



Working with GIS

Visualizing space and place in your research.

A workshop by Jonathan Bos, PhD Candidate at the
Fryske Akademy and Leiden University



Geographical Information Systems

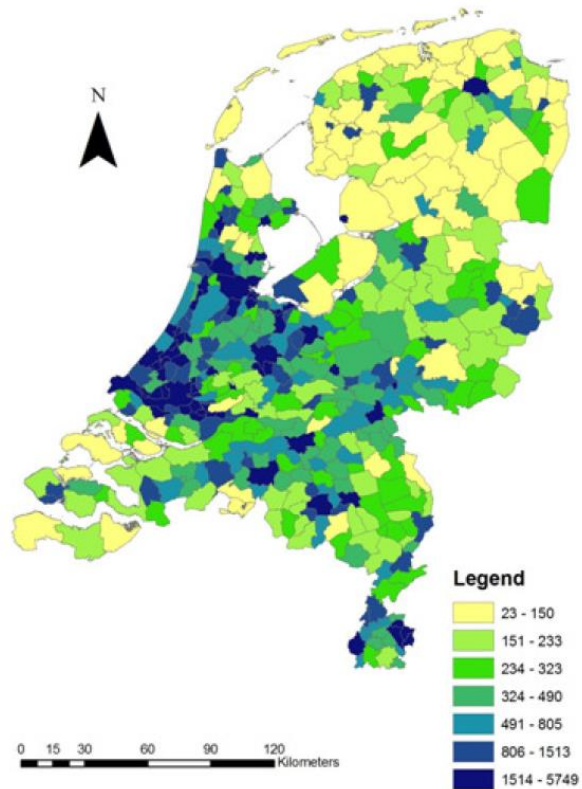
Geographical Information (GI) + Systems (S) = GIS

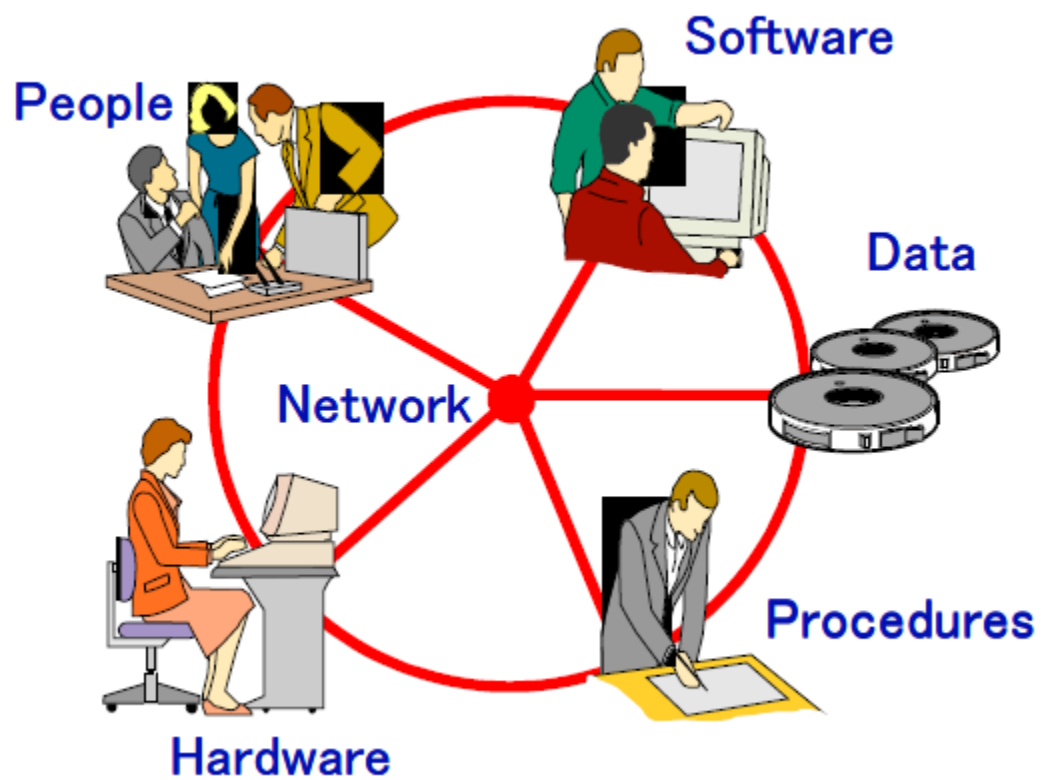
“A system for capturing, storing, checking, integrating, manipulating, analysing and displaying data that is referenced to the surface of the earth.”

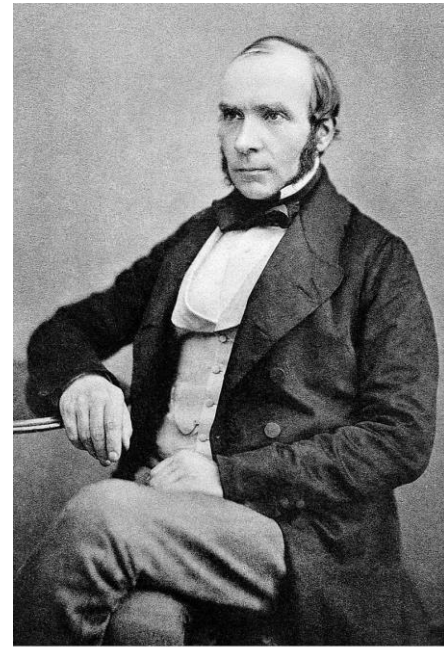
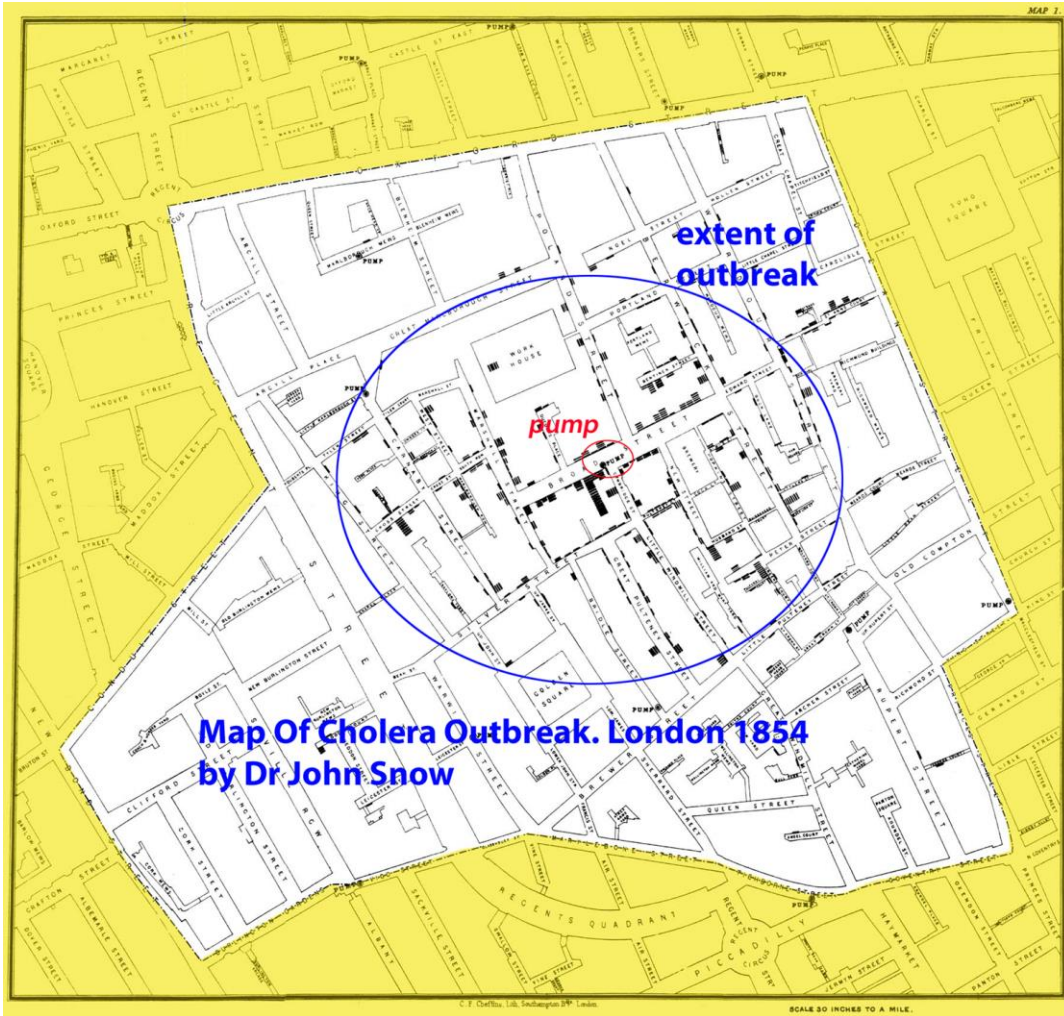
Turn this

