

## Lab 1 Introduction

For each lab activity, you will start by creating your workspace folder on the **local hard drive**. Avoid using network drives. Network drives can increase processing time and cause technical glitches. In a computer lab, you will use the **C:** drive as your local hard drive. When you log into a computer then your user folder with your username should be created automatically under C:\Users.

In your user folder, create folder named Spatial\_Data\_Studio. Please use **only this folder** for all your works from this course!

In some computer labs or on your personal computer a different drive letter, such as **D:** may be assigned. You may also use an **external USB drive** if you plan to work in multiple locations but this will slow down your processing speed unless it is a SSD drive.

Under the Spatial\_Data\_Studio make a new folder for each lab session and give it a descriptive name. Be sure there are **no spaces in the name**. You may use underscores instead of spaces. In some cases we will also create the following three subfolders: **original**, **working**, and **final**. Having a standardised folder structure helps to keep your work organised, primarily when you are working with multiple partners.

For storing your data/work in the web and making it accessible from both computer labs, we will use OneDrive. OneDrive is already installed to the computers of the computer lab. In case you wish to install it to your personal computer then use guidelines from here: <https://wiki.ut.ee/display/AA/Microsoft+OneDrive>

You can login to OneDrive using your Tartu Uni credentials.

### Before you start:

- 1) Create the folder on the local C:\Users\Your\_Name\Spatial\_Data\_Studio\Lab\_1a
- 2) Download file Lab\_1a.7z for this lab session from: <https://bit.ly/3bUVbmk>
- 3) Move your Lab\_1a.7z file to Lab\_1a folder and unzip all the files and then delete zipped file to clean up space on the disk.

## PART A

### *Become familiar with geospatial data models and data types*

1) Open Lab 1.mxd file. Explore the layers in Table of Contents. You can change the view of Table of Contents by Drawing Order, by

Source, by Visibility and by Selection<sup>1</sup>



**Can you identify which are raster and which are vector layers?**

**Please fill the Quiz Lab 1A Q1 in Moodle**

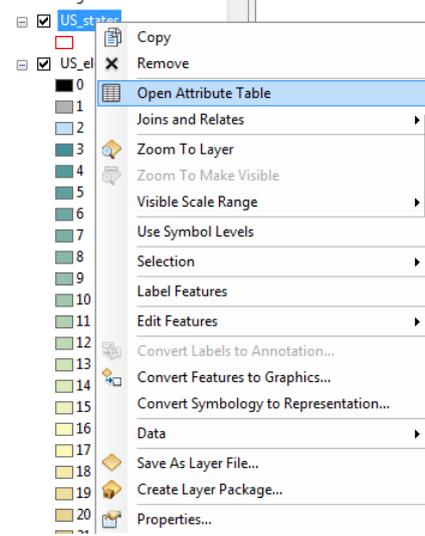


<sup>1</sup> More reading about Table of Contents: <http://desktop.arcgis.com/en/arcmap/10.3/map/working-with-arcmap/using-the-table-of-contents.htm>

2) Open the attribute table for US\_states.shp by right clicking the layer name in Table of Contents and choosing Open Attribute Table. Explore the attributes.

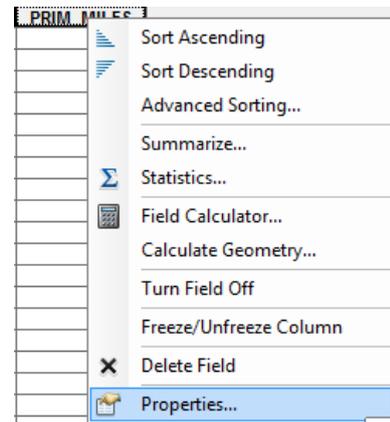
**Which attributes belong to nominal, ordinal, interval or ratio type?**

