TiSIG - Creating a small GIS system for 2D and 3D visualisation

8 December 2023

TSI (Information Systems Technologies)

Class 2023

Introduction

Victor COINDET

Put lessons into practice

Develop personal skills

Aims of the project

Develop a GIS (Geographic Information System)

2D mode

- Camera management
- Layer system
- Loading different types of data

3D mode

- Camera management
- Layer system

Summary

1. Project management

2. Software development

3. Results and analysis

Project Management

Agile methodology (also called Agile)

Project management methodology

High usage since 2001 in dev teams

Adapt to change and working efficiently

Agile methodology – Roles

Scrum master : Coaches dev team and manages scrum rituals

Product Owner : Interacts with the client and writes user stories

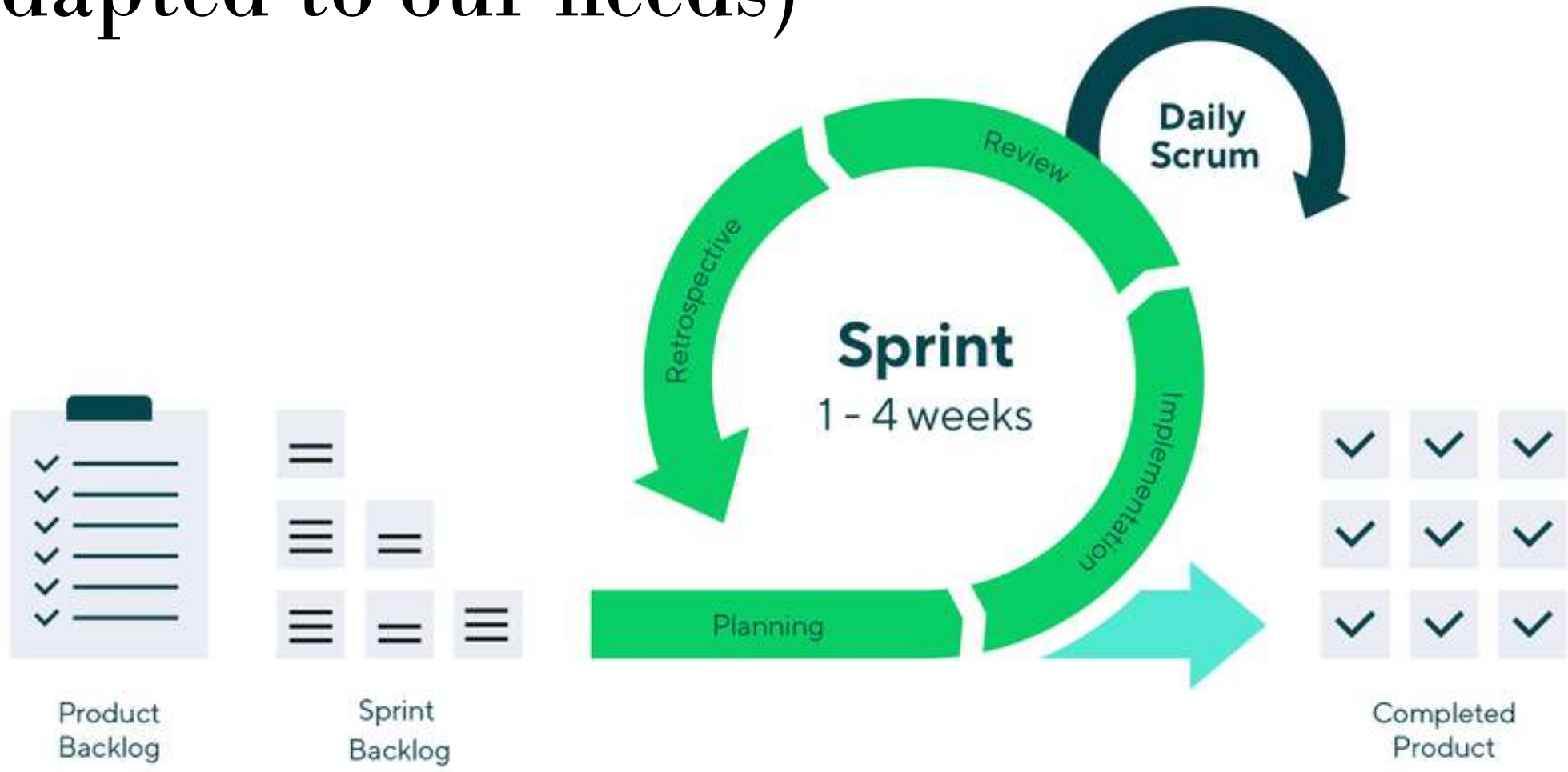
Dev team : includes developer, tester...

Agile methodology – User Story and Sprint

User story : Functionality resumed into a sentence, and developed in scenarios

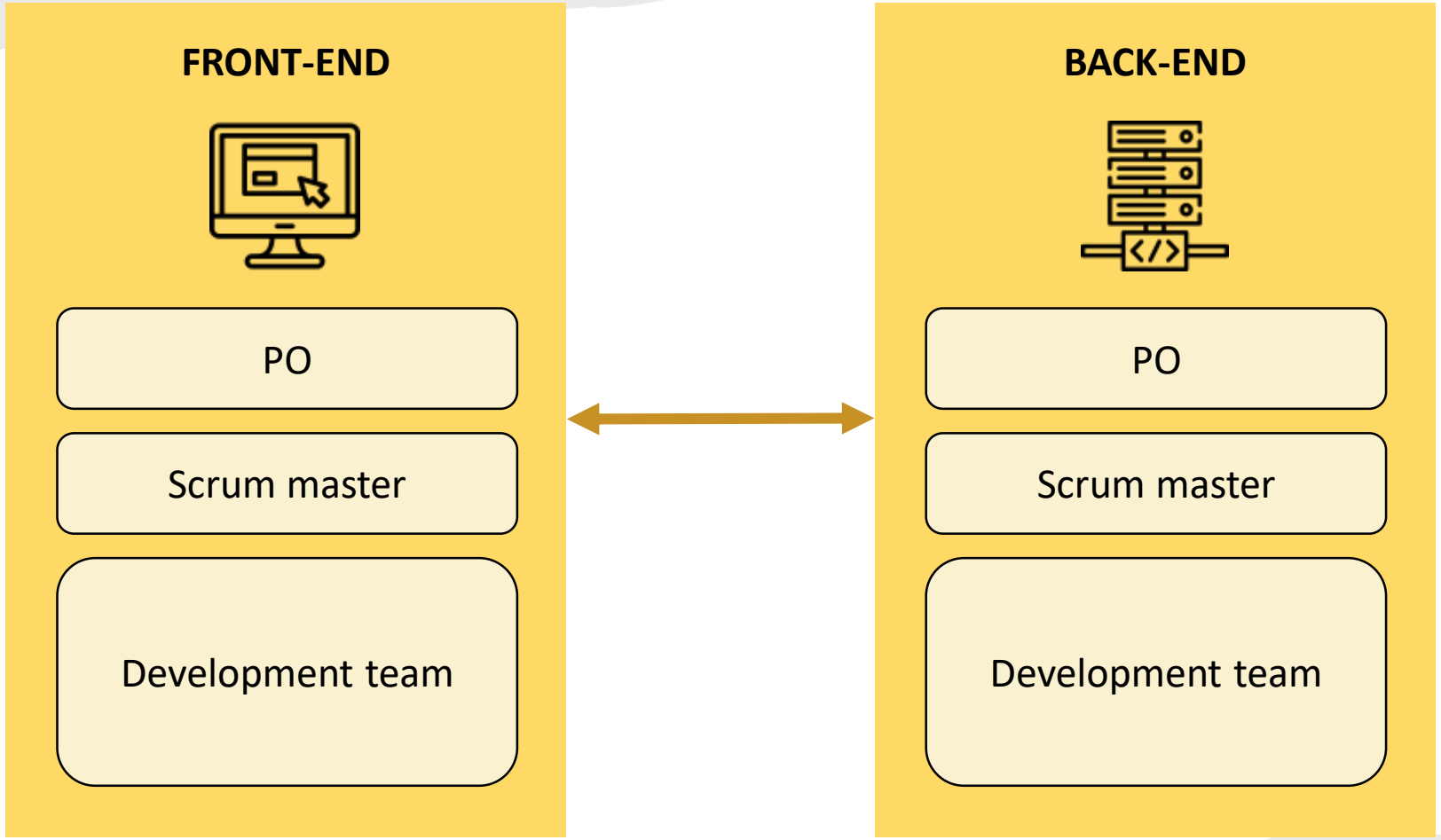
Sprint : Working period where user stories are developed

Agile Methodology – Scrum rituals (adapted to our needs)

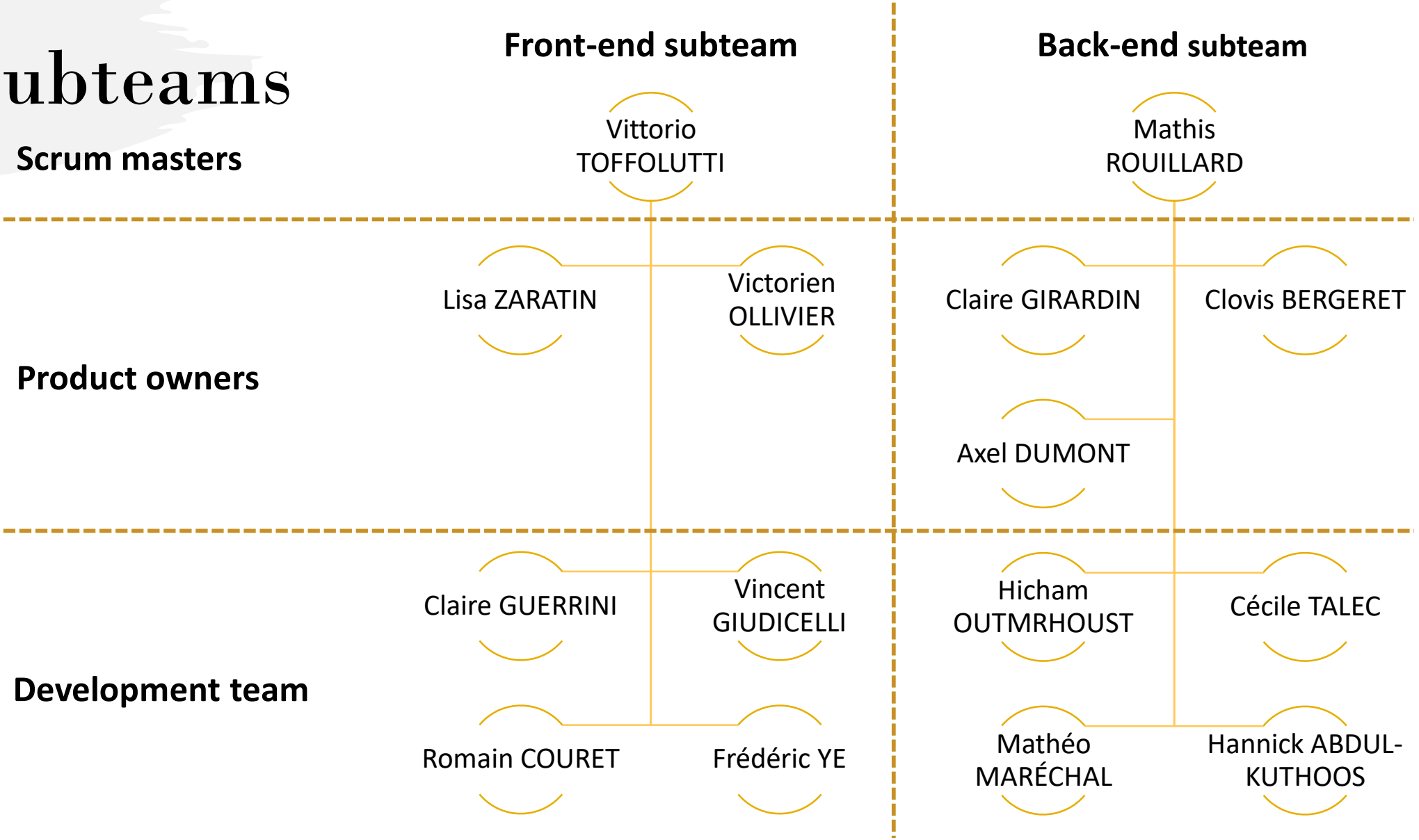


Description of all scrum rituals during a project (link here)

The team


FRONT-END
PO
Scrum master
Development team
BACK-END
PO
Scrum master
Development team

