

GIS Analyses using Free and Open Source Software (FOSSGIS)

Lecturers: Christina Ludwig and Veit Ulrich

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Who are we?

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Dominik Neumann Tutor



What is this course about?

GIS Analyses using **Free and Open Source Software**

Discuss in groups of 4 students.

1. What are the differences between

- **Free Software,**
- **Open-Source Software and**
- **Proprietary Software?**

2. What do you expect from this course?

The Free Software Definition

According to the [Free Software Foundation](#) Free Software has the freedom to ...

1. **run** the program, for any purpose.
2. **study** how the program works, and adapt it to your needs.
3. **redistribute** copies.
4. **improve** the program, and release your improvements to the public, so that the whole community benefits.

→ **Free as in free speech, not as in free beer.**

Free Software vs. Open-Source Software:

Richard Stallman, founder of the Free Software Foundation, explains:

“The two terms describe almost the same category of software, but they stand for views based on fundamentally different values. **Open source is a development methodology; free software is a social movement.**” [\[1\]](#)

→ Still the requirements are very similar so it is usually combined to **Free and Open Source Software (FOSS)**

What is FOSS GIS?



GIScience Research Group and HeiGIT



HEIDELBERG INSTITUTE
FOR GEOINFORMATION
TECHNOLOGY

HeiGIT gGmbH
A non-profit to transfer
research to applications



GIScience Research Group
Heidelberg University
Basic Research



UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386



At HeiGIT and GIScience Heidelberg we provide **research and development** to support decision making in the field of **sustainable mobility, humanitarian aid and climate action**. We believe in **open geoinformation, open methods and open software**.



FOSSGIS made in Heidelberg

HeiGIT and the [GIScience Research Group](#) develop and maintain several FOSSGIS tools:

openrouteservice: Route planning and reachability analyses

The logo for openrouteservice, featuring the words "openroute" and "service" in a bold, black, sans-serif font, stacked vertically.

ohsome API: Download and analysis of OpenStreetMap data

We will get to know them in this course as well.