**Please fill the Quiz Lab 1 Q2 in Moodle**



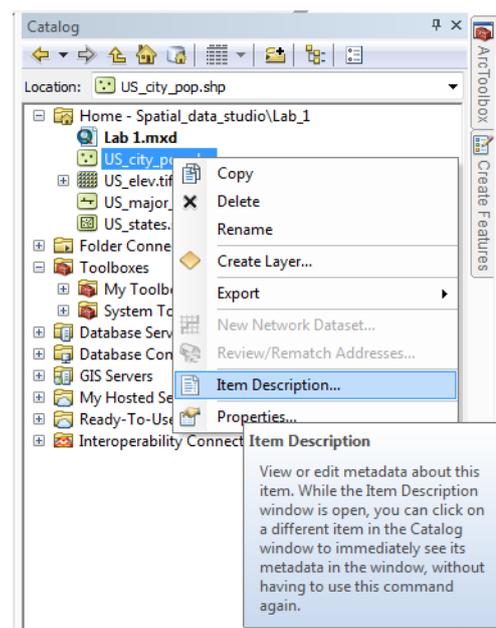
3) It is suggested to choose Field Type according to the level of measurement of your data. If it is Nominal then Field Type should be String (Text). If it is Ordinal then Field type should be Integer etc. You can check the Field Type by doing right click on the Field name and choosing Properties. Explore Field Types of US\_city\_pop. What is the field type of GNIS\_ID , ANSICODE, NAME, POP\_2010, ELEV\_IN\_M and ELEV\_IN\_FT?

**Please fill the Quiz Lab 1A Q3 in Moodle**



### Viewing metadata

4) Viewing Metadata. Open ArcCatalog  within ArcMap. You may dock it to your right side of ArcMap



view for example. You can also open ArcCatalog<sup>2</sup> in a separate program view. Right click on US\_city\_pop.shp→Item description. This opens metadata for the layer. Explore the metadata of US\_city\_pop.shp

### **Please fill the Quiz Lab 1A Q4 in Moodle**

Explore also metadata of US\_states.shp. How is it different in the level of detail from the metadata of US\_city\_pop.shp?

*Hint:* the level of detail in metadata can be very different. Some metadata is very explicit and for some layers metadata is non-existent which makes it complicated to use and share. Some data might even miss information about spatial reference system which means that you might distort data if you use it in a wrong reference system etc

### ***Data organisation***

Files with the extension .mxd are ArcMap document files. MXD stands for **Map Exchange Document**. ArcMap document files contain map, specifics about the GIS data used (including pointers to the file location for each dataset), display information (symbolology and labeling) and other elements used in ArcMap. **ArcMap document files don't physically store GIS data but contain pointers to the location of the GIS data.** GIS data that is not locatable when opening an ArcMap document file will be noted by an exclamation point (!) next to the data symbolology in the legend section of the ArcMap table of contents.