Subteams


Front-end subteam
Back-end subteam
Scrum masters
Vittorio TOFFOLUTTI
Mathis ROUILLARD
Product owners
Lisa ZARATIN
Victorien OLLIVIER
Claire GIRARDIN
Clovis BERGERET
Axel DUMONT
Development team
Claire GUERRINI
Vincent GIUDICELLI
Hicham OUTMRHOUST
Cécile TALEC
Romain COURET
Frédéric YE
Mathéo MARÉCHAL
Hannick ABDUL-KUTHOOS

Tools

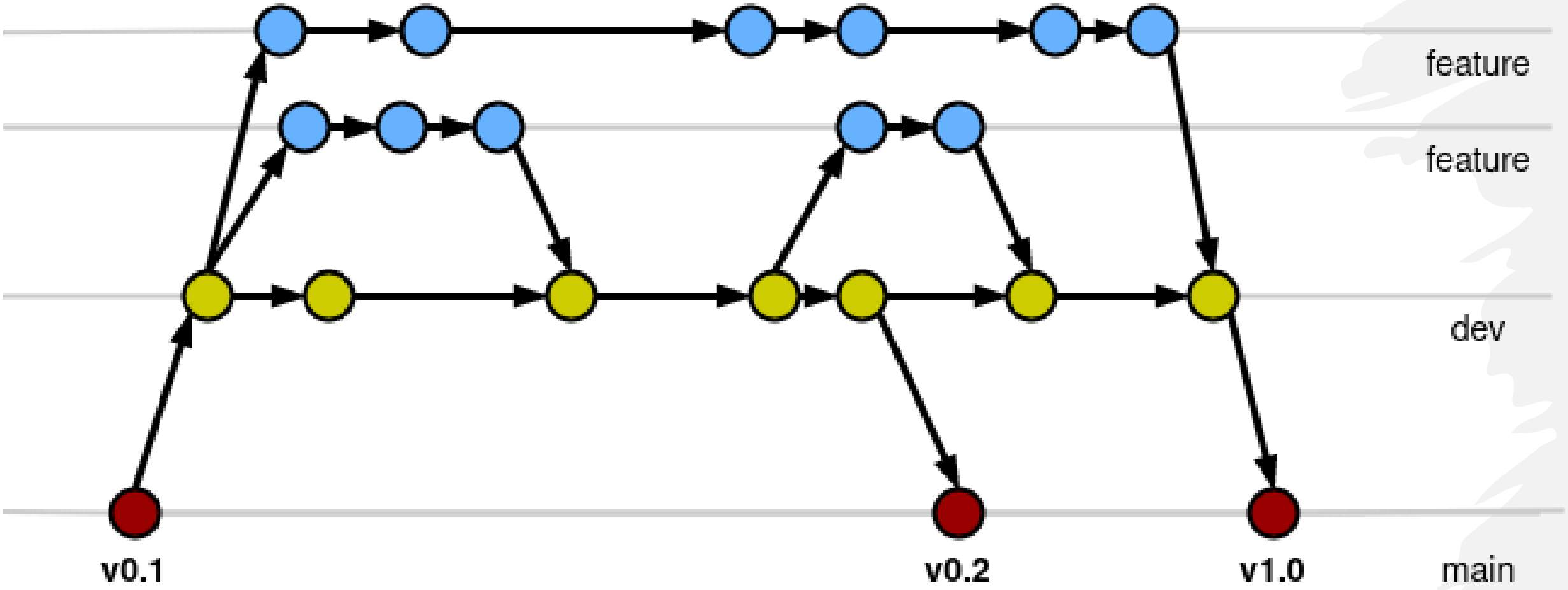
	**Distributed version control**
	**CI/CD**
	**Kanban**

Trello

Trello

Example of the front's Kanban

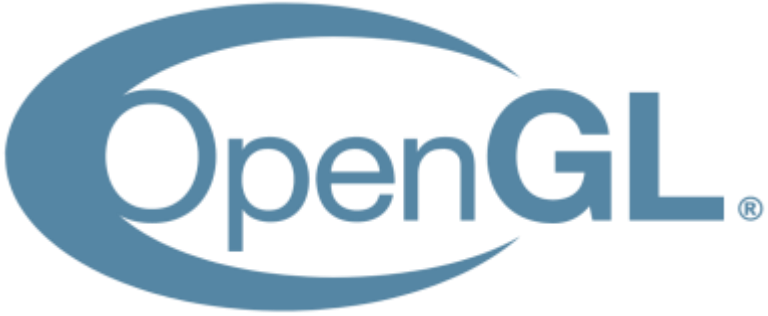
Github



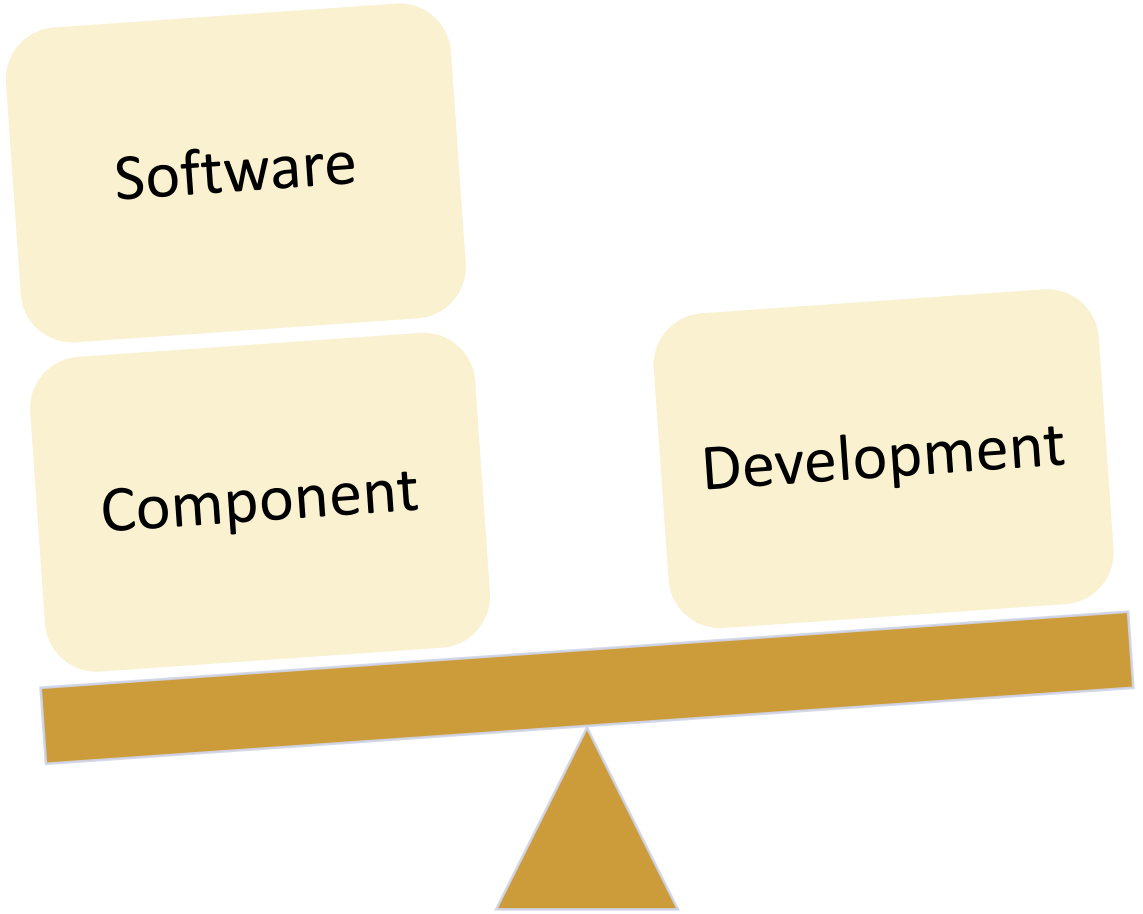
Branches creation on Github

Software development

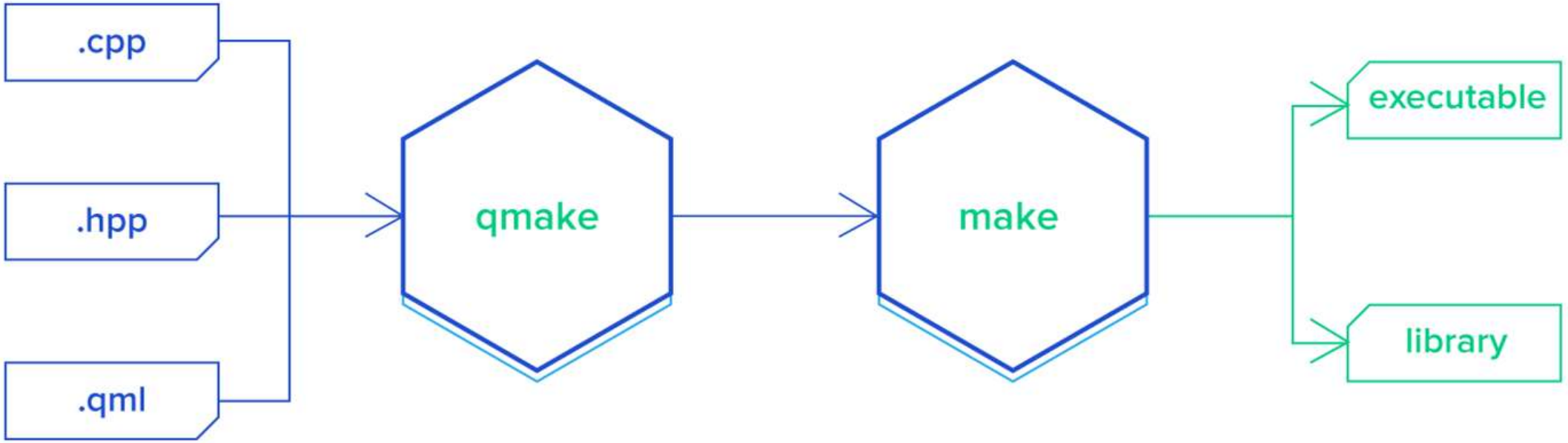
Technical environment



Software analysis

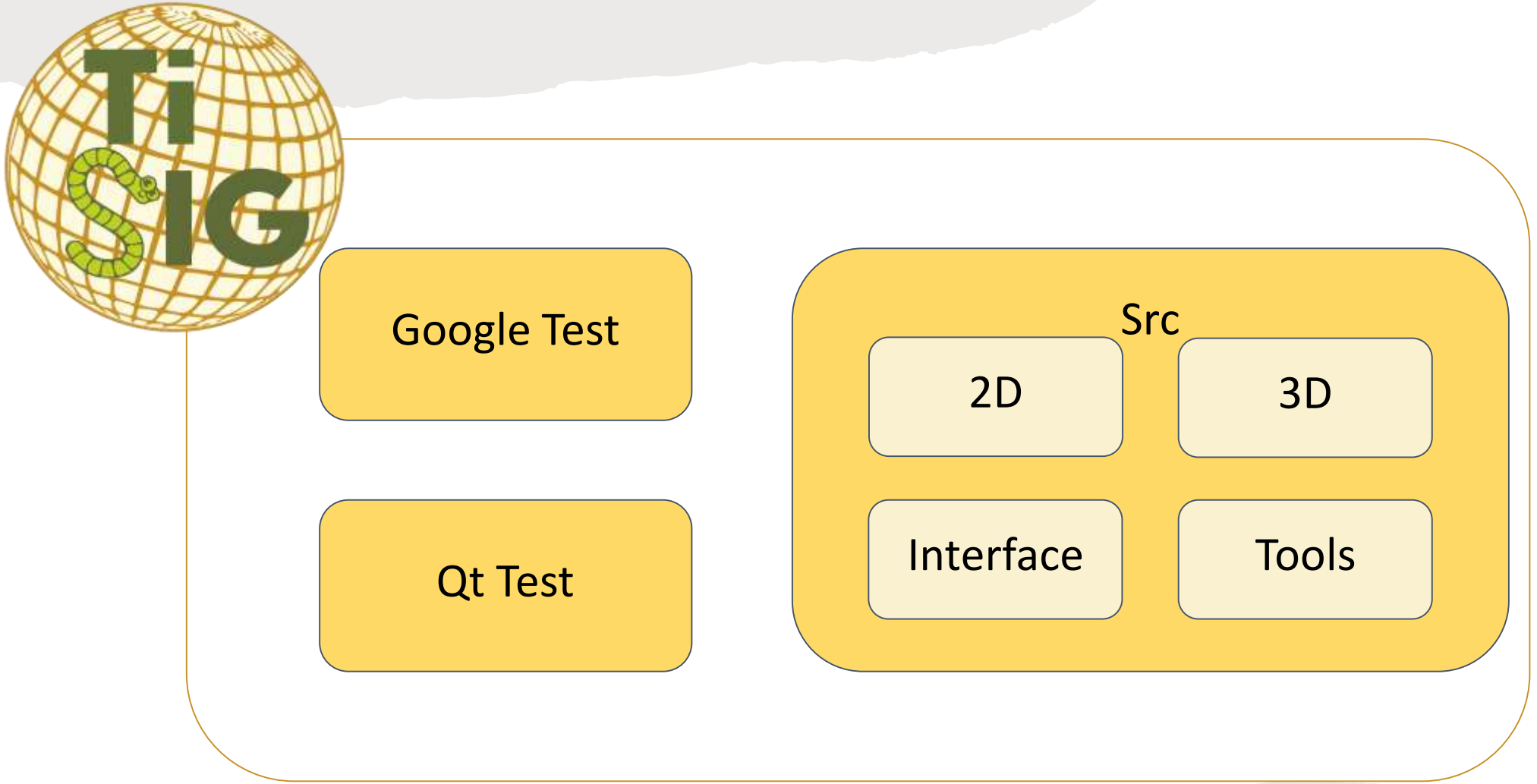


Qmake and Cmake



Explication of Qmake (source : A Vital Guide to Qmake)