GEMNAAM	OPP TOT	BEV DICHTH	AANT INW	PROVNR	PROVCODE	PROVNAAM
Appingedam	2462	511	12190	20	20	Groningen
Bedum	4496	238	10600	20	20	Groningen
Bellingwedde	11007	88	9510	20	20	Groningen
Ten Boer	4571	160	7250	20	20	Groningen
Delfzijl	22748	208	27650	20	20	Groningen
Groningen	8369	2327	181610	20	20	Groningen
Grootegeest	8778	140	12150	20	20	Groningen
Haren	5070	412	18810	20	20	Groningen
Hoogezand-Sappemeer	7305	512	34390	20	20	Groningen
Leek	6427	303	19190	20	20	Groningen
Loppersum	11199	97	10780	20	20	Groningen
Marum	6488	156	10070	20	20	Groningen
Almere	24877	1388	180920	24	24	Flevoland
Stadskanaal	11996	290	34120	20	20	Groningen
Scheemda	11746	123	14120	20	20	Groningen
Slochteren	15884	100	15190	20	20	Groningen
Veendam	7871	369	28120	20	20	Groningen
Vlagtwedde	17051	99	16600	20	20	Groningen
Zeewolde	26897	79	19700	24	24	Flevoland
Skarsterlân	21689	145	27050	21	21	Friesland
Winschoten	2224	854	18480	20	20	Groningen
Winsum	10253	139	14000	20	20	Groningen
Boarnsterhim	16859	127	19310	21	21	Friesland
Zuidhorn	12837	147	18460	20	20	Groningen
Dongeradeel	26694	149	24860	21	21	Friesland
Achtkarspelen	10399	274	28140	21	21	Friesland
Ameland	26850	58	3460	21	21	Friesland
het Bildt	11651	119	10960	21	21	Friesland
Bolsward	942	1054	9600	21	21	Friesland
Dantumadeel	8749	227	19460	21	21	Friesland
Franekeradeel	10916	200	20570	21	21	Friesland
Harlingen	38767	618	15460	21	21	Friesland

Into this









John Snow



- 
- Turn data into knowledge
 - Optimize routes
 - Develop network data using GPS: drivers inform each other about obstructions in the road
 - Reduce 1 mile per driver per day. For such a big company this has a lot of impact

<https://youtu.be/HFwM83G8nRg?t=51>



- 
- Turn data into knowledge
 - Develop a 1832 (pre-land consolidation) infrastructure for historians, archaeologists, institutions, etc.
 - Combine modern data and data from 1832 with all kinds of possible sources.


<http://hisgis.fa.knaw.nl/?db=nederland&rafn=Fryslan&layer=620Kadaster+1832+gebouwen+fryslan&layer=630Kadaster+1832+percelen+fryslan&style=0&style=0&fn=provincie&fv=fryslan>



- DARMC allows innovative spatial and temporal analyses of all aspects of the civilizations of western Eurasia in the first 1500 years of our era, as well as the generation of original maps illustrating differing aspects of ancient and medieval civilization. **A work in progress with no claim to definitiveness**, it has been built in less than three years by a dedicated team of Harvard undergraduates, graduate students, research scholars and one professor, with some valuable contributions from younger and more senior scholars at other institutions.

<http://maps.cga.harvard.edu/darmac/>



- 
- For MoEML, the map is a Graphical User Interface (GUI) that allows us to visualize literary and historical data, a material object with its own historical and aesthetic interest, and a text in its own right.

<https://mapoflondon.uvic.ca/agas.htm>

MAP *of* EARLY MODERN LONDON

“A GIS can be seen as a set of tools that allows the user to analyze spatial data, such as maps. Like a toolbox that holds a set of tools that enable the user to create or repair an object, GIS is software that contains within it the elements necessary to work with almost any type of spatial data.”

