen, select the more options pulldown arrow to the right of the first button in the upper left of the palette -> Select "Raster"

3. In the "Select Files" dialog, navigate to the location where you stored the GIS DEM information and look for the file that stores the elevation data. The name and file type will depend on the GIS information you acquired but typically it will be the largest file and will likely be several hundred MBs.

4. The file will be imported but nothing will display yet.

5. Right click on the newly displayed file in the "Data Sources" palette -> Select "Configure" from the context menu

6. In the "Data Source Configuration" dialog, verify that the "type" in the upper right is set to "Terrain" -> If you have imported an aerial first and want to limit the area of the topography to match the aerial, click on the "Raster" tab -> Check "Clip to Model Extent"

7. Usaully, Infraworks can align data to each other and determe the projection and coordinate system the data is in, but occassionally you may need to research what the data projection and coordinate system is and change it in the "Geolocation" tab in the "Coordinate System" field. If you have trouble seeing the data after refreshing, remove the data and reimport and change the Coordinate System.

8. Once done configuring the data, click "Close & Refresh" -> The model will now import the topography information, this may take some time depending on the data set. I have had some data set import in a few minutes and others take several hours to process.

9. The topography model should now be visible on your screen.

10. To export to other programs click on the "Settings and Utilities" icon (wrench and screw driver crossing each other) in the menu in the upper left -> In the vertically expanded menu, select "Export FBX"

11. In the "Export to FBX" dialog, in the "Extents" portion, check the "Use Entire Model" or click the "Polygon" button to select a smaller region of the model to export. If a polygon is used, one single clicks to select the points and double clicks to select the last poitn and return to the "Export to FBX" dialog.

12. In the "Target Files" portion of the dialog, click on the folder icon to the write of the file path -> In the "Select target file for export" dialog, navigate to the location you wish to save the exported model.

13. Change the "Save as type" pull down to the file type you wish to export too. FBX files will create a mesh with UV mapping and any aerial images mapped to the mesh, however FBX is not readable by all 3D modeling software and additional translation steps may be required. DXF files are readable by most 3D modeling software but do not including any mapping and sometimes the files don't export reliably. If you are going to import into Rhino or Revit, I suggest starting with DXF. If you importing into 3DS Max or Maya, FBX is a good choice.

14. In the "Select target file for export" dialog, click "Save"

15. Back in the "Export of FBX" dialog, verify that "Export Materials/Textures" and "Merge Objects With The Same Texture" are checked -> Click "Export"

16. You can close Infraworks, the file will save automatically.

17. Import the file into your favorite software to use as you see fit.