Tree structure

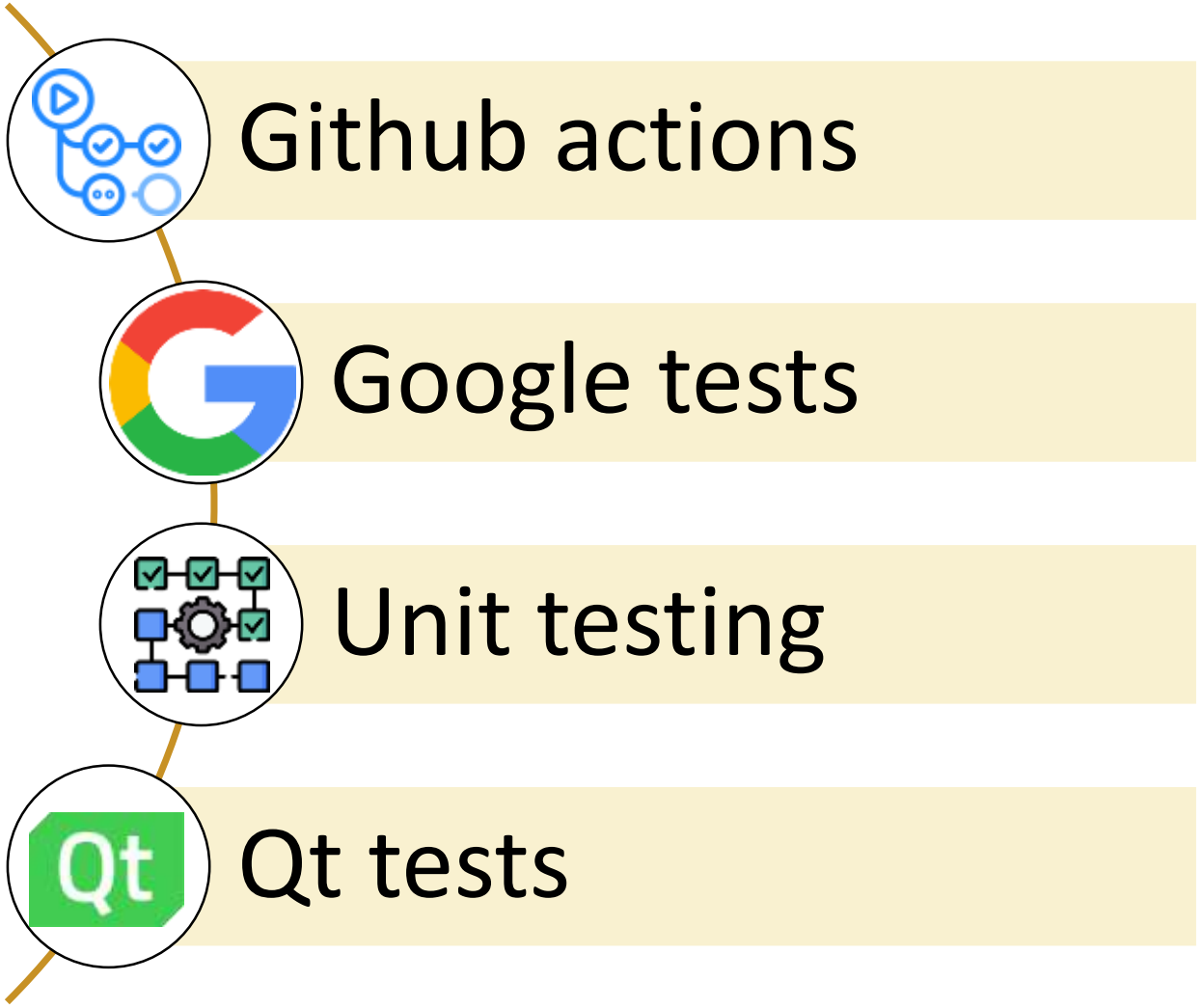


Test and Github actions

Easier to follow the progress

Each test is include in the app

Everyone does their own tests



Installation and .sh file

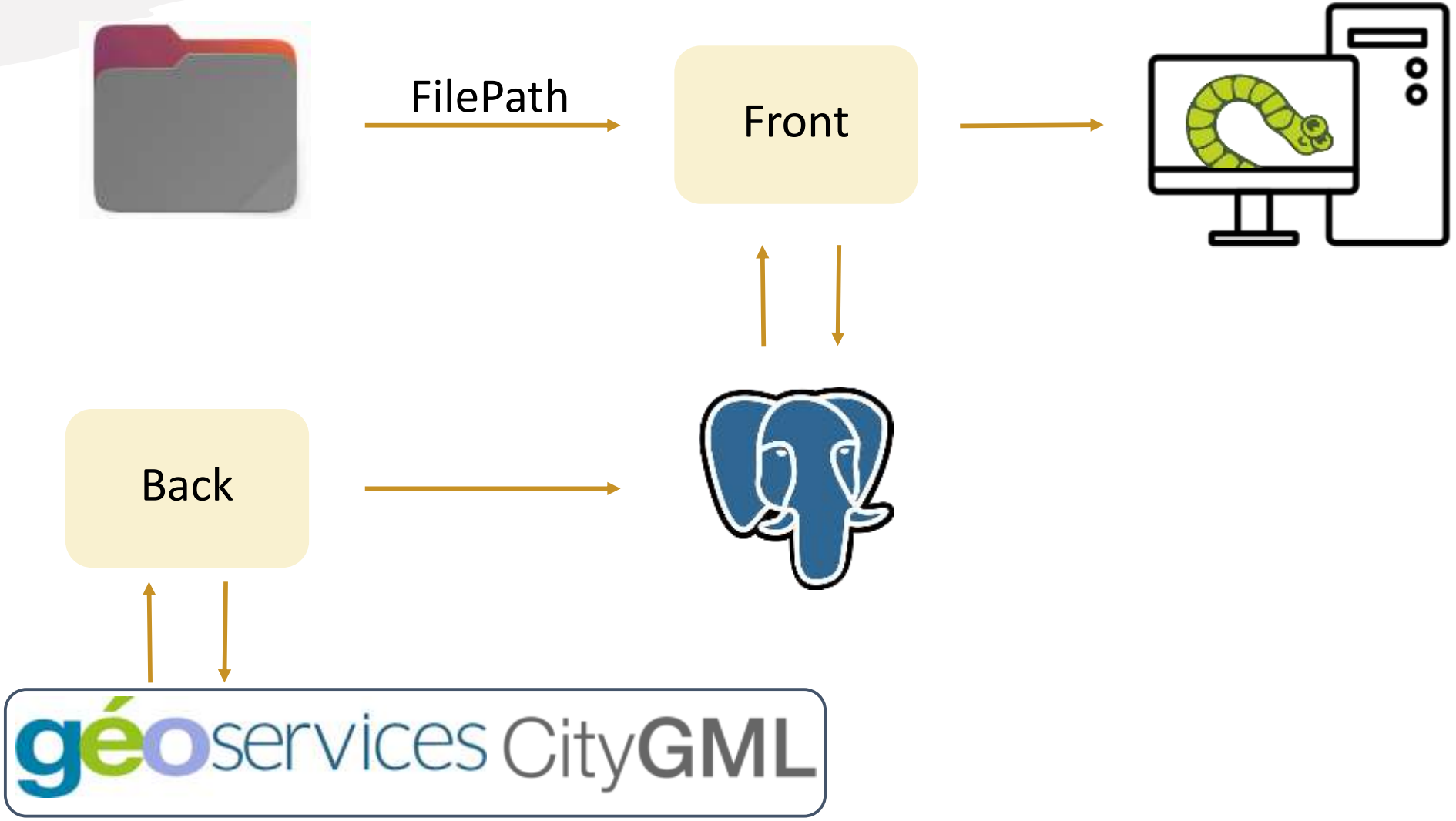
Install dependencies

Initialise databases

Create the app

Everyone can install the app in 5 minutes

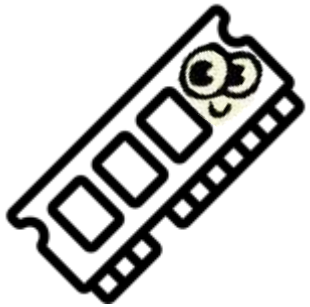
Database use



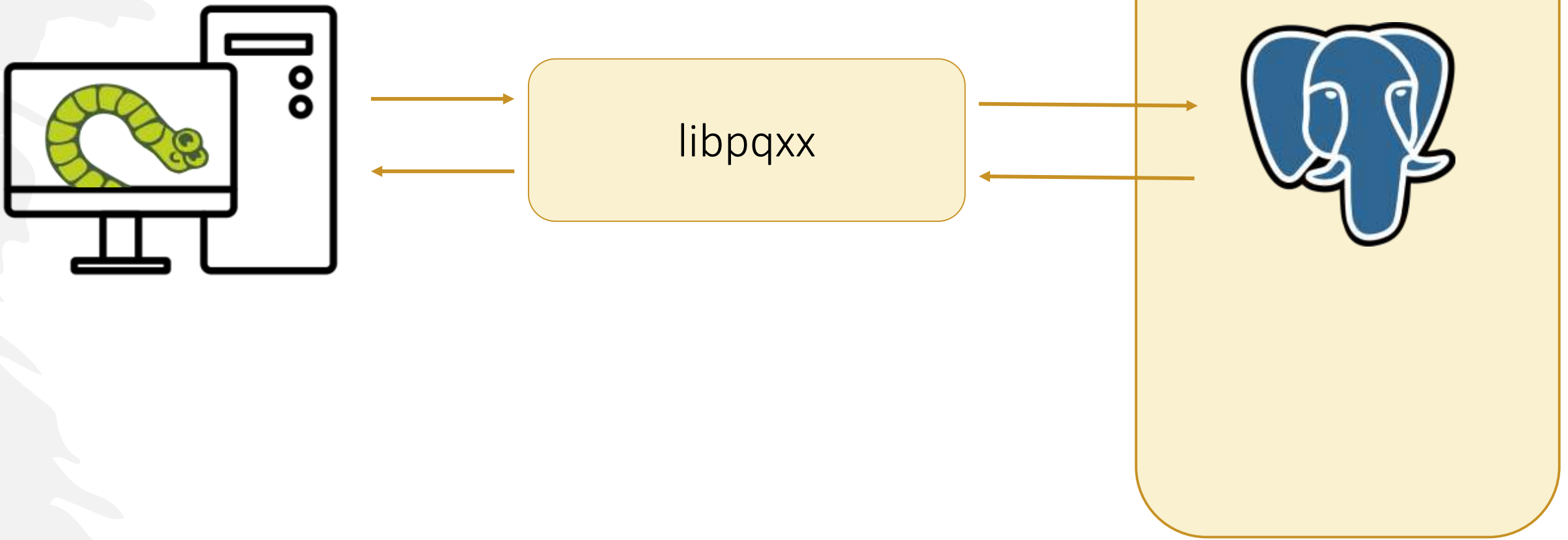
Launching Docker

Docker start

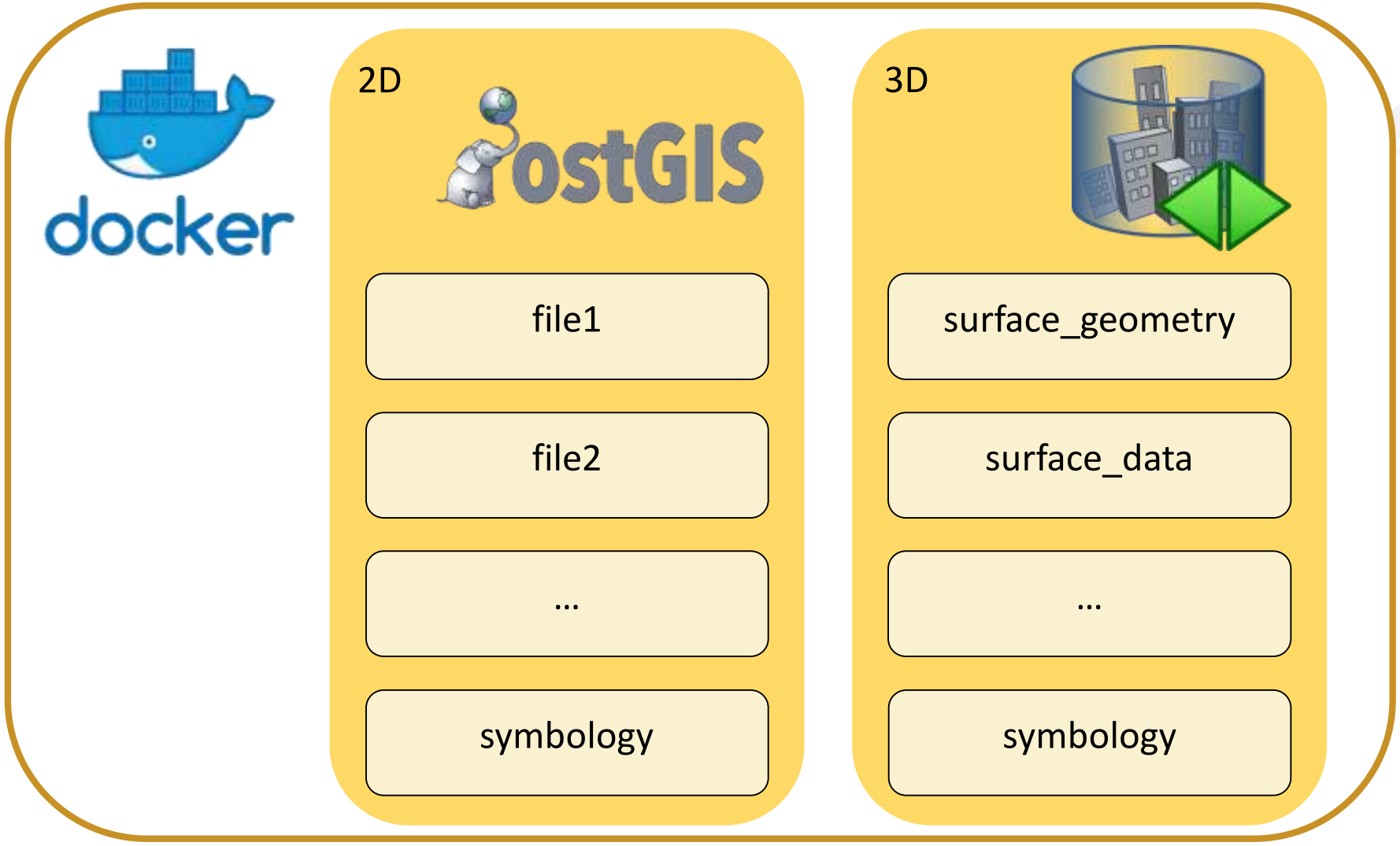
DROP TABLES
docker stop



Using docker

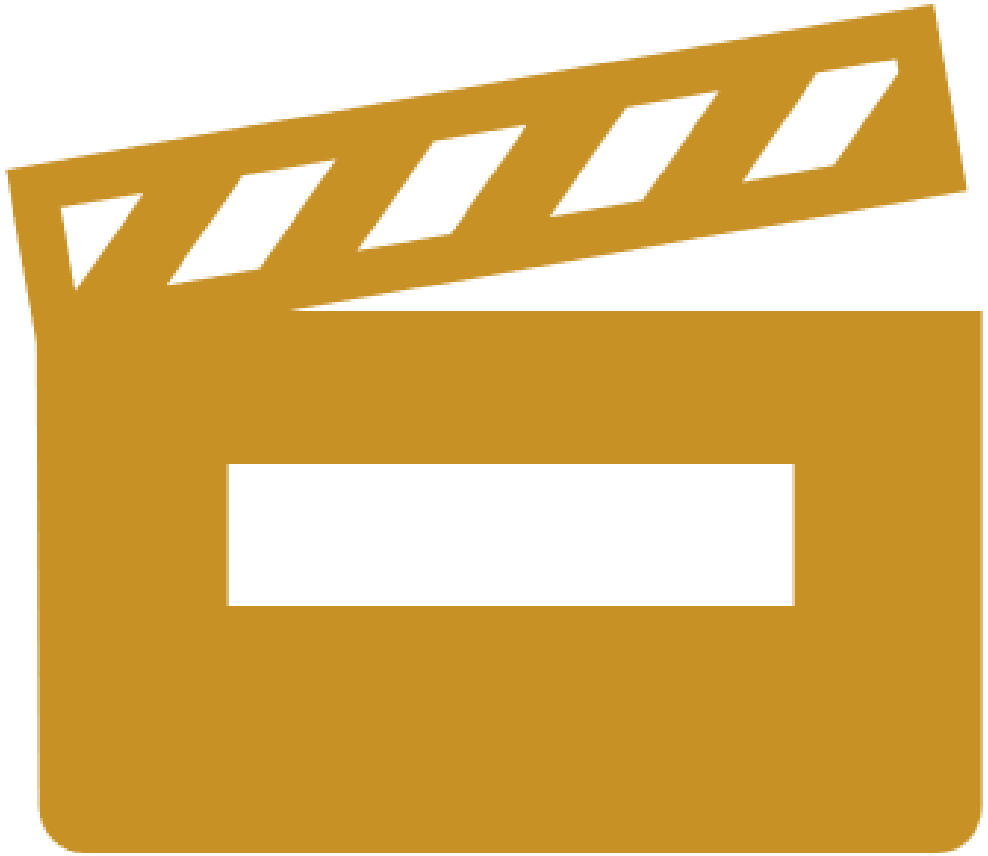