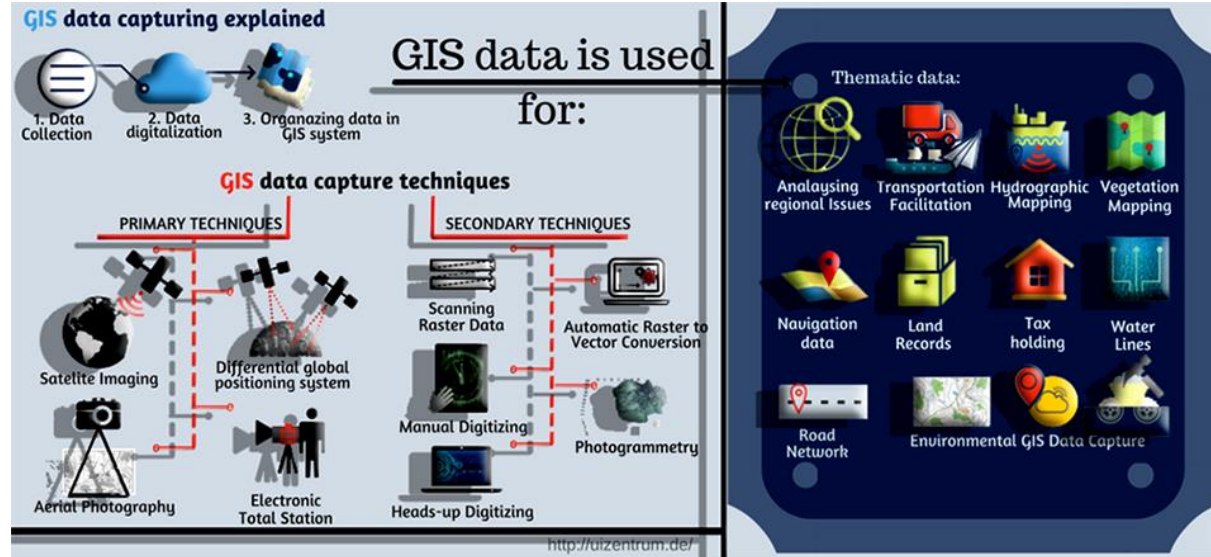


What can you do with GIS?

1. Organise
2. Analyse
3. Visualize

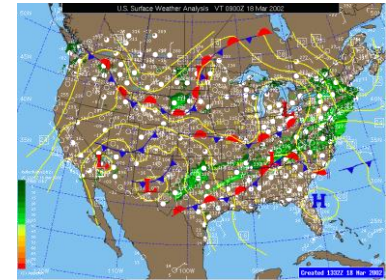
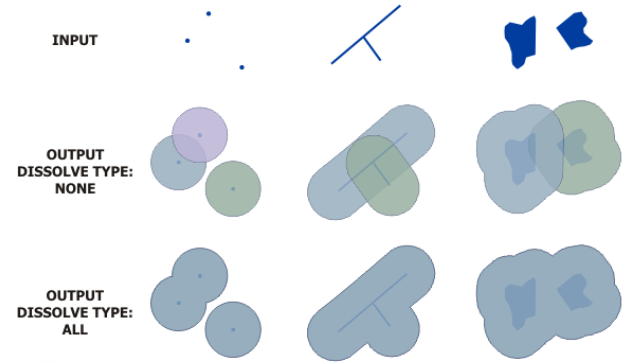
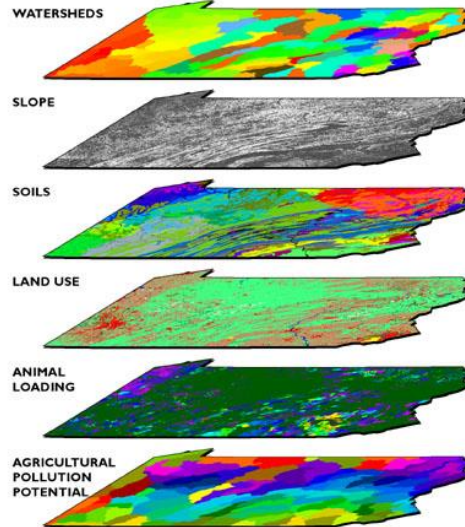
Organise

- Research question
- Capturing and storing data
- Preserve maps and files
- Organize Metadata



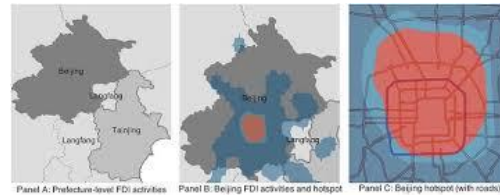
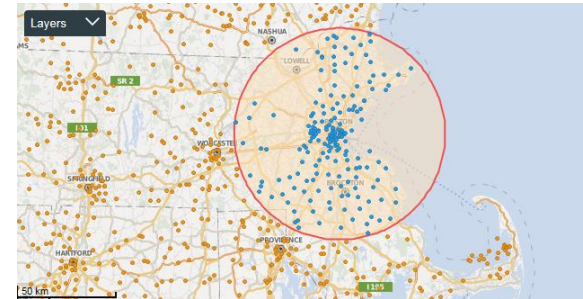
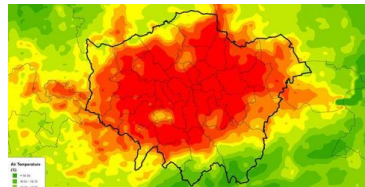
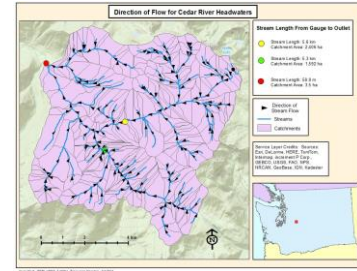
Analyse

- Map overlay
- Buffering
- Surface analysis
- Network analysis
- Location, distribution, form, space and relationship



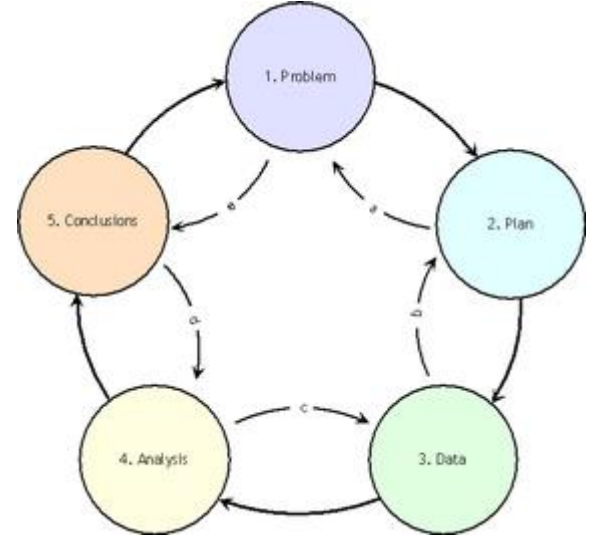
Visualize

- Choropleth
- Heat map
- Core-periphery analysis
- Size map
- Point map
- Web-based maps
- Story maps



How to start?