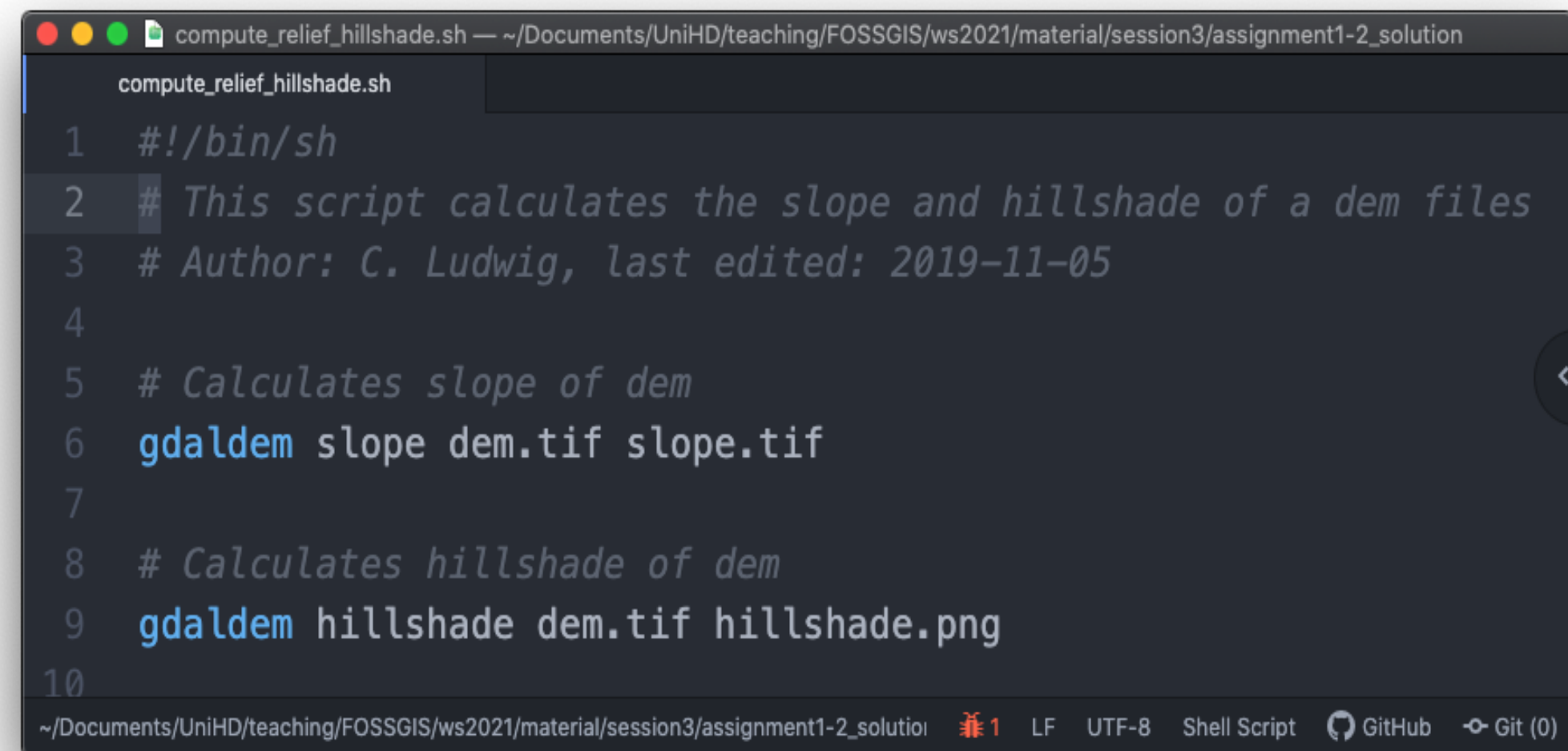
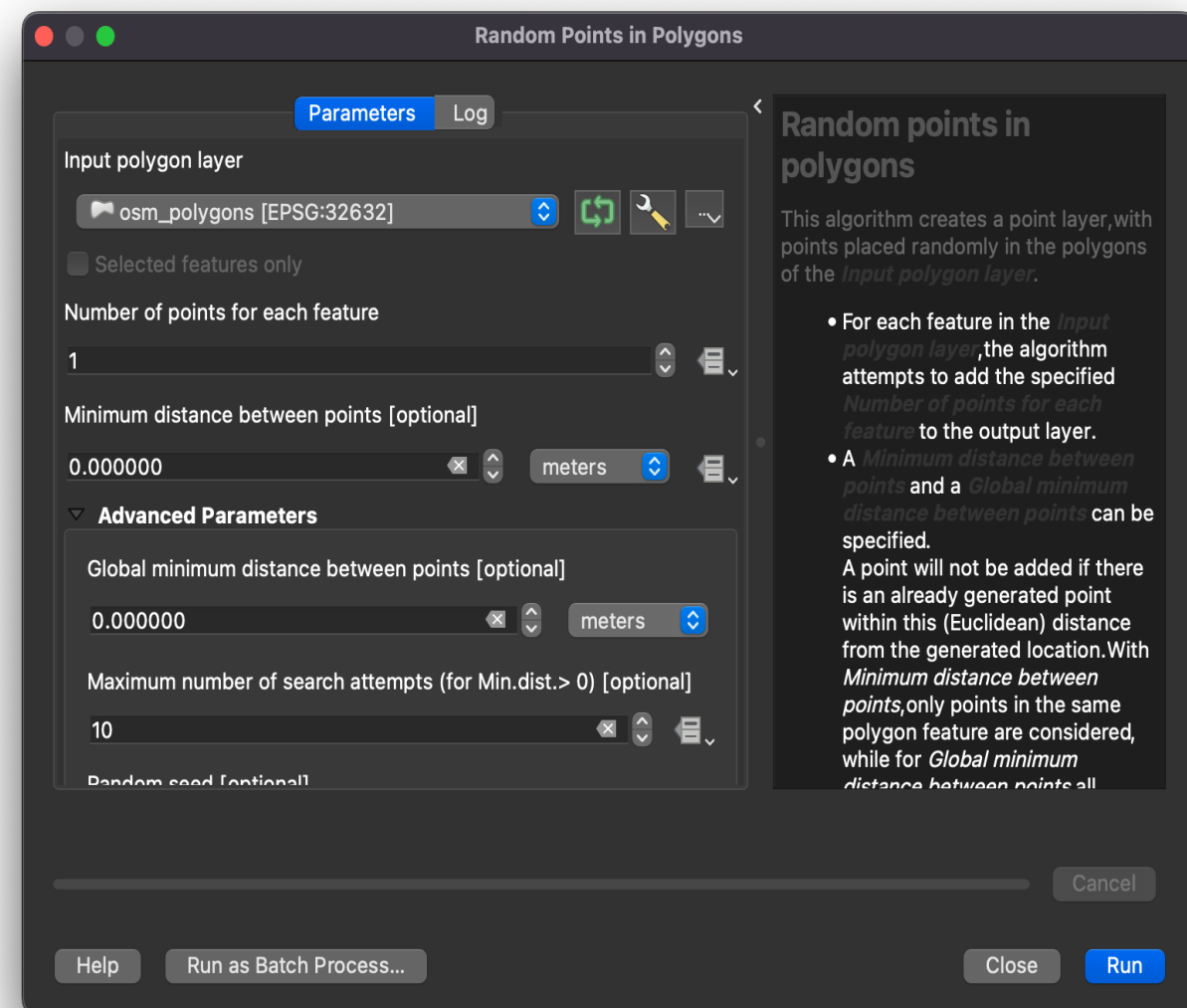
The logo for ohsome, featuring the word "ohsome" in a bold, sans-serif font with alternating red and grey letters. Below it, the word "osm" is written in a smaller, grey, monospace-style font, with a small apostrophe before the 'o'.