Docker content



2D Visualisation

TiSIG's demonstration – 2D visualisation



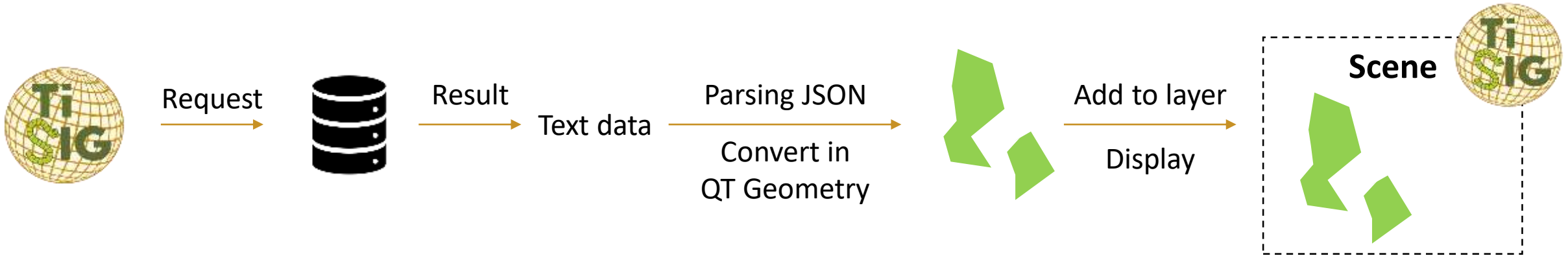
Importing ShapeFiles

filename.shp

filename			
attribute 1	attribute 2	…	geom

"filename" table created in the database

Displaying ShapeFiles



Managing ShapeFiles

road		
id	lenght	geom

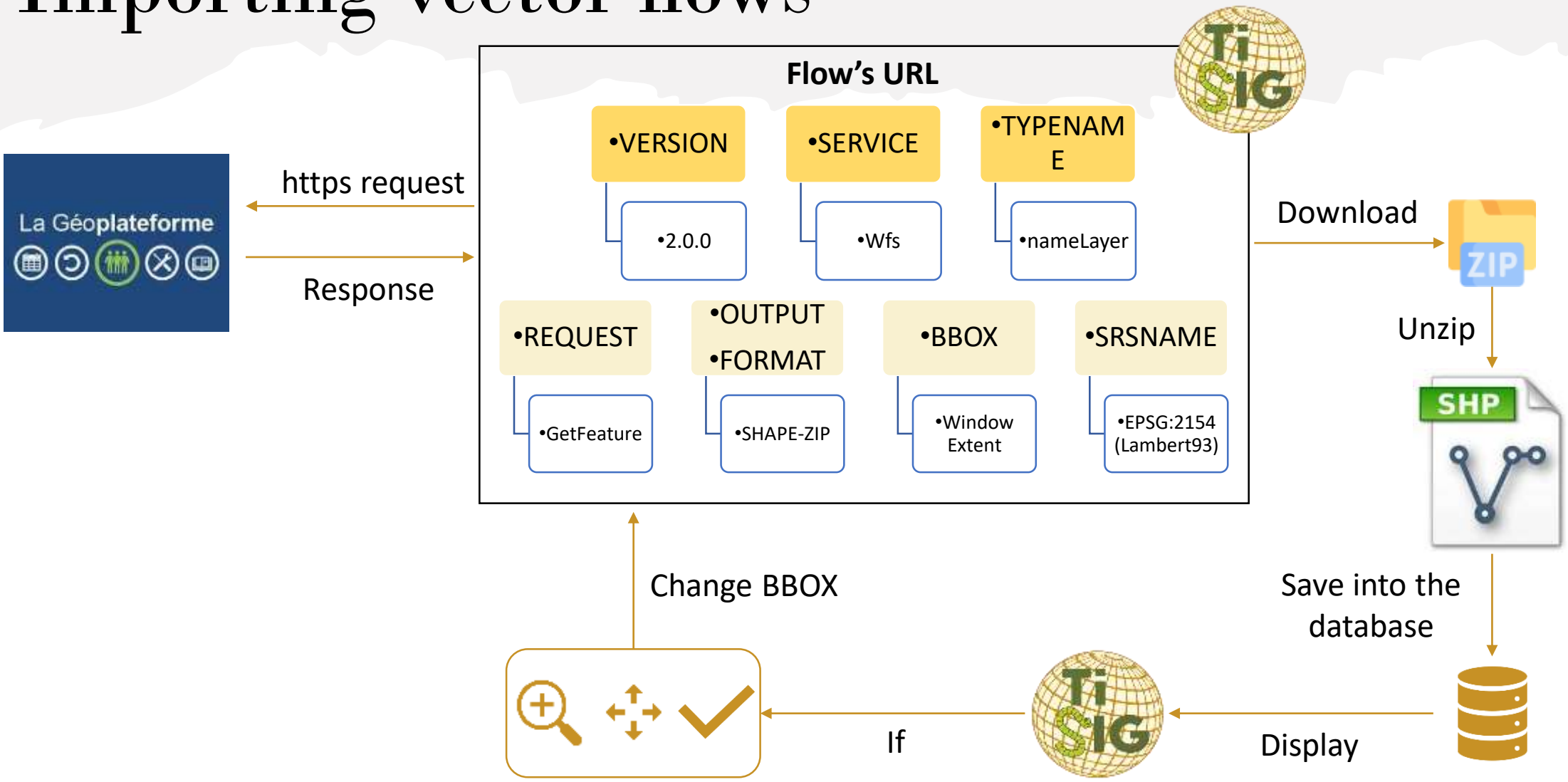
building		
id	nature	geom

river	
id	geom

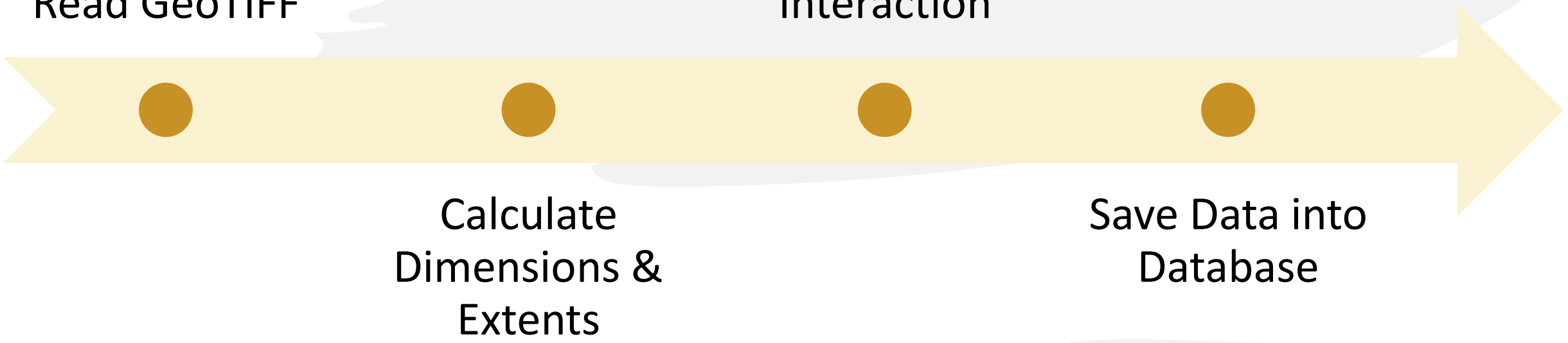
symbologie					
id	table_name	red	green	blue	alpha
1000	road	158	55	65	255
1001	building	23	186	215	255
1002	river	123	111	2	255