1. Research question
2. Gathering sources
3. Organizing, processing, and analyzing data
4. Performing spatial analysis
5. Go back to step 1 or 2
6. Combine your other (economic, social, historical) results and ideas with your GIS results
7. Publish your work
8. Preserve your data



Maps of Friesland (1845)

Maps of Friesland (1695)

List of nobility (1504 and 1525)

Cadastre of 1832

Tax register (1511)

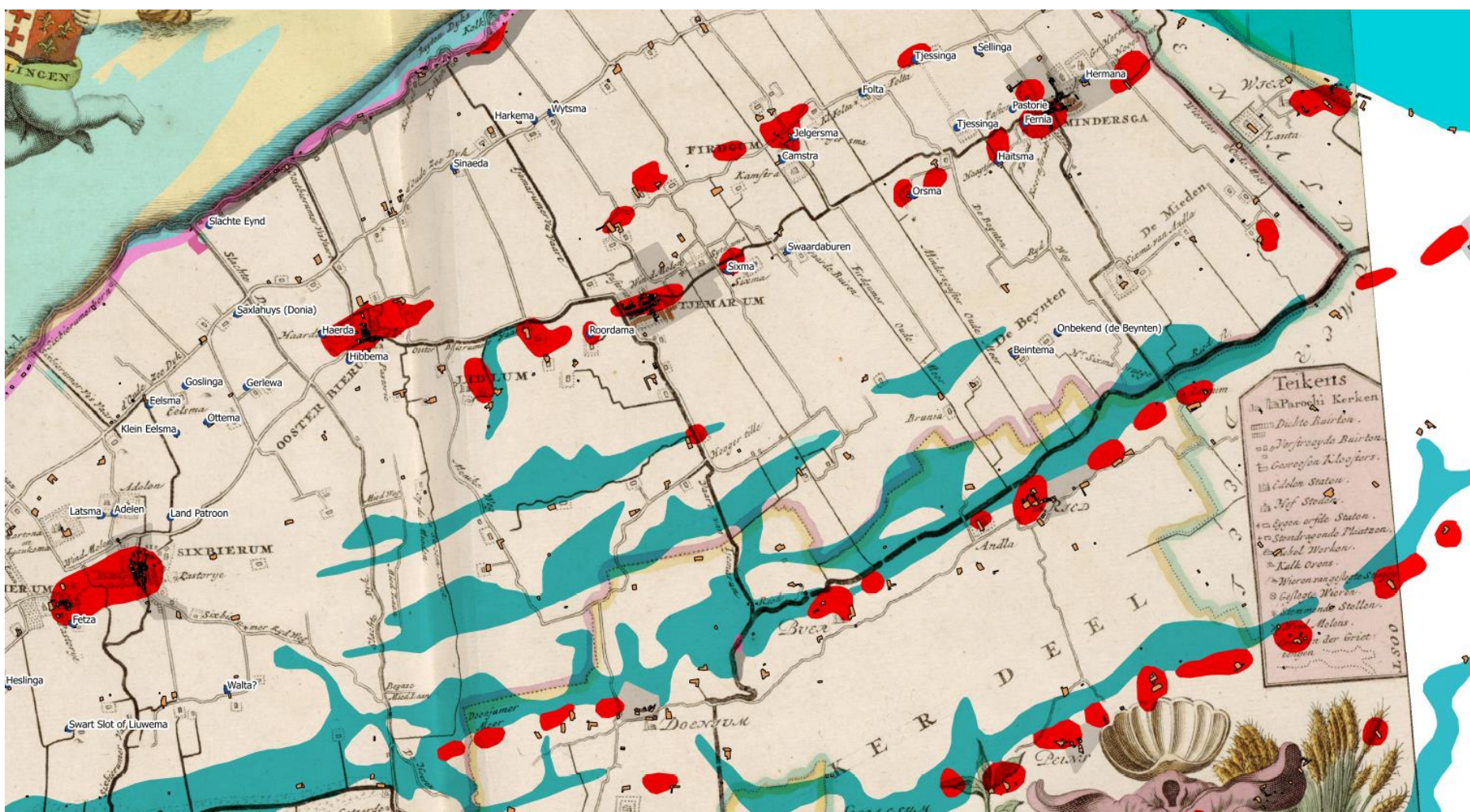
Later successor of the tax
register (1540)

Chronicles about the history of
Friesland from 1200-1550

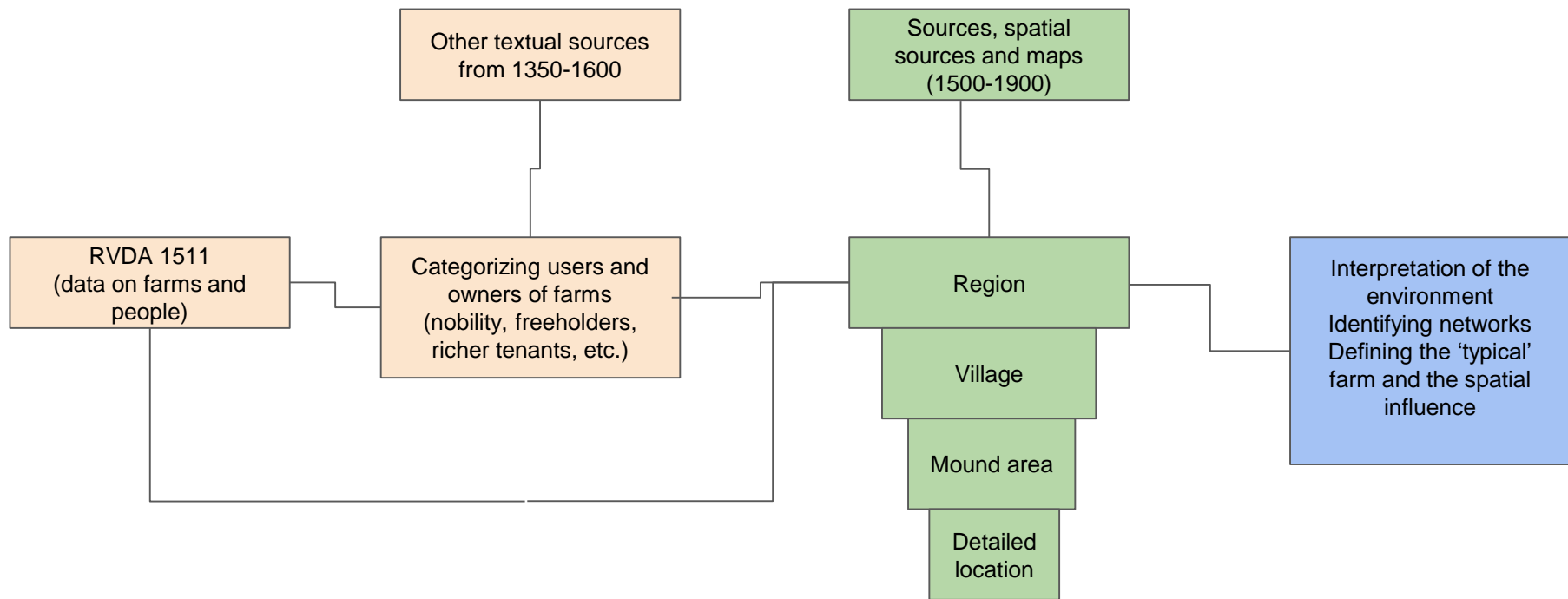
Later successor of the tax
register (1700)

Literature using the tax
register





Teikens
La Parochi Kerken
Dichte harten
Dorpsvelden
Gevogten Klogien
Edelen Staten
Nef Staten
Egen en fide Staten
Sonderende Planten
Edel Werken
Kalk Ovens
Wonen van geloven
Gefloste Wonen
Stellen
L. Molens
van der Griet
L. 1800



Interpretation of farms, groups and individuals

Localization of property

Definition and explanation

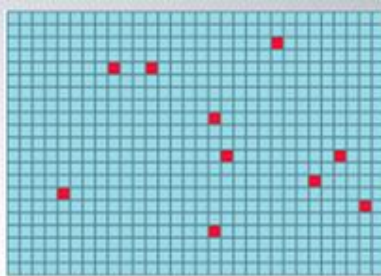


Key concepts

- Vector and raster models
- Vector types: polygons, points and lines
- Layers
- CRS
- Plugins
- Print Layout
- Toolbox for analyses
- Finding data
- Problem? Use a search engine.