Learning Goals of this course

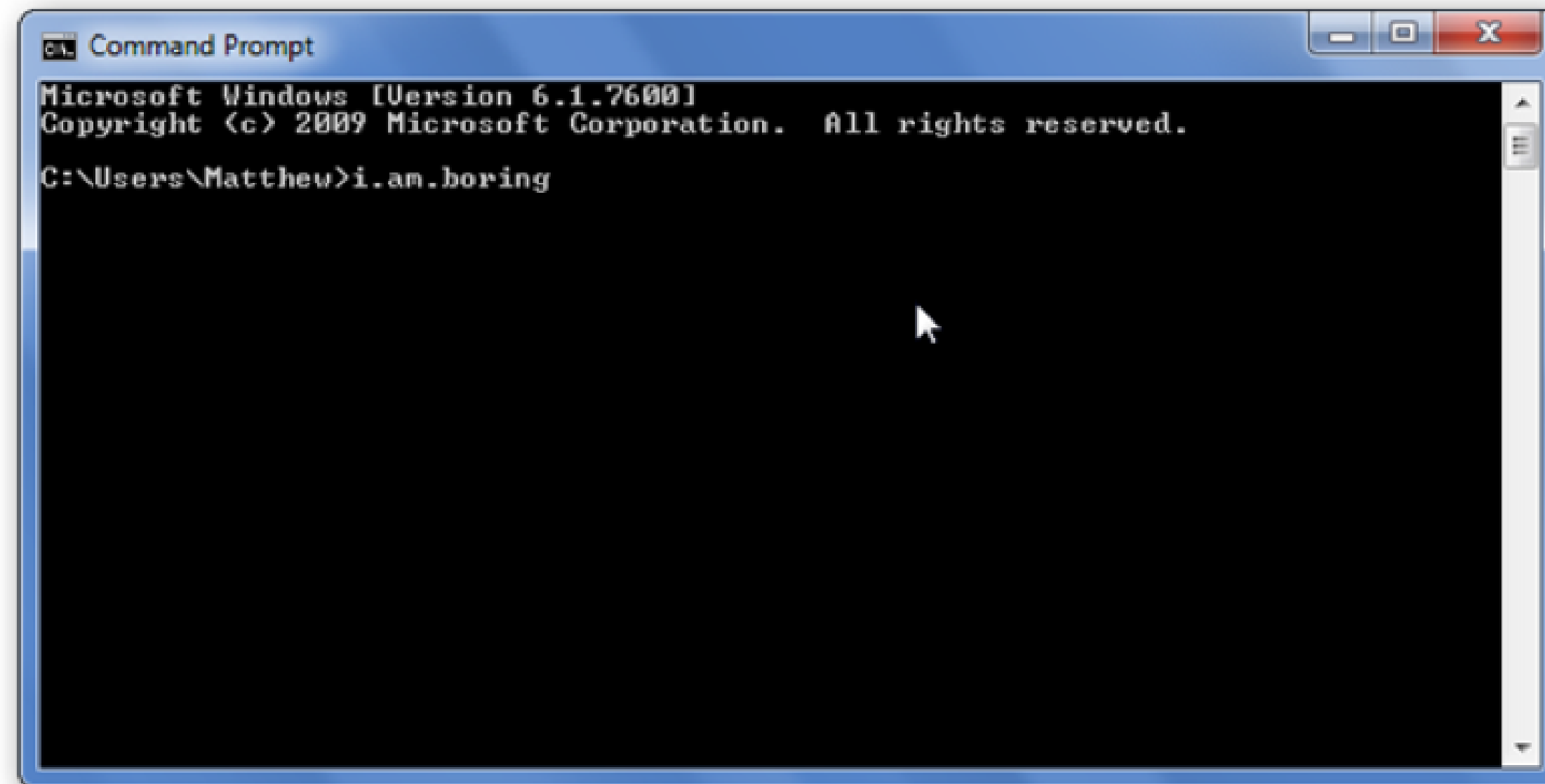
By the end of this course, you will be able to ...