Example of adding layers in “symbologie" table

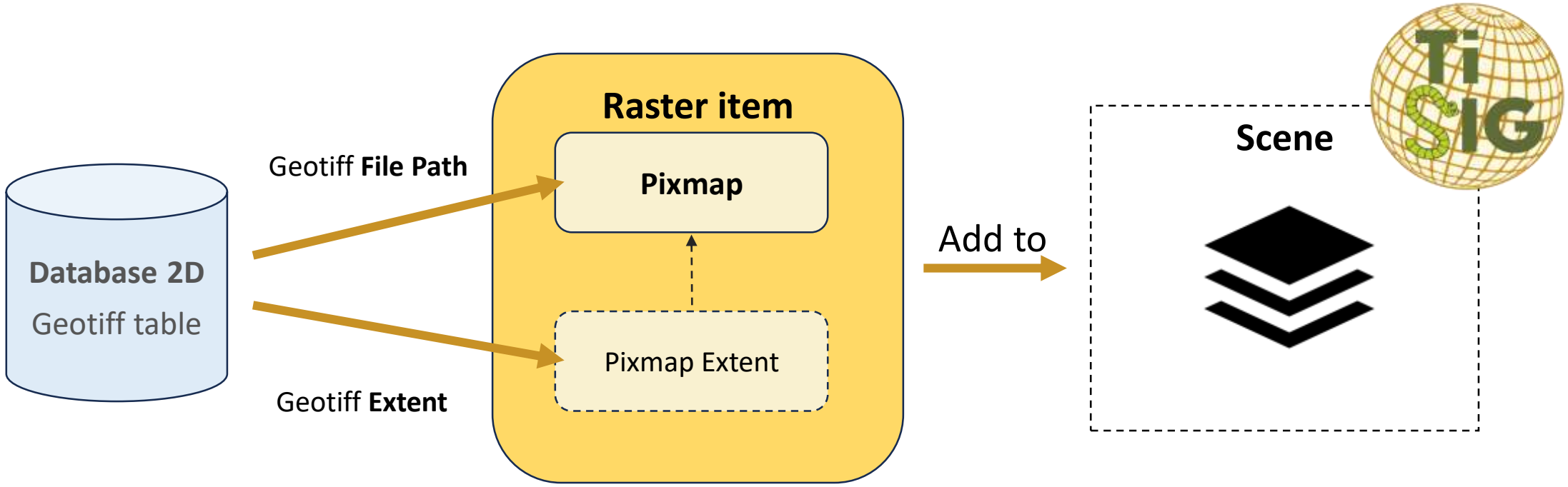
Importing vector flows



Importing rasters (GeoTiff)