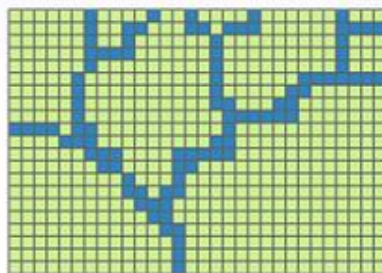
Point features



Raster point features



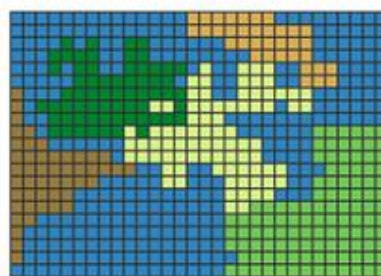
Line features



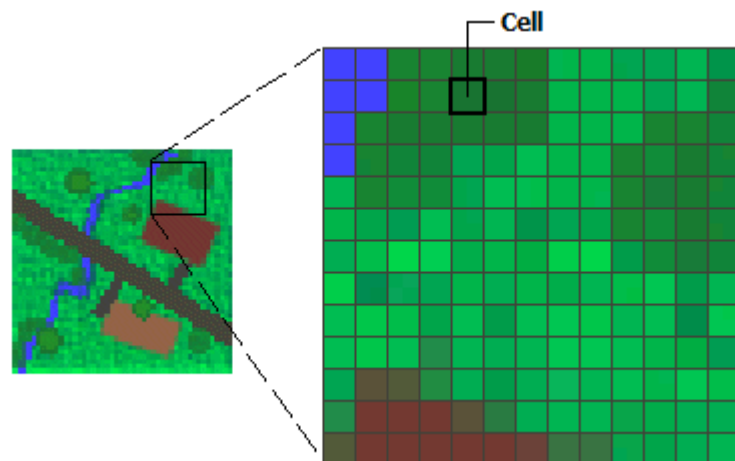
Raster line features

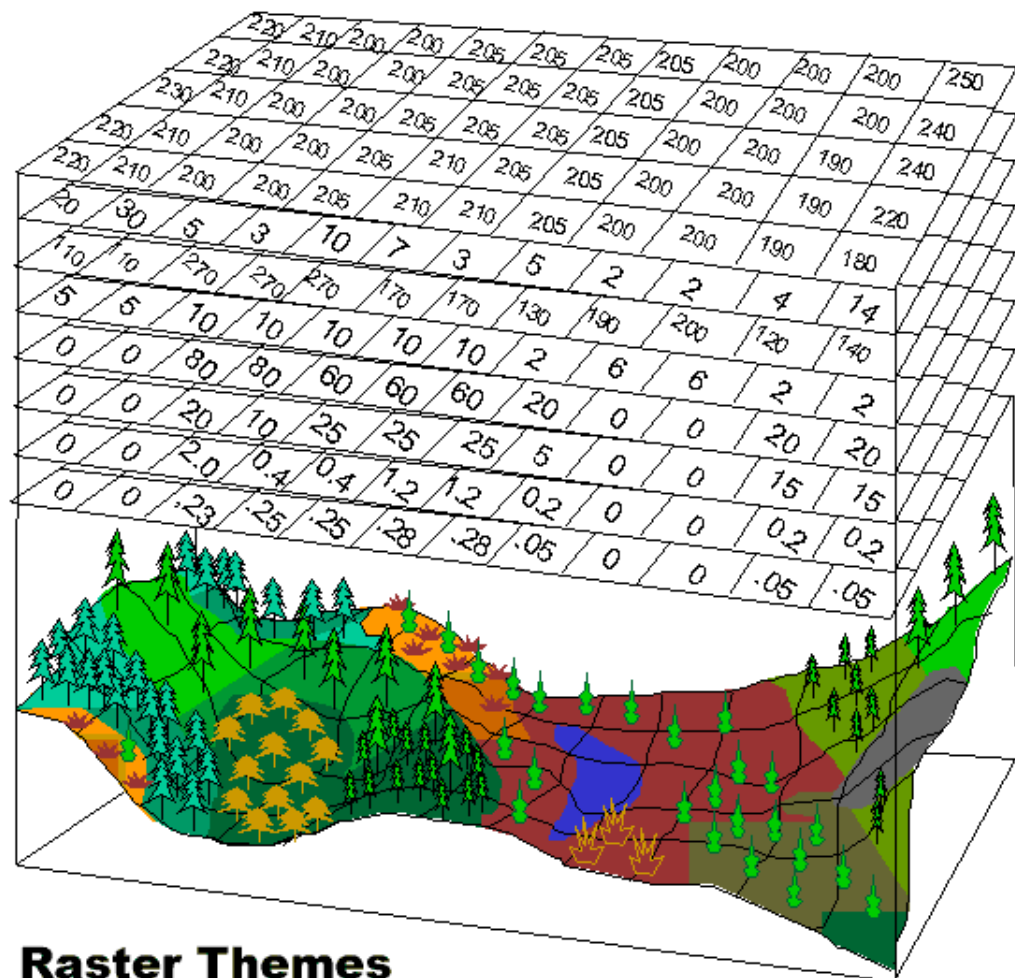


Polygon features

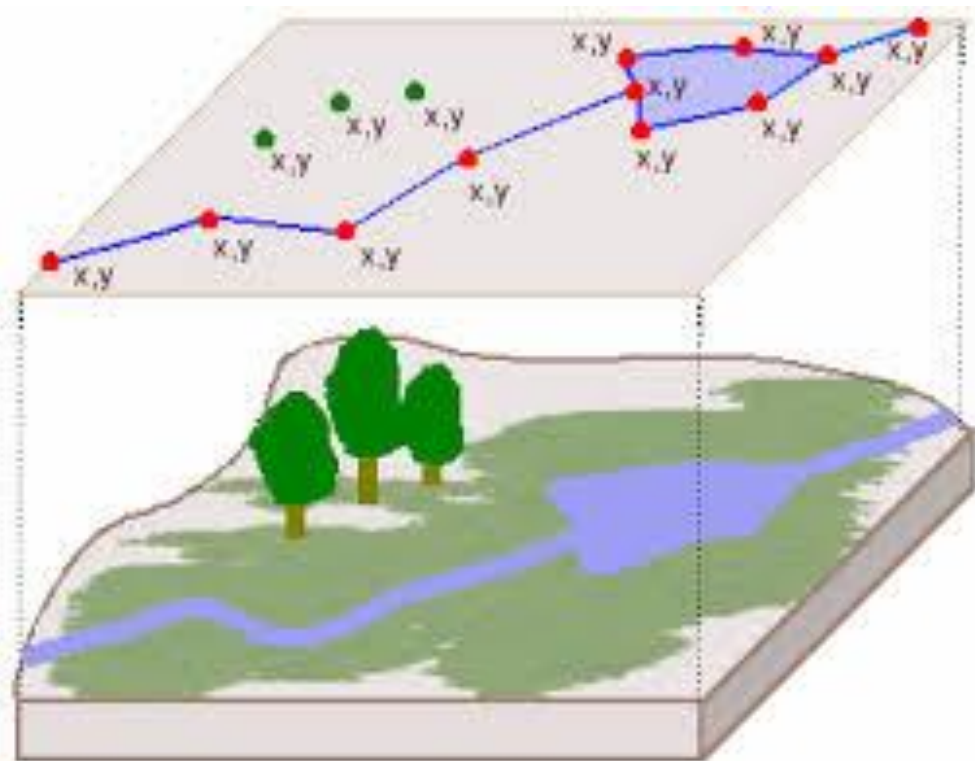


Raster polygon features





Raster Themes



Data source

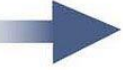
Street data



Buildings data



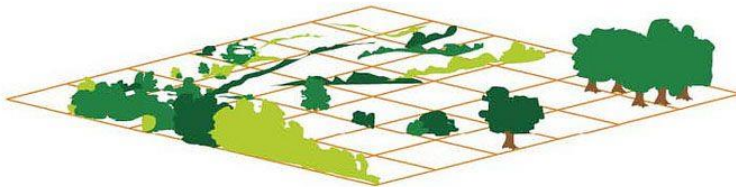
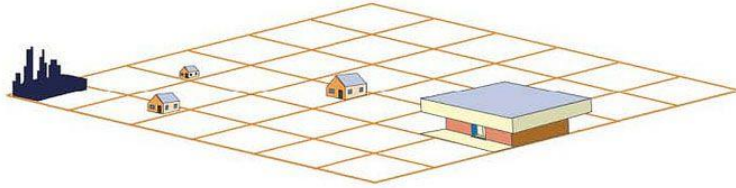
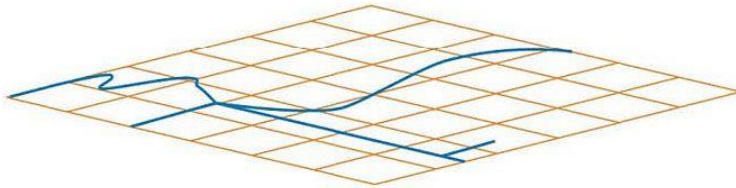
Vegetation data