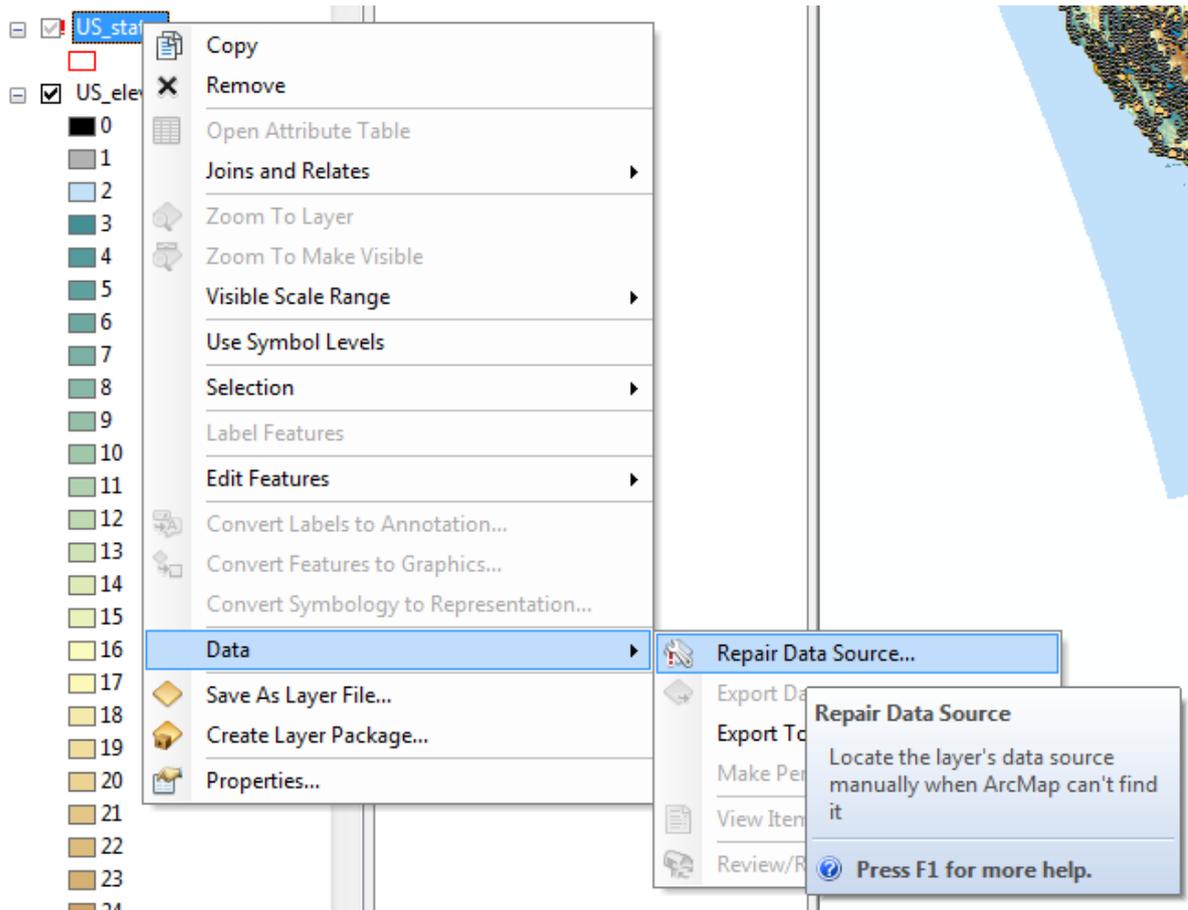
If you need to move your data files or mxd file then after moving them to another folder you need to repair your data source.

Let's do a little test try. Close your mxd and ArcGIS. Create a folder called Test to your Lab\_1 folder (C:\Users\Your\_Name\Spatial\_Data\_Studio\Lab\_1\Test) and move all the files for US\_major\_roads and US\_states to newly created Test folder. Re-open Lab\_1.mxd file. It is unable to find and show you US\_major\_roads and US\_states because you moved them to another folder. In the Table of Contents you should see red exclamation marks (!) next to those two layers.

Right click on the layer US\_states name and choose Data→Repair Data Source and navigate to the new location of the files and choose the correct file. All other files will be then repaired automatically.

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<sup>2</sup> [Quick Tour to ArcCatalog](#)



Save your mxd and close ArcGIS again and move US\_states and US\_major roads back to Lab\_1 folder. Re-open Lab\_1.mxd and repair data sources again. Save and close.

## PART B

In this part you will explore by yourself similar data as in Part A and will make fill in a Quiz 1B and make a map based on the data.

### Before you start:

- 1) Create the folder on the local C:\Users\Your\_Name\Spatial\_Data\_Studio\Lab\_1b
- 2) Download file Lab\_1b.7z for this lab session from: <https://bit.ly/3bUVbmk>
- 3) Move your Lab\_1b.7z file to Lab\_1a folder and unzip all the files and then delete zipped file to clean up space on the disk.