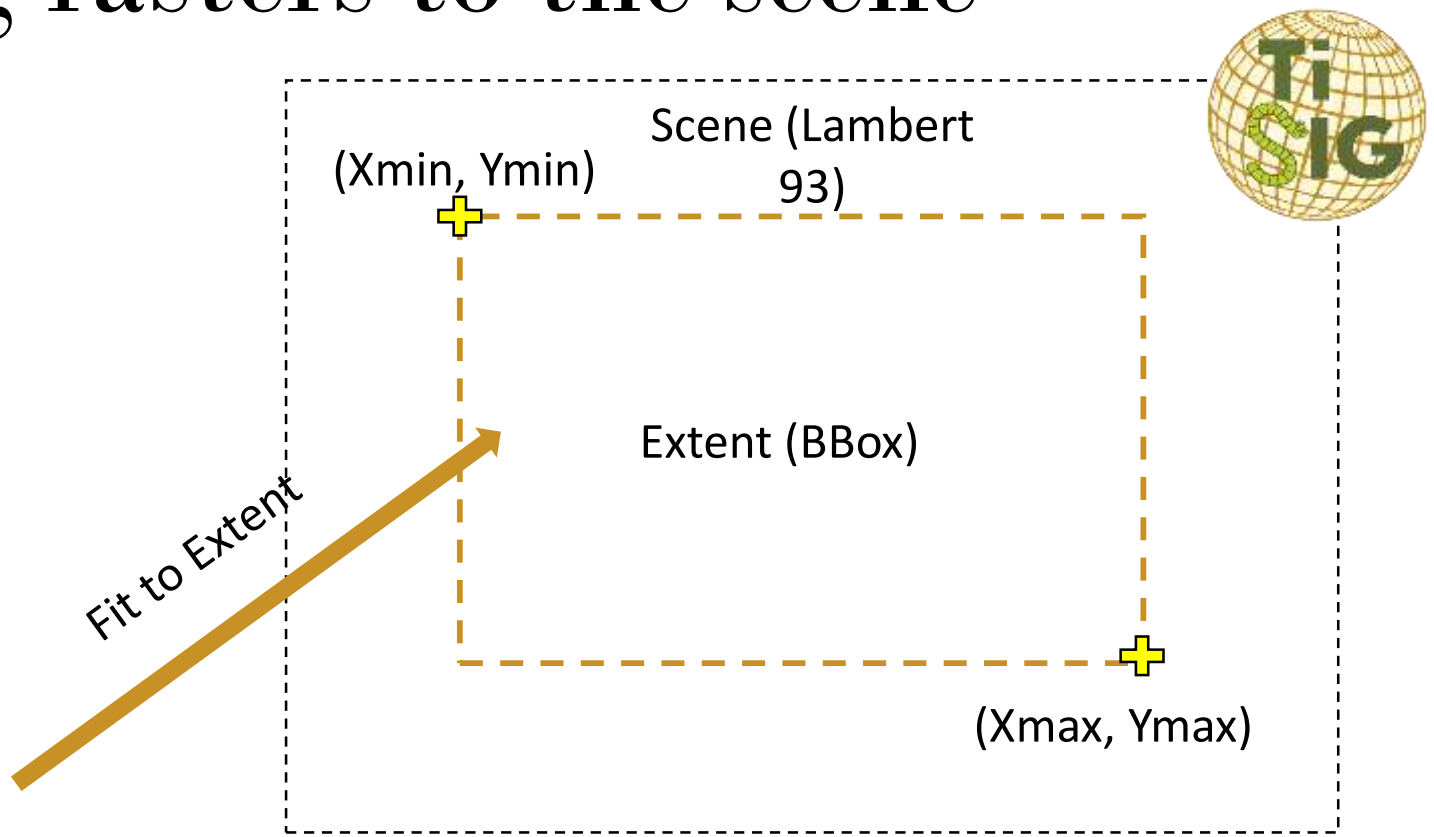


Displaying rasters



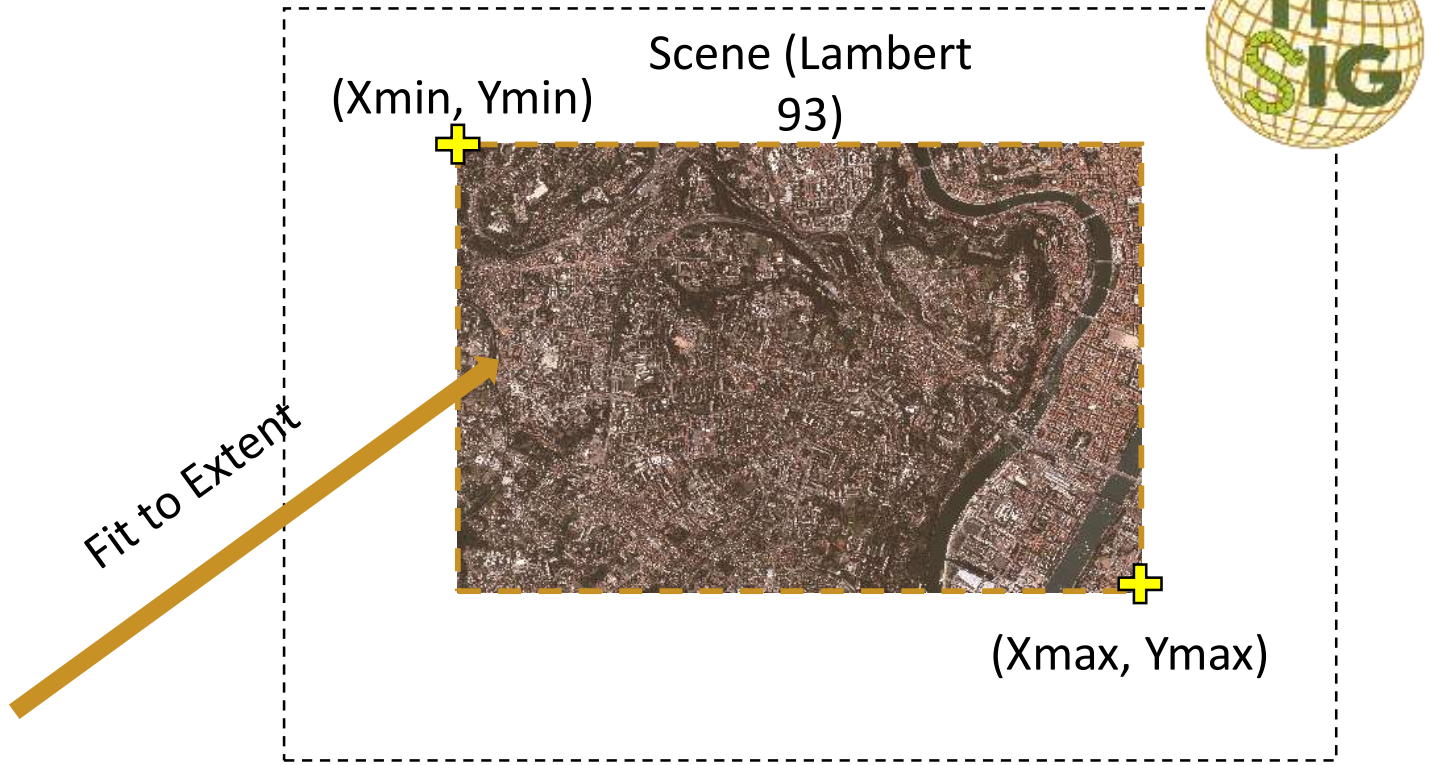
Adapting rasters to the scene

Raster

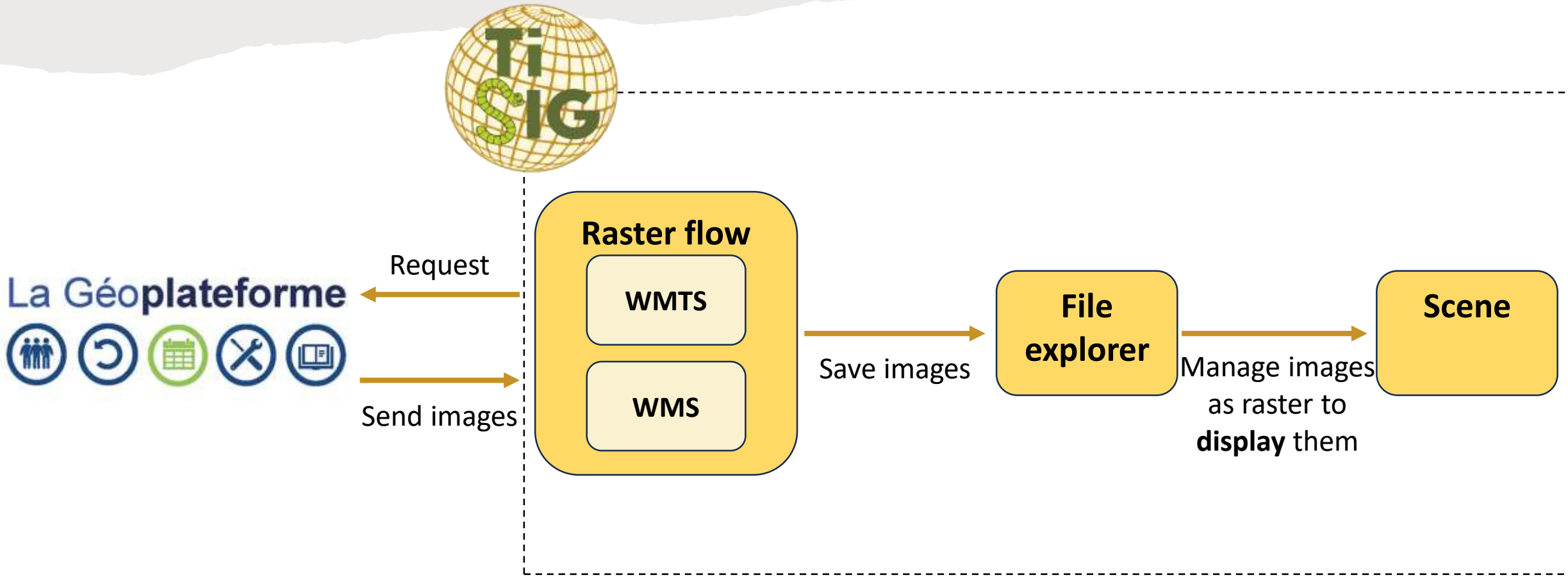


Adapting rasters to the scene

Raster

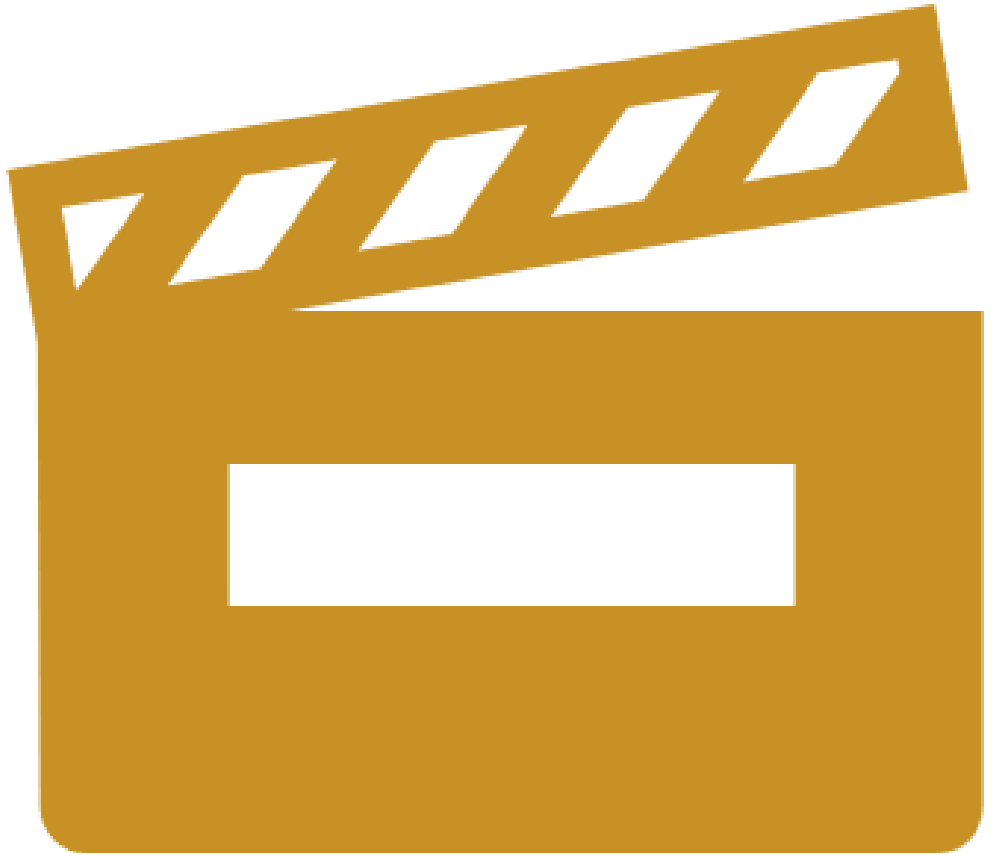


Importing raster flows

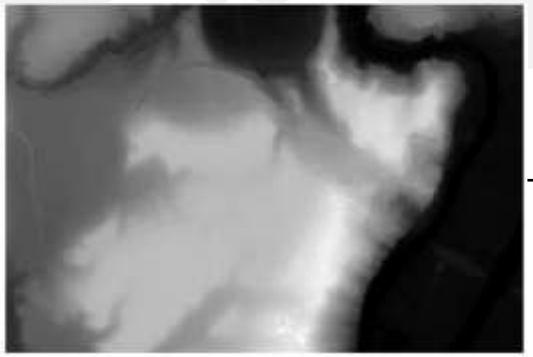


3D Visualisation

TiSIG's demonstration – 3D visualisation



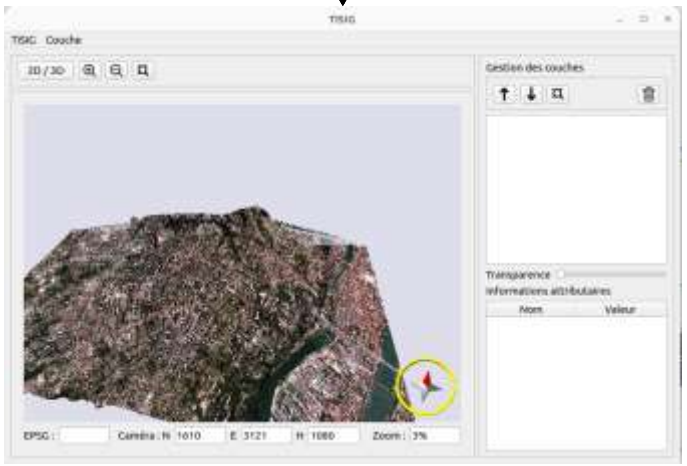
Plastering an orthophoto on DTM (MNT in french)



DTM (Digital Terrain Model)