- ... **perform GIS analyses** using Free and Open Source GIS (QGIS, GRASS GIS, gdal/ogr).
- ... find other suitable FOSSGIS tools online and **teach yourself how to use them**.
- ... find suitable **open data** online for your analysis.
- ... implement a GIS analysis in a **script based, automated way**.
- ... use the **command line**.
- ... **use git** to track your progress and share your GIS analysis.
- ... **discuss the limitations and uncertainties** of your GIS analysis.

You will learn how to write scripts instead of clicking in QGIS



This requires learning to use the command line

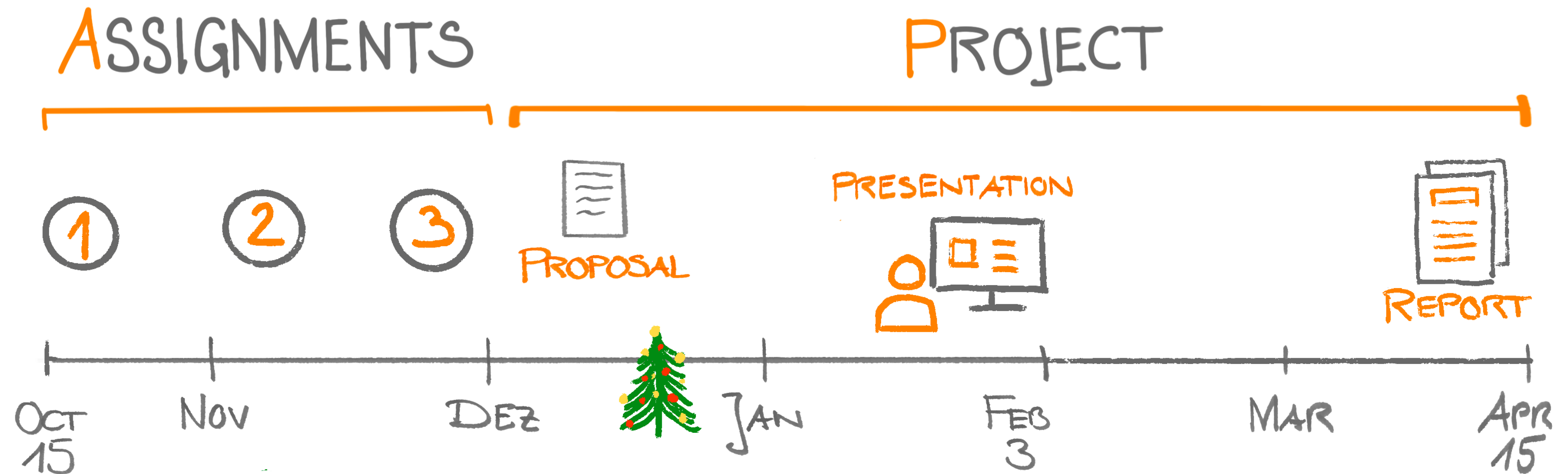


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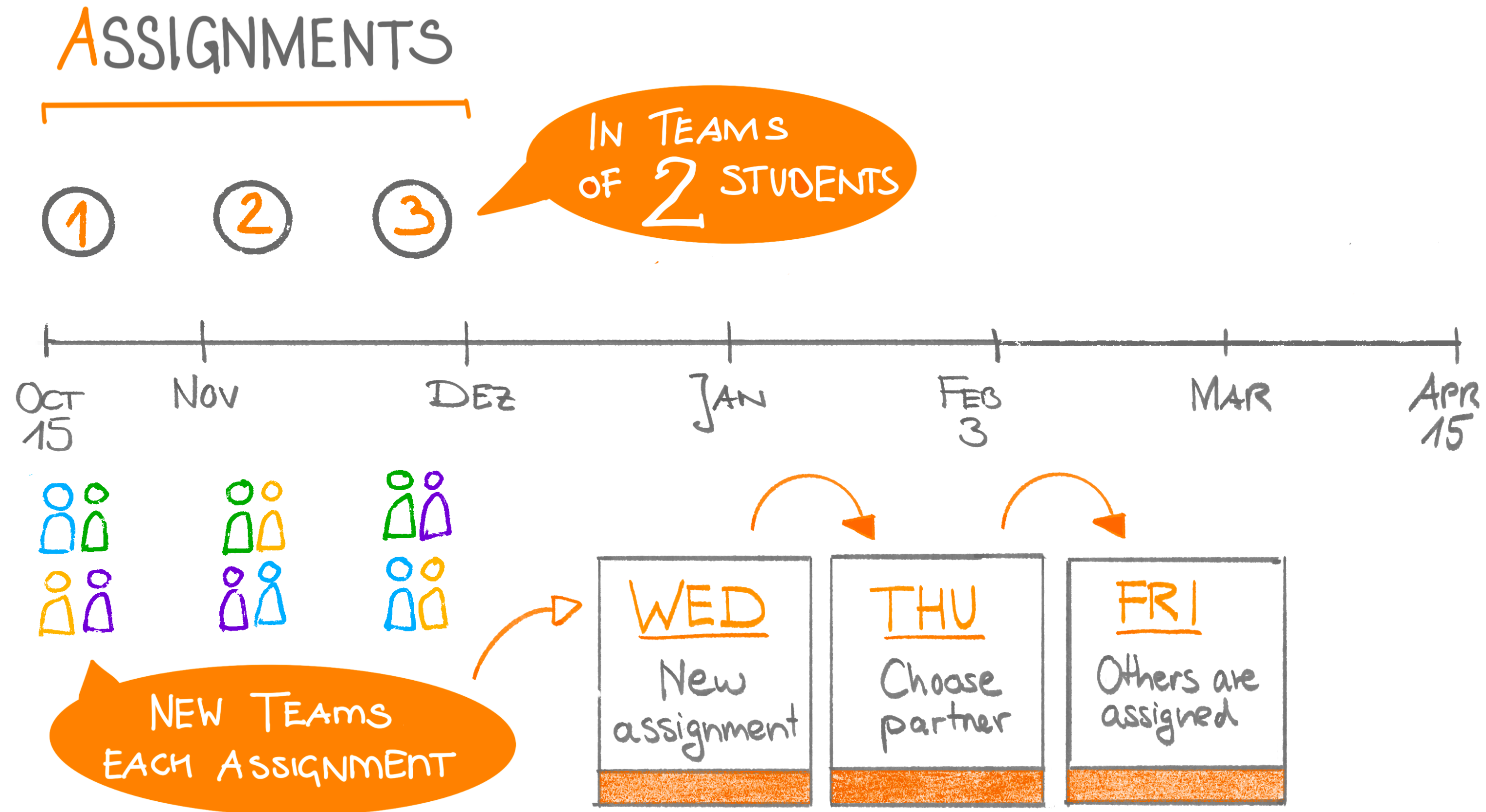
Timeline of the course



Assignments: What and when?

Assignment	Start	Choose groups	Submit	Questions	Groups
Assignment 1: QGIS	Wed 29.10.	Fri 31.10.	Tue 4.11.	questions	Post here
Assignment 2: GDAL	Wed 5.11.	Fri 7.11.	Tue 18.11.	questions	Post here
Assignment 3: GRASS GIS	Wed 19.11.	Fri 21.11.	Tue 2.12.	questions	Post here

Assignments: How are they done?