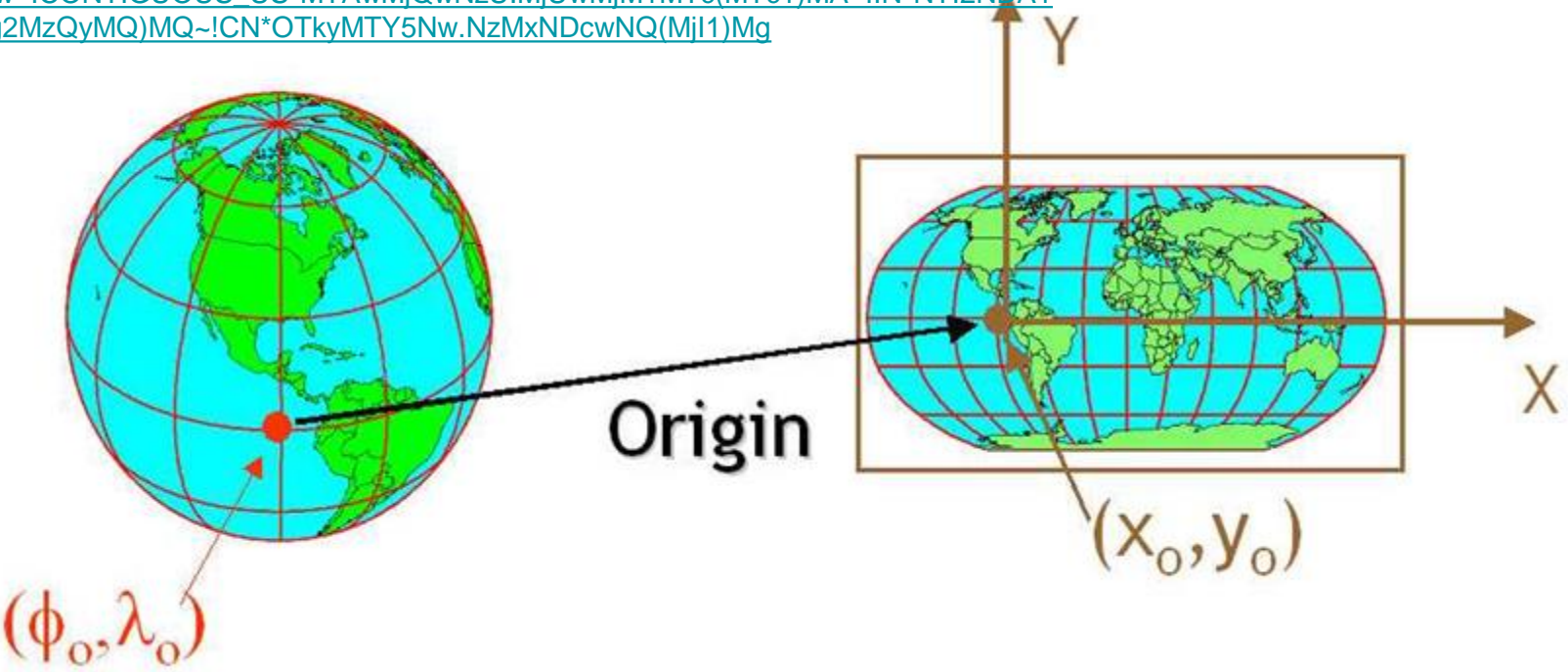
Integrated data

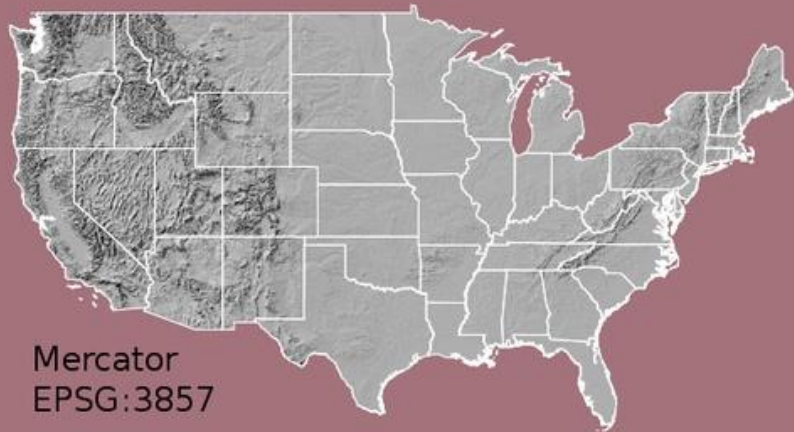


Data layers



[https://thetruesize.com/#?borders=1~!MTU5MDg5NjM.NDI1ODlwOQ*MzMzNjlyNzU\(NDEyOTg1Mw~!CONTIGUOUS_US*MTAwMjQwNzU.MjUwMjM1MTc\(MTc1\)MA~!IN*NTI2NDA1MQ.Nzg2MzQyMQ\)MQ~!CN*OTkyMTY5Nw.NzMxNDcwNQ\(Mjl1\)Mg](https://thetruesize.com/#?borders=1~!MTU5MDg5NjM.NDI1ODlwOQ*MzMzNjlyNzU(NDEyOTg1Mw~!CONTIGUOUS_US*MTAwMjQwNzU.MjUwMjM1MTc(MTc1)MA~!IN*NTI2NDA1MQ.Nzg2MzQyMQ)MQ~!CN*OTkyMTY5Nw.NzMxNDcwNQ(Mjl1)Mg)





Mercator
EPSG:3857

UTM Zone 11N
EPSG:2955



U.S. National Atlas
Equal Area
EPSG:2163



WGS 84
EPSG:4326



Plugins | All (312)

All Search

Installed