Orthophoto

Orthophoto plastered on DTM

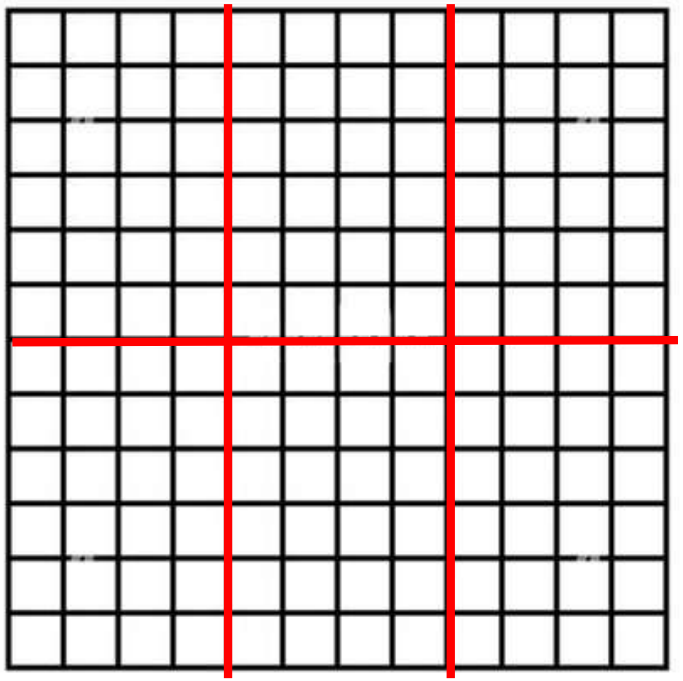


Advantage of a .obj file

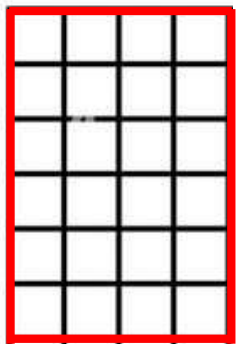
Contains vertexes and texture

Easy to use

Dividing DTM



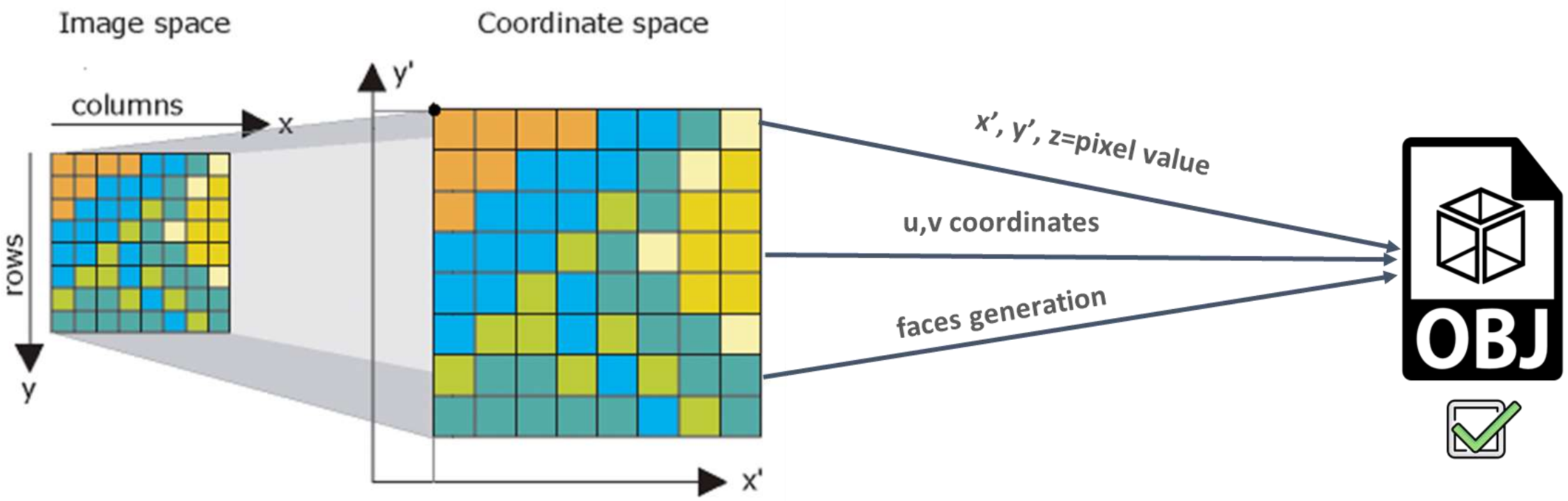
Lyon 5th borough DTM



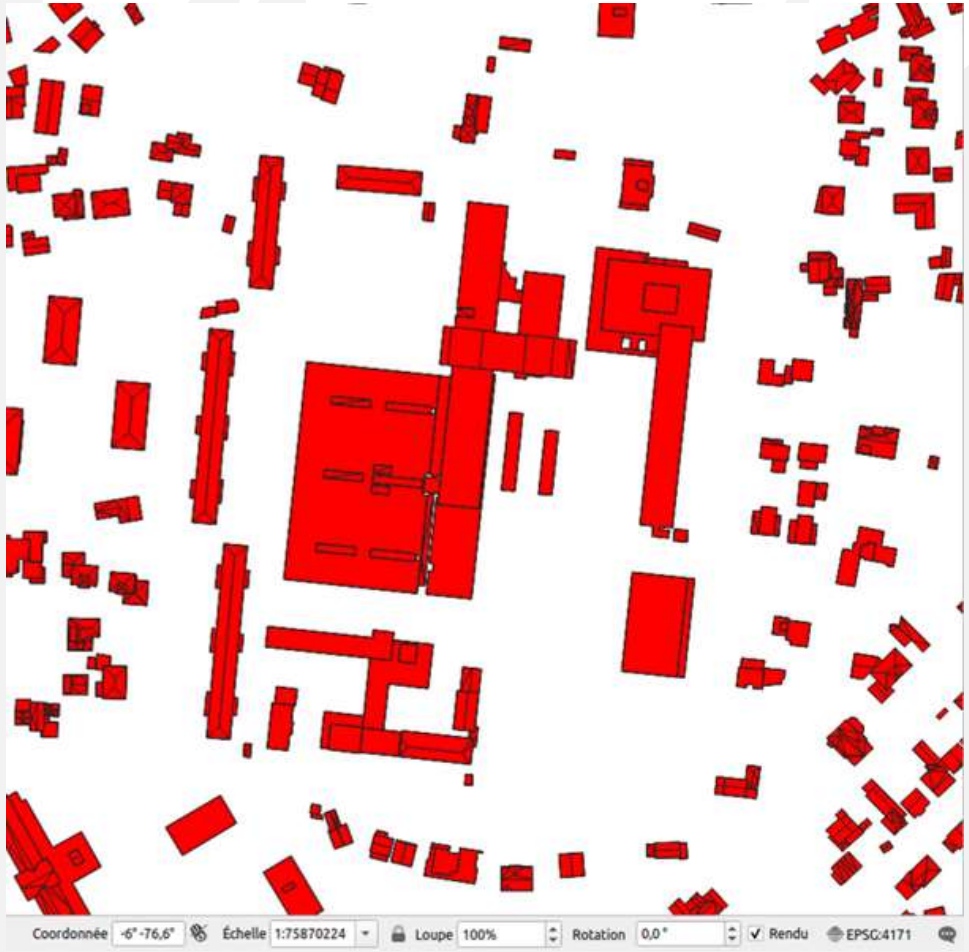
Multiple DTMs

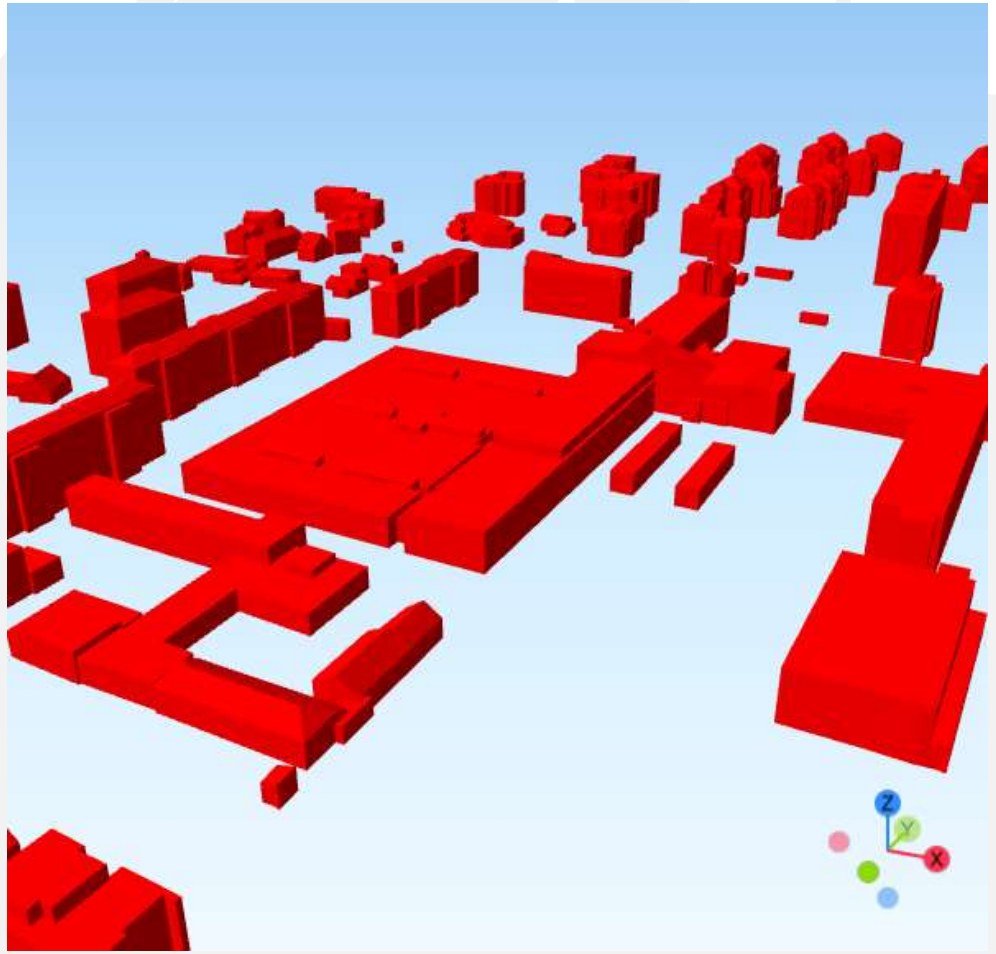
Multiple OBJ files

Writing a DTM obj file



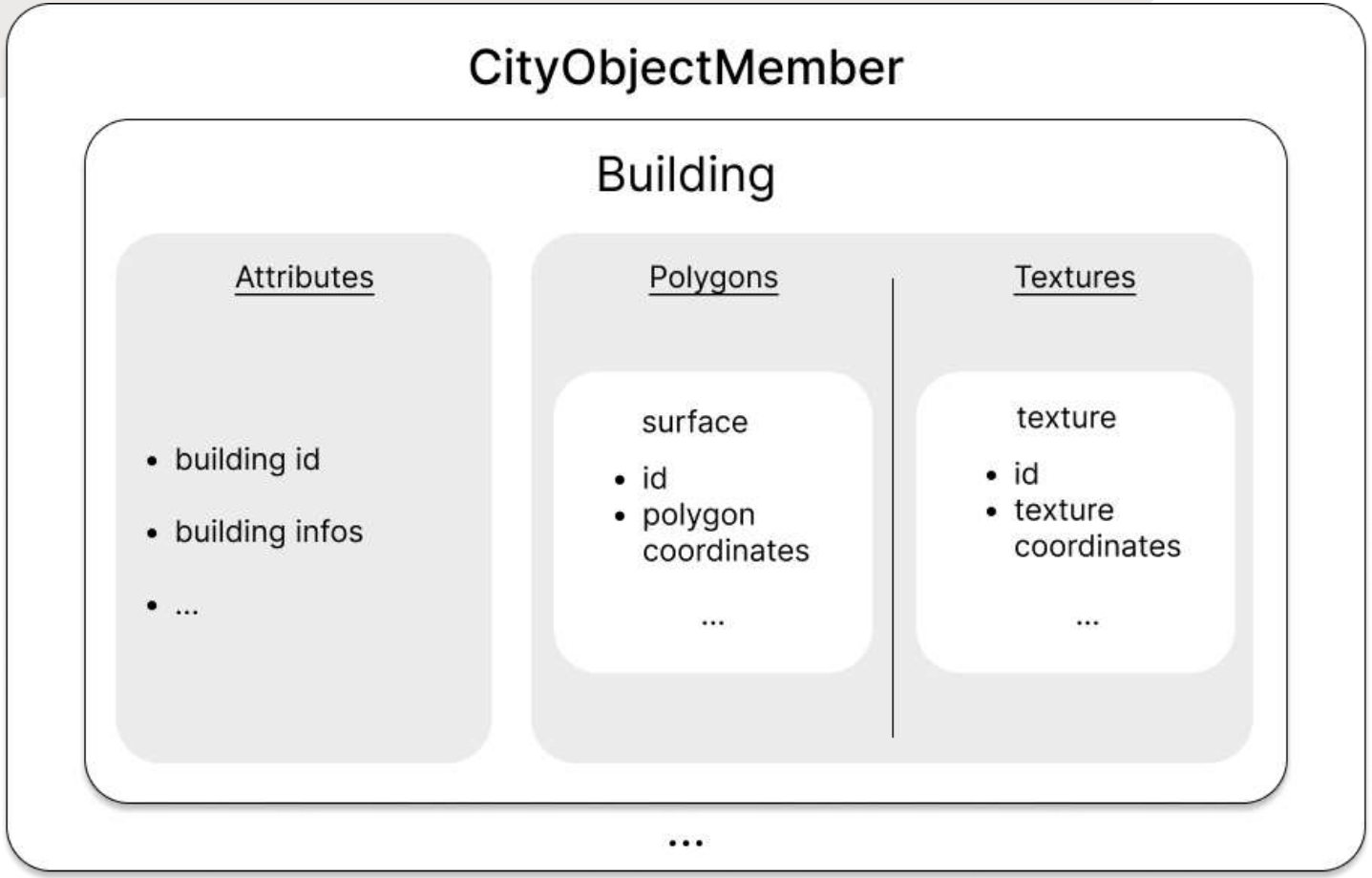
Aim of 3D visualisation





Screenshots of recognizable buildings using Qgis2threejs

Structure of a .GML file