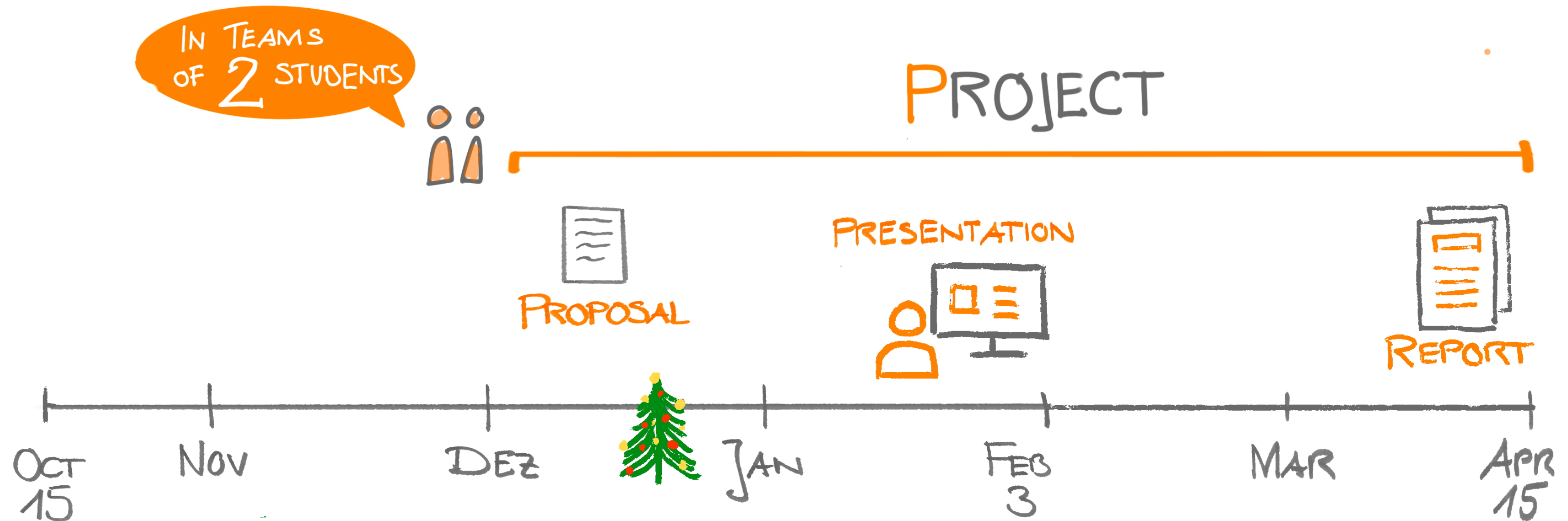
Assignments: Get help at the tutorial

- **Tutor:** Dominik Neumann
- **Time:** Wednesday 13:15 - 14:45 (from today until Christmas break)
- **Place:** Berliner Str. 48, PC-Pool
- Attendance is **optional**