### TASKS to perform independently:

**1) Explore the datasets and fill in the Quiz 1B.**

**2) Create one thematic map of your choice** (for example, population in the cities and administrative units or Estonian land use). The map has to have the title, legend, north arrow, scalebar and appropriate coloring schema. See examples: Figure 1 and Figure 2. **Upload the map to Moodle (jpg, png or pdf).**

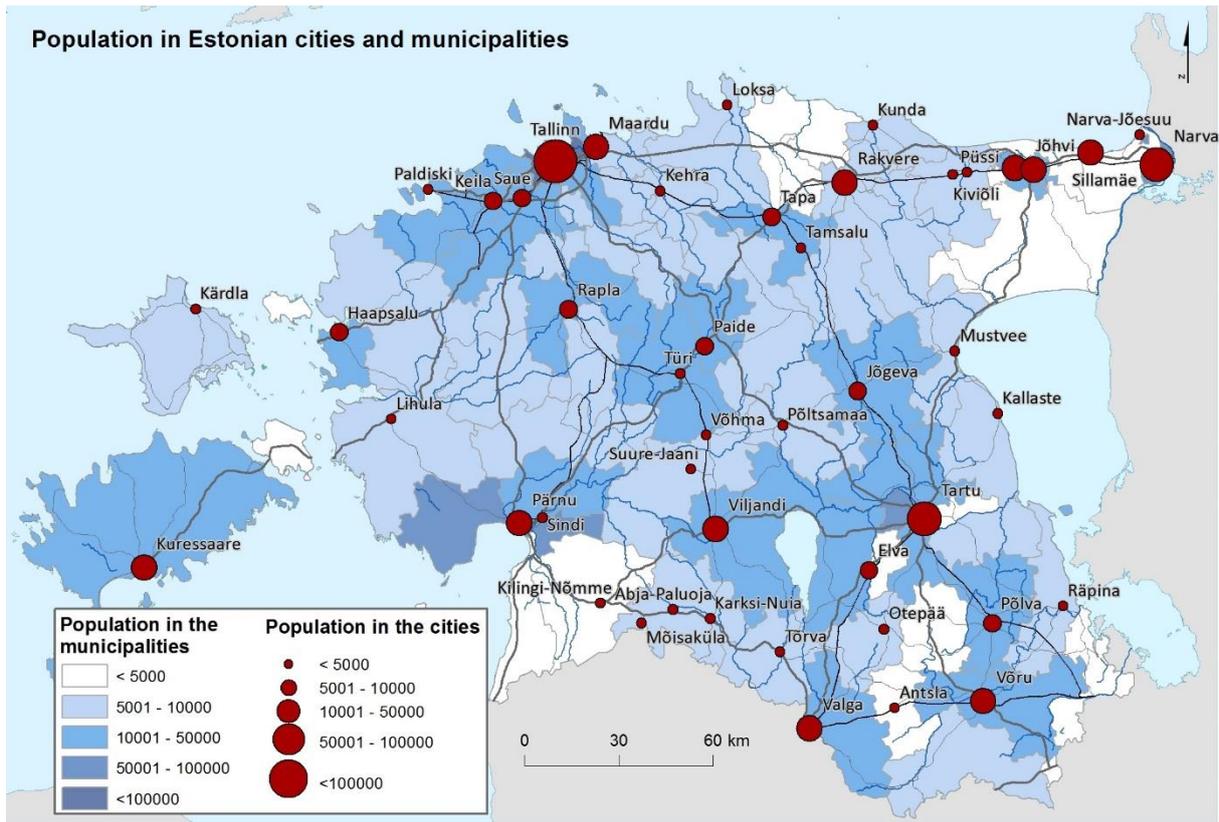


Figure 1. Population in Estonian cities and municipalities

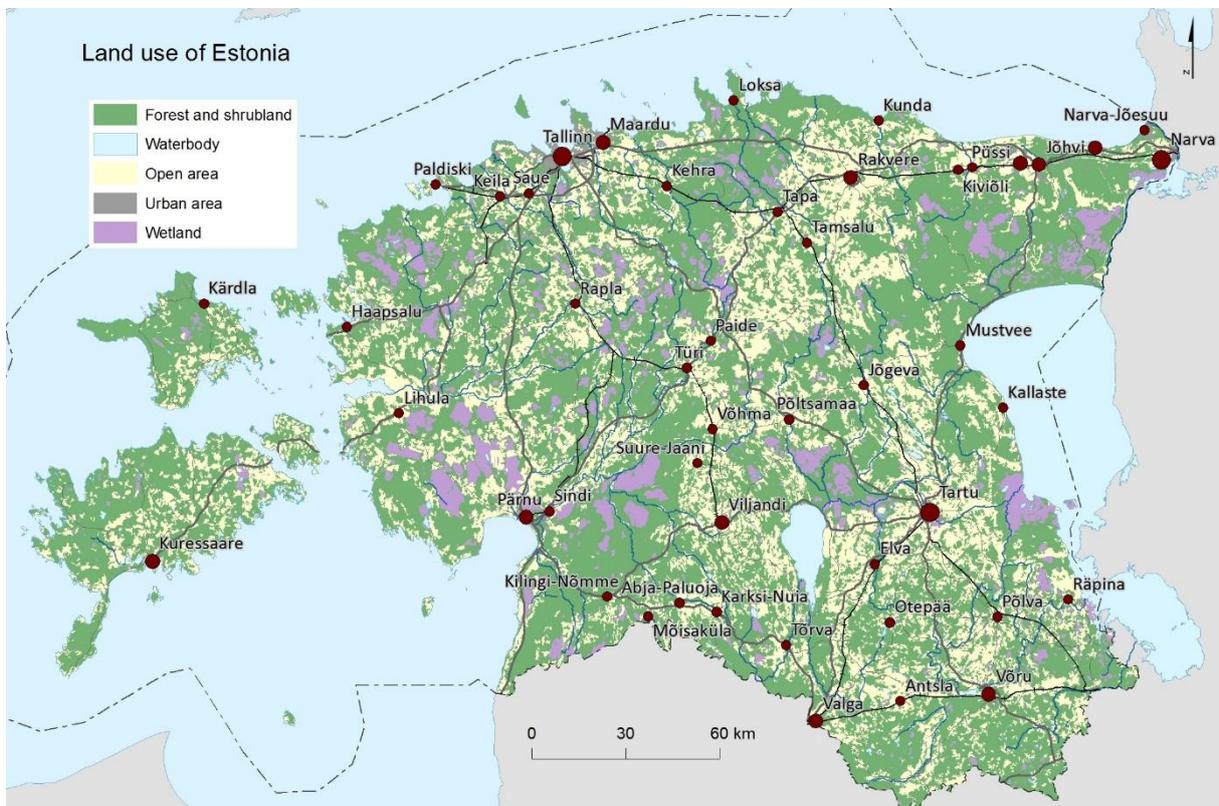


Figure 2. Land use of Estonia

**Data used in this Lab:**

**U.S. National Atlas Cities** provides information about the locations, names, features, types, populations, and elevations of cities and towns for conducting geographic display and analysis on national and large regional scales.

Data source:

<https://www.arcgis.com/home/item.html?id=872b352dfd1d4f6e942e8e0208321ced>

**U.S. Major Roads** provides an invaluable reference and cartographic layer that make it easy to identify areas in other datasets. U.S. Major Roads overlays accurately on streets and other boundary data.

<https://www.arcgis.com/home/item.html?id=871852b13b53426dabdf875f80c04261>

**100-Meter Resolution Elevation of the United States.** The original dataset has been resampled to approx. 1000m to reduce the file size. Source:

[https://nationalmap.gov/small\\_scale/](https://nationalmap.gov/small_scale/)

**The State boundaries of the United States of America** at a scale of 1:1,000,000 as of 2013. Source: [https://nationalmap.gov/small\\_scale/](https://nationalmap.gov/small_scale/)

**Generalized Estonian Topographic Data, Estonian Land Board 2016**

<https://geoportaal.maaamet.ee/eng/Maps-and-Data/Estonian-Topographic-Database/Generalized-Estonian-topographic-data-p554.html>