ArcGIS (ArcMap) tutorial

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What is ArcGIS?

- ArcGIS is a geographic information system (GIS) for working with maps and geographic information, created by Esri.
- **ArcMap** is the main component of Esri’s ArcGIS suite of geospatial programs, often used primarily to create, edit, and analyse maps.
- **Who uses ArcGIS?**
  - Anyone working with geographic data, maps… geospatial specialists, planners, architects…
  - Arch/Planning students often use ArcGIS for spatial context analysis
ArcGIS

ArcMap
To view, edit and query geospatial data and create maps.

ArcScene
3D visualisation application, allowing you to view GIS data in 3D.

ArcCatalog
A data management application used to browse datasets and files.

ArcToolbox
Contains geoprocessing, data conversion and analysis tools.
Sorting Excel Data

- ArcMap requires different categories of information to be represented in different files.
  - Therefore, the data should be organized from **largest to smallest** to remove 0 values
  - Then, each category of data must be saved and imported into ArcGIS in **separate Excel files**.
Sorting Excel Data Example

- What fields need to be separated?
  - For example, car crash entries can be separated by the severity of the crash: fatal, severe, or minor

1. To select all data, press Ctrl + A (Command + A for Mac) twice.
2. While highlighted, look at the top bar and select Data > Sort.
3. In the pop-up window, select Sort by > infill the chosen column (i.e., crash fatal) > Largest to Smallest > Click Ok.

Now all the data entries required will be in order from largest to smallest, meaning you can remove entries that have no/a zero value easily if you wish....
Sorting Excel Data Example (Cont.)

- Separate data and create a **Excel Workbook** *(not multiple sheets on the same file)* for each category
  - If your map requires values above zero, then select said values and save them in a separate file.
  1. After sorting **ONE COLUMN** (i.e. crash fatal from largest to smallest), click + drag from the top left of all the data to the right, down to where the entries are greater than zero
  2. Do not miss columns to the right of the desired entry
  3. Copy the data **Ctrl + C** (Command + C for Mac)
  4. Create a new Excel Workbook/ an entirely new spreadsheet
     - File > New > Blank Workbook
  5. Paste in cell A1 **Ctrl + V** (Command + V for Mac)
  6. Check the column letters and data match the original file
Sorting Excel Data Example (Cont.)

- Save the Excel Workbook with a relevant title
  - Means when you input into ArcGIS, you know what data you are working with

1. Title each Workbook clearly, including the sheet (i.e Fatal crashes)
2. Always save to a clear folder on your USB (File> Save as)
3. Save as an older version of Excel to ensure compatibility (97-2003 Workbook is suitable)

Repeat the whole sort > new workbook process for each category of information you want to input into ArcGIS (i.e crash severe and crash minor)
Starting with ArcMap

Open ArcMap by searching "arcmap" in the Start Menu and selecting it.

Select My Templates from the left-hand menu that pops up, and select Blank Map. Click OK.
Navigating ArcMap
Typical process of using ArcMap

1. Retrieve and prepare your geospatial data
   • e.g. basemap data, object of study (e.g. statistics, crash data)
2. Import the data into ArcMap (Data view)
3. Visually configure spatial data (Data view)
   • e.g. design map showing different points of interest
4. Prepare for presentation/printing (Layout View)
Retrieve and prepare your geospatial data

Useful sources of geospatial data:

- Auckland GeoMaps – specific to Auckland
  https://geomapspublic.aucklandcouncil.govt.nz/
- GeoDataHub (only for UoA)
  https://geodatahub.library.auckland.ac.nz/
- Land Information New Zealand Data Service
  https://data.linz.govt.nz/
- Stats NZ
- ...And many more with a little Google search!

“Geospatial data”

- Is information related to geography (e.g. physical or human).
- Can be spatially expressed (e.g. map).
- Uses a geographic reference (e.g. coordinates, eastings etc.)
Access the GeoDataHub on University Computers:

1. Open File Explorer from bottom task bar (on Windows setup)
2. Right-click This PC from the left pane
3. Select Map network drive.
4. On the pop-up window, select a drive letter (e.g. Z:) and insert the following link:
   \files.auckland.ac.nz\shared\LIB\geodata
5. Select Finish.

GeoDataHub should now appear under your linked networks under This PC.
Importing GeoDataHub into ArcMap:

1. On ArcMap, go to Catalog (right side of screen).
2. Select Folder Connections. In the pop-up window, find the folder link to GeoDataHub.
3. Once selected, the GeoDataHub should appear in your Catalog under Folder Connections.
4. Drag and drop geospatial data you wish to include in the centre of the screen.

For example, add parcel data:

1. In your GeoDataHub folder, navigate to restricted > Auckland > AucklandCouncil_data > property > 2013_property_address
2. Drag the Parcel.shp file into the centre of the screen.
Importing Excel Data into ArcMap

Please note, that in order to have separate symbols for different categories of data in ArcMap, they must be in separate Excel files. They must be saved in the .xlsx (Excel Workbook) file format.

Select the Add Data button located in the menu toolbar.

Click Connect to Folder, and navigate to the folder where you have previously saved the Excel workbooks.

Double-click on one of your workbooks, and select the sheet that appears in the window.
Importing Excel Data (Cont.)

The sheet will now appear in your Table of Contents as shown. From now on these sheets will be referred to as tables.

Repeat the steps for the other two workbooks. You can use the UP arrow to get to the previous folder to select another workbook.

When you are finished, your Table of Contents should look similar to the far right image.
Plotting XY points (placement of data)

Right click on one of the tables and select Display XY Data...

In the pop-up window, select EASTING for the $X$ Field: and NORTHING for the $Y$ Field:

You must also select the Coordinate System we want the data to use, which is different for all parts of the world.

It is likely that the coordinate system will already be set, as the Parcel.shp and Road.shp files set a default system. The window should appear like the one shown (left).

If not, select Edit... and navigate to Projected Coordinate Systems > National Grids > New Zealand > Select NZGD 2000 New Zealand Transverse Mercator.

Repeat these steps for each table that requires a set of points. The points should now be visible on your map.
Exporting the Points as Shapefiles

In order to use the data you've plotted in different maps and to ensure you can re-access it, it is important to export and save the files as shapefiles (.shp). A shapefile is a popular geospatial vector data format for GIS software.

Right click on a crash layer in the Table of Contents, select Data > Export Data...

Rename your shapefile to a relevant name. Ensure that the Save as type is Shapefile.

When prompted as to whether you would like to add the exported layer to the map, select yes. If you wish, you can then delete the previous layers, as you have your shapefile.
Visually configure spatial data

- You can configure the appearance of spatial data under Properties.
- **Symbology** is particularly useful for editing the way information is visualised.
Presentation (Layout view)

Key tips:

- In the top menu, navigate to File > Page and Print Setup to change paper size and orientation
- In the top menu, navigate to Insert to add features e.g. title, legend, scale
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