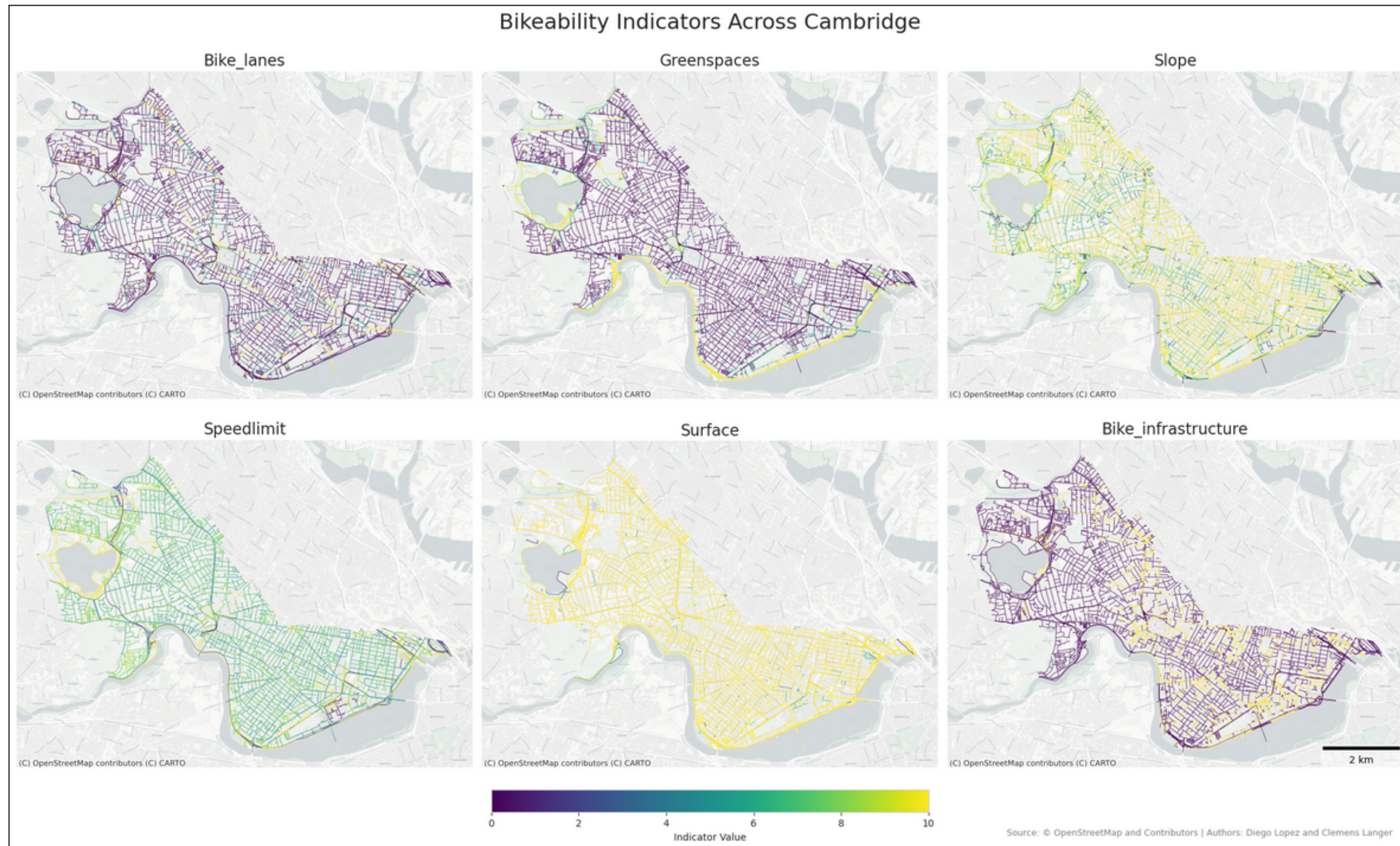


Group project

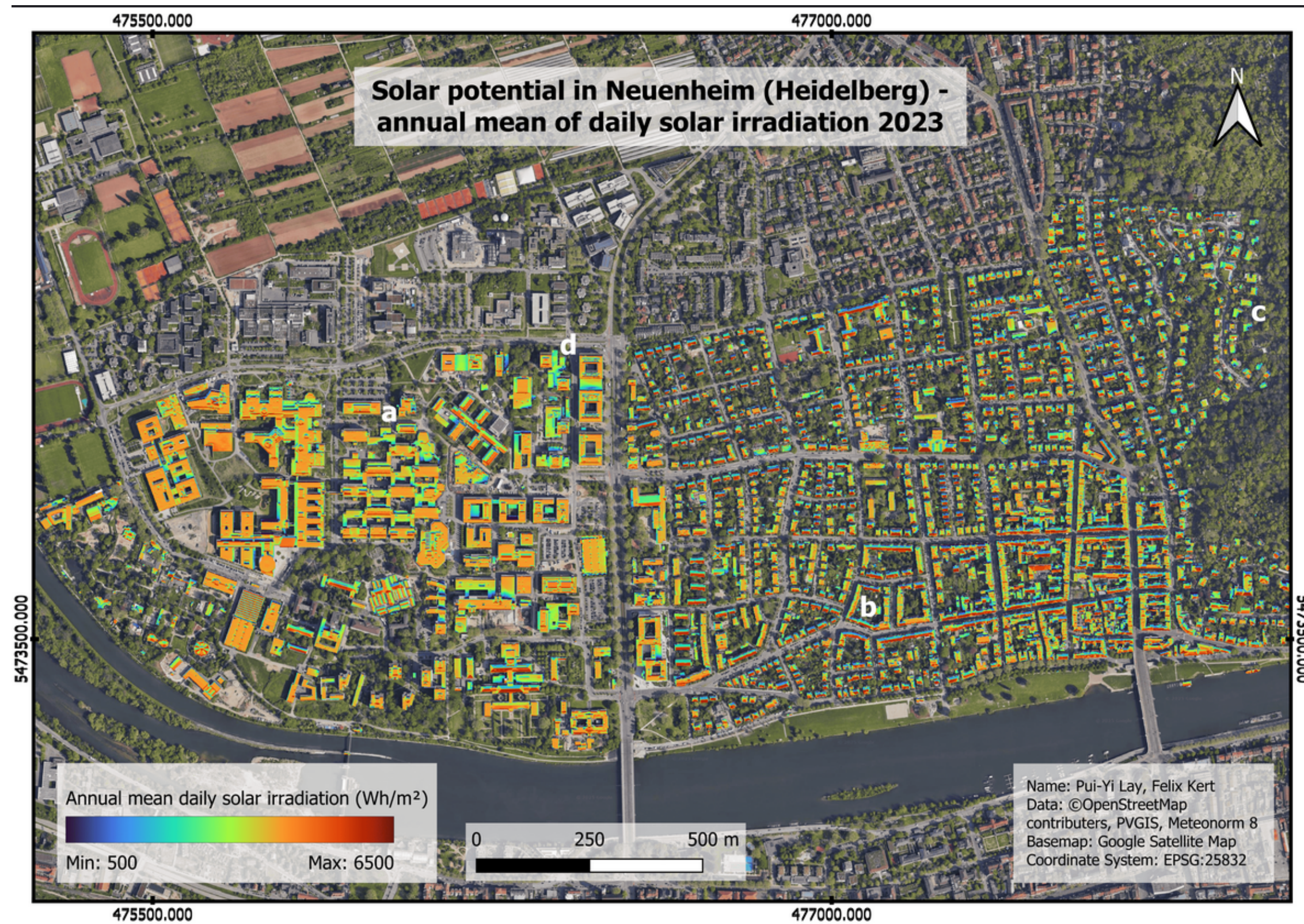
Goal: Perform a spatial analysis as an automated workflow using different FOSSGIS tools.