Not installed
Upgradeable
Settings

Accuracy Assessment

- AccurAssess
- Affine Transformation
- AniMove for QGIS
- ArcheoCAD
- Area Along Vector
- Arrows
- Astrogeology POW
- Attribute painter
- autoSaver
- AutoTrace
- ☐ Azimuth and Distance
- ☒ Azimuth and Distance
- BLN Exporter
- Blurring
- Buffer by Percentage
- Bulk vector export

Accuracy Assessment

Generate an error matrix and measures of mapping accuracy for raster and reference data.

☆☆☆☆ 3 rating vote(s), 18723 downloads

Tags: confusion matrix,error matrix,accuracy assessment,remote sensing,map comparison

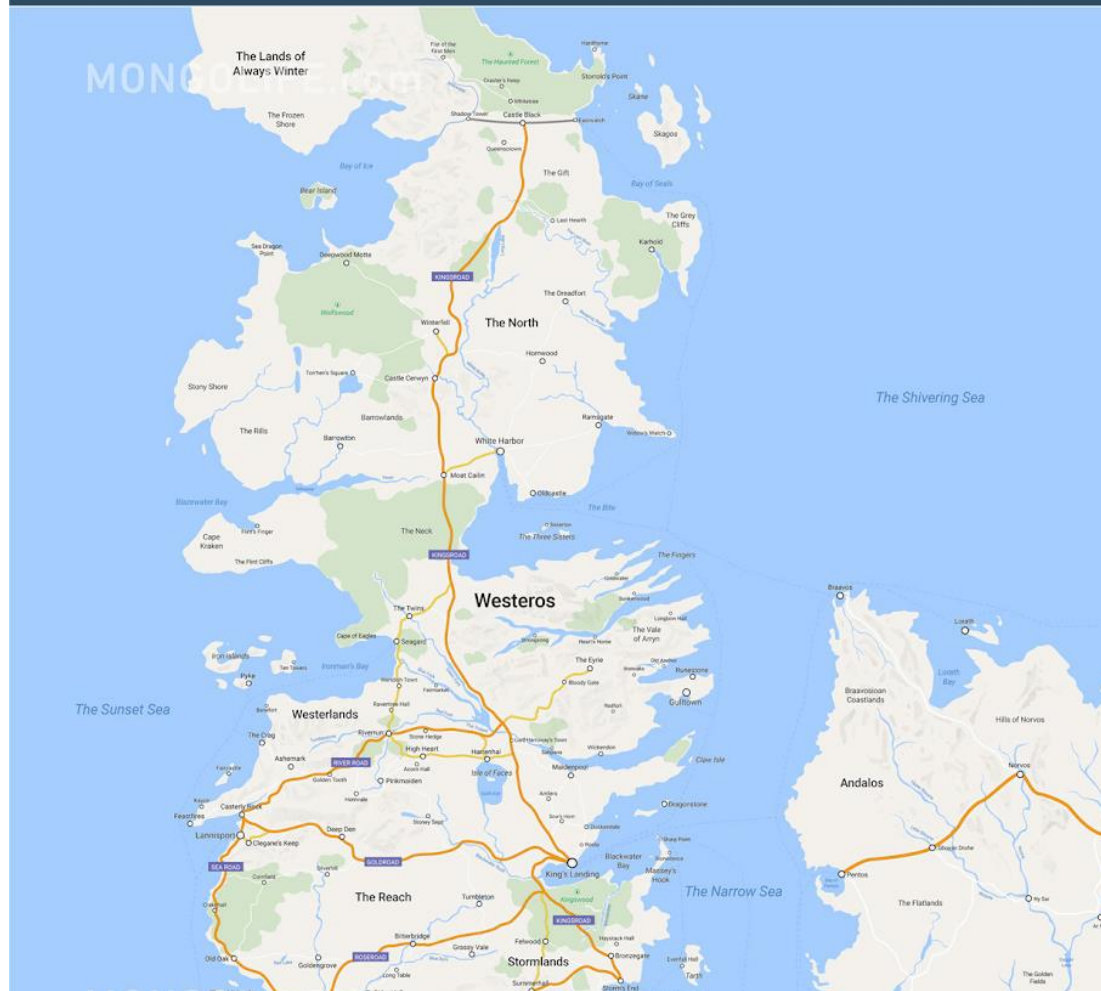
More info: [homepage](#) [tracker](#) [code repository](#)