Example: Bikeability indicators across Cambridge



Example: Solar Potential in Heidelberg-Neuenheim

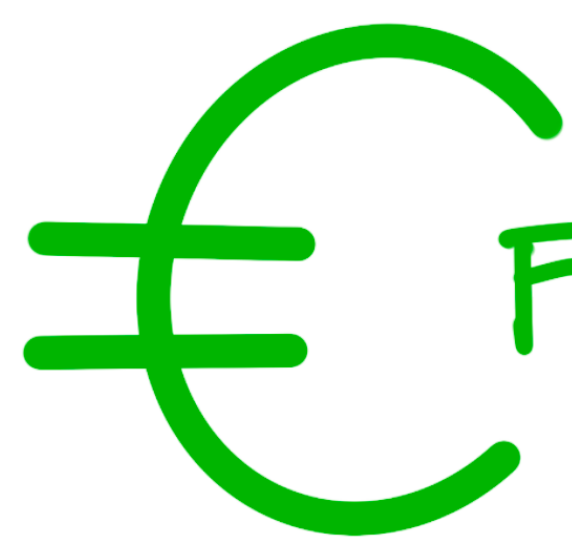


Grading

Deliverable	Weight	Due
Assignments	20%	Oct - Dec
Project proposal	0%	Dec 8th
Project presentation	30%	Jan
Project report and code	50%	Mar 31st

Why, why, why everything in groups???

LIMITED
TUTOR
FUNDING

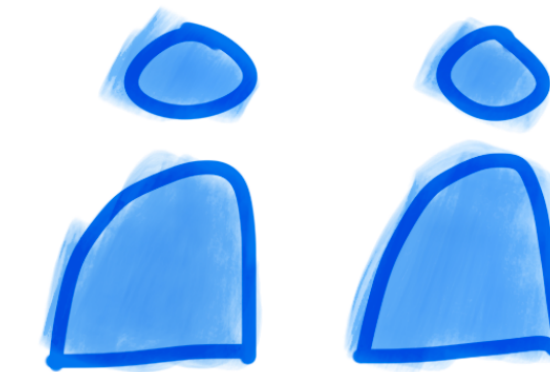
A green hand-drawn Euro symbol (€) is positioned to the left of the text "LIMITED TUTOR FUNDING".

STOP

A red octagonal stop sign with a white border and the word "STOP" in white capital letters is centered above the word "FRUSTRATION".

FRUSTRATION

TEAMWORK

Two blue hand-drawn stick figures are positioned below the word "TEAMWORK".

Time schedule

Date	Topic
15.10.	Introduction: What is FOSS and command line
22.10.	FOSSGIS Projects and git part 1
29.10	Open Data, QGIS automatisation & git part 2
05.11.	GDAL
12.11.	GDAL scripting
19.11.	GRASS GIS
26.11.	GRASS GIS and Python
03.12.	Project management
10.12.	Project proposal discussions
17.12.	Project work
<i>Christmas Break</i>	
07.01.	Project work
14.01.	Project presentations
21.01.	Project presentations
28.01.	Project presentations
03.02.	—

Course material and platforms

Course Webpage: Contains all content of the course

–> <http://fossgis.courses-pages.gistools.geog.uni-heidelberg.de/home>

GitLab: For submission of assignments and project. Log in using your uni id. You will learn how to use it next week.

–> <https://courses.gistools.geog.uni-heidelberg.de/fossgis/home>

Rules of the course

ECTS credits:

- 4 ECTS by default
- Optional: 1 ECTS extra for additional project work

Prerequisites:

- Introduction to GIS (exam must be passed)

Attendance

- Mandatory. Let us know via email if you cannot attend a seminar session. Especially, if you are supposed to present.
- Also: Be on time for the seminars! = 9:15

Deregistration:

- Until Sunday October, 19th via email

Use of ChatGPT or other AI tools

- It can help and speed up scripting, but during scripting exercises it will prevent you from learning.
- You may use AI in this course, but do it wisely. Start by trying to solve the problem yourself, reading documentation and googling.
- If you use AI, make sure to understand the solution it offers. Check the results!
- In the final project, indicate where you used AI tools, which tools you used, and what you used them for.

Your rules?

What are rules, needs and wishes from your side to

- the lecturers
- your fellow students

regarding

- the general course rules
- behaviour in class
- AI usage
- grading scheme of the group project.
- or something else?

Discuss in groups, share it in the group and we'll decide.

Todos until next week

1. Set up the required software on your computer. [Software Setup Instructions](#)
2. Log into [the course GitLab](#) once so your account is created. If you have problems, write an email.
3. Provide your [operating system here](#).
4. Get familiar with the command line. See [introduction](#) and [exercise](#).

See also section 'Getting started' on course webpage.

References

[0] [The Free Software Foundation: About](#)

[1] [Stallman, R.: Why Open Source Misses the Point of Free Software](#)