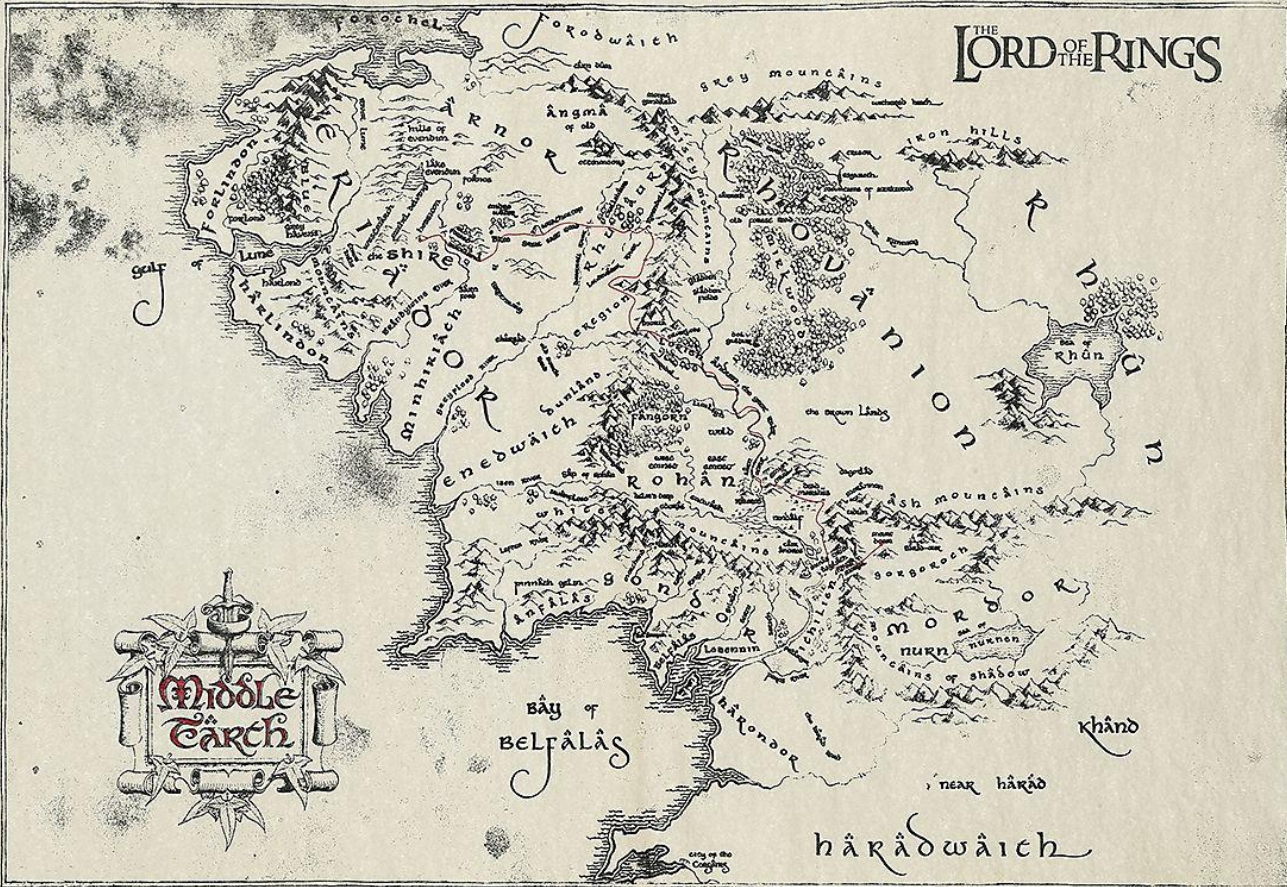
Author: Jared Kibele

Available version: 0.4.2 (in QGIS Official Plugin Repository)

Upgrade all Install plugin Help Close

Should you use GIS?

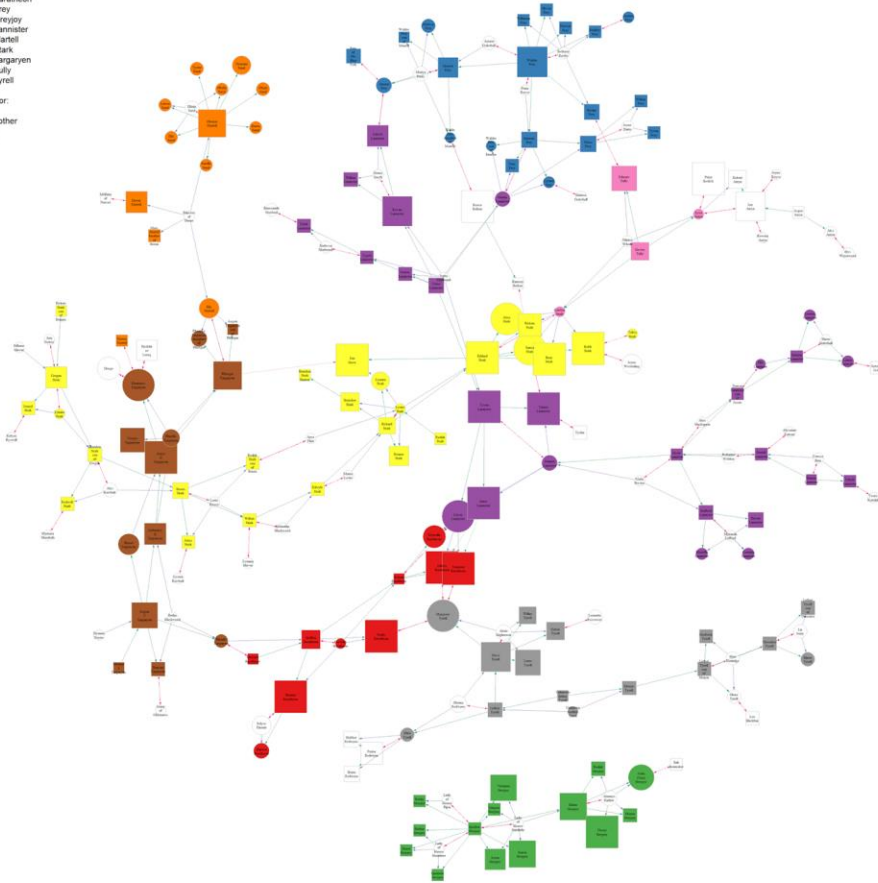




Game of Thrones Family Ties

Node color:
● House Baratheon
● House Frey
● House Greyjoy
● House Lannister
● House Martell
● House Stark
● House Targaryen
● House Tully
● House Tyrell

Edge color:
— father
— father/mother
— mother
— spouse



[https://shiring.github.io/networks/2017/05/15/got final files/figure-markdown github/unnamed-chunk-9-1.png](https://shiring.github.io/networks/2017/05/15/got%20final%20files/figure-markdown_github/unnamed-chunk-9-1.png)



Using GIS in your research

Advantages:

1. Exploring both geographical and thematic components of data.
2. Stresses geographical aspects of research question
3. Allows handling, structuring and exploration of large volumes of data.
4. Integration from widely disparate sources.
5. Variety of visualisation.
6. Offers opportunities for asking new questions or looking at your data in a whole new way.

Limitations:

1. Data: expensive and time-consuming. (70-90%)
2. Learn to work with the software
3. Software is not always what you want it to be. Time is a difficult aspect.
4. Shows spatial relations, but does not show why, no explanations.
5. Origins in sciences, computer science and geography. Focus on quantity, not quality data.