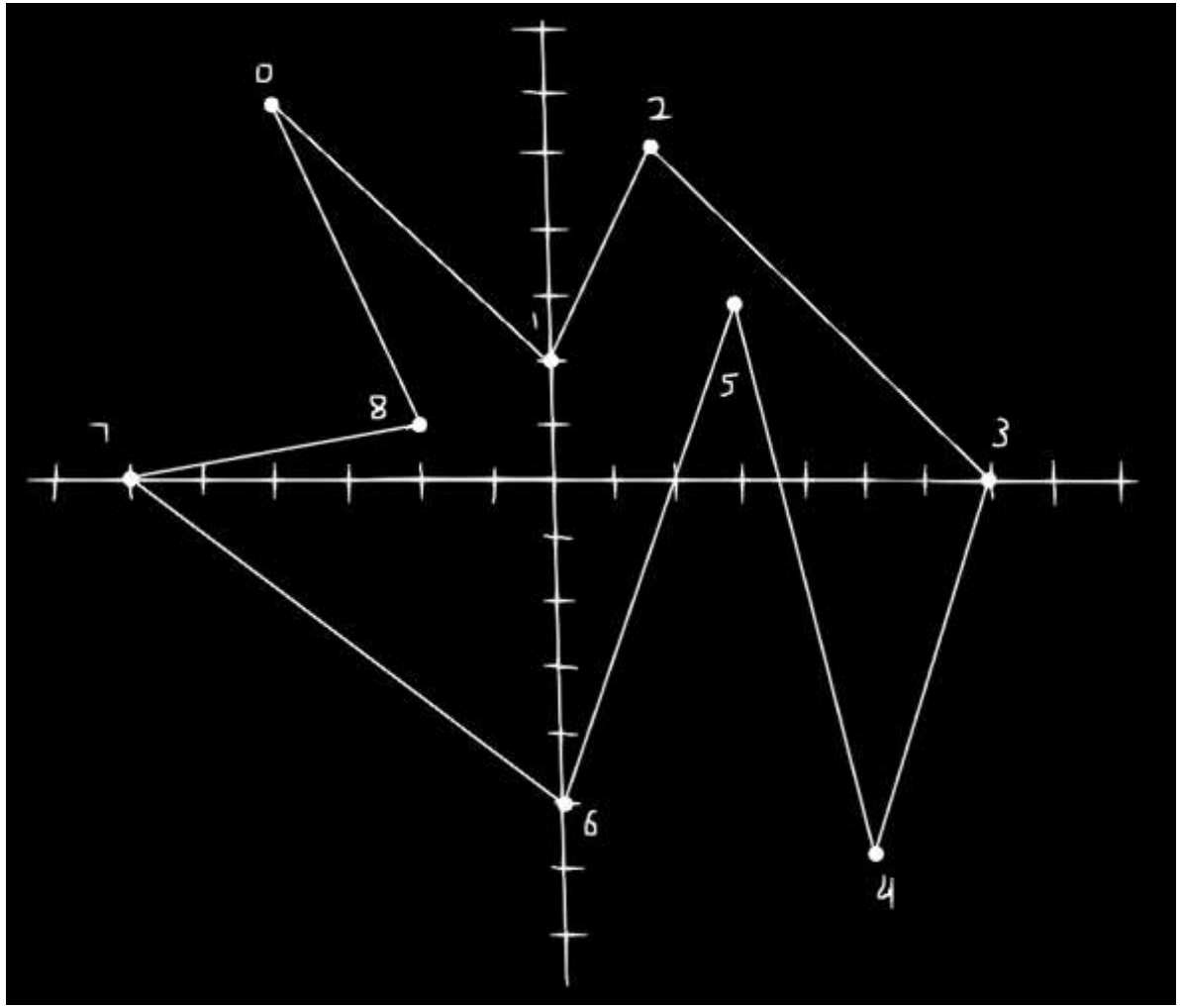


Structure of a building in a .GML file

3D City DB

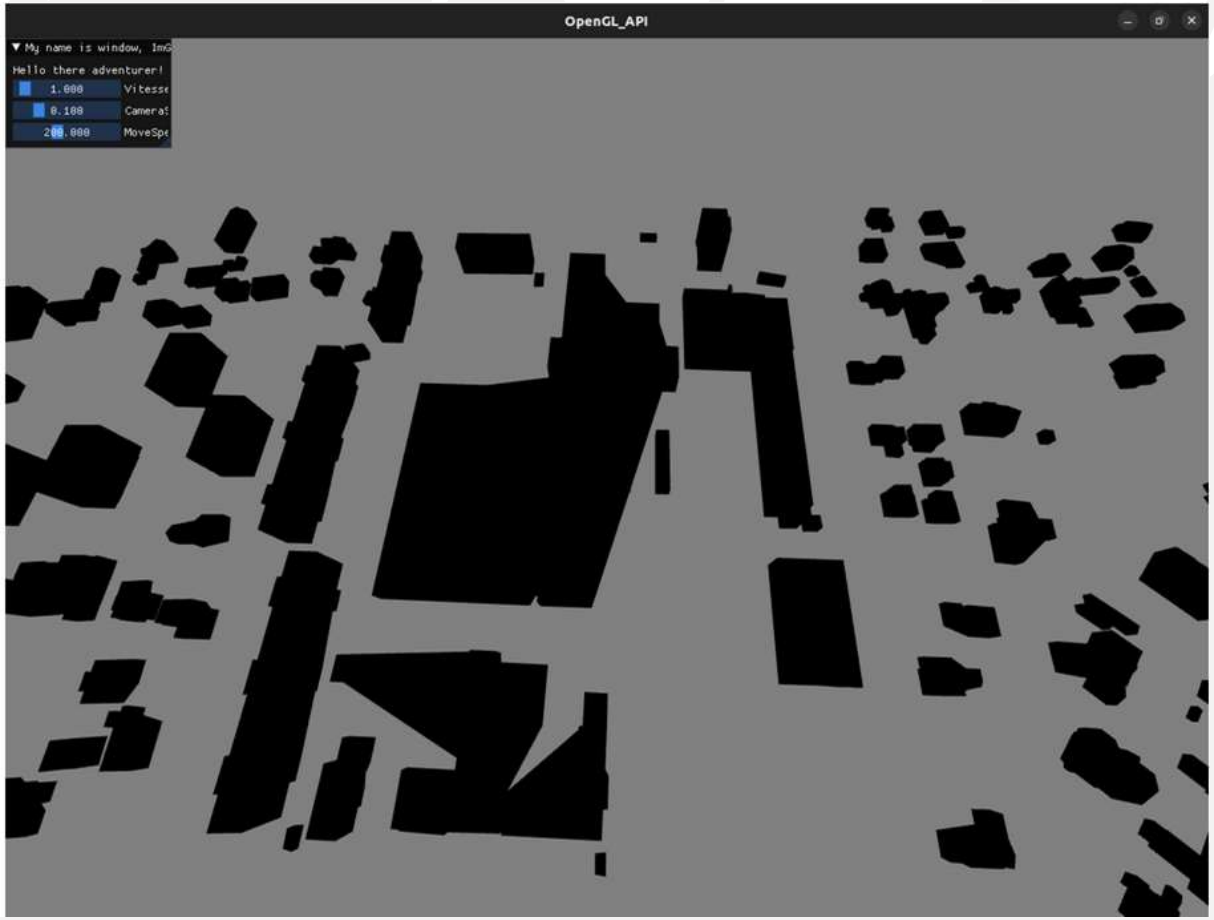
PgAdmin 4

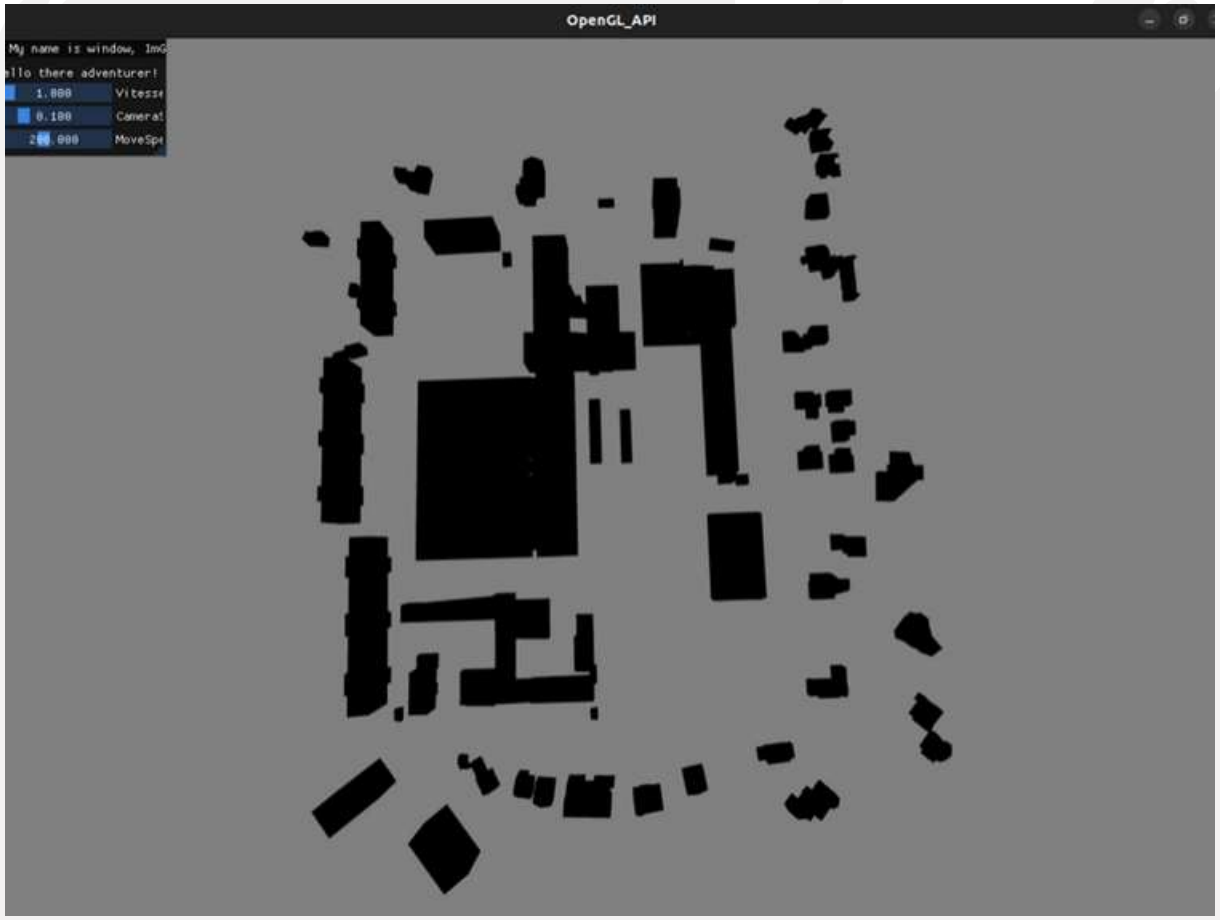
Triangulation



Example of a polygon with an interesting triangulation

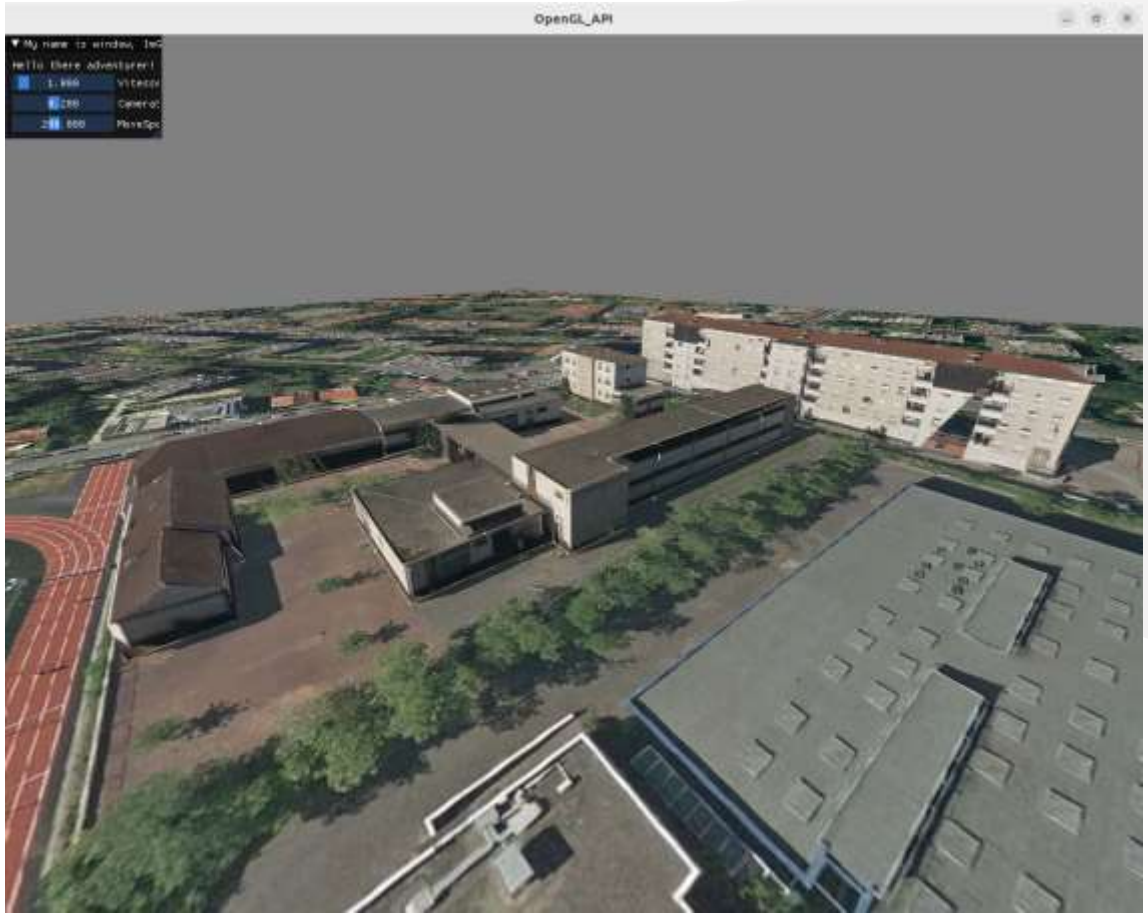
Triangulation results

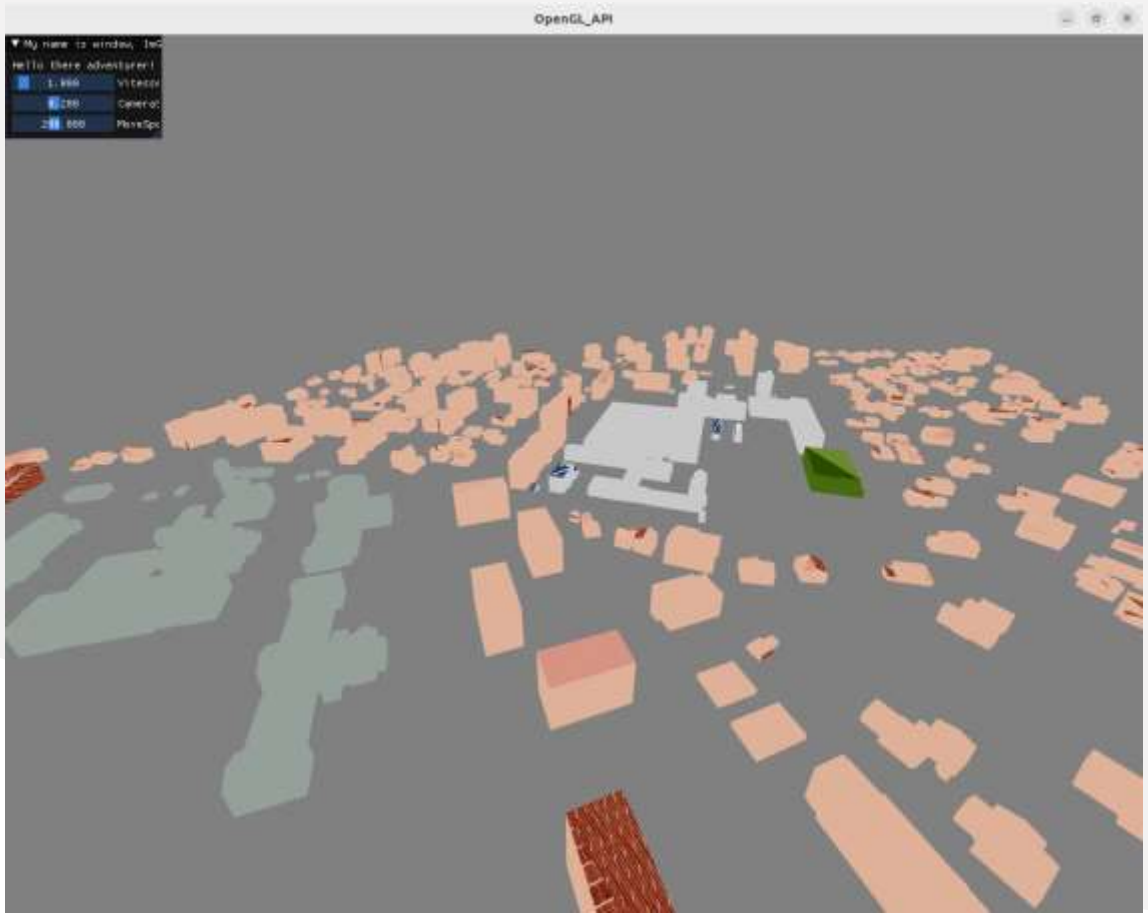




Screenshots of triangulations ranging from less to more accurate

Applying texture or symbology to buildings





Screenshots of buildings showcasing textures and symbology

Interactions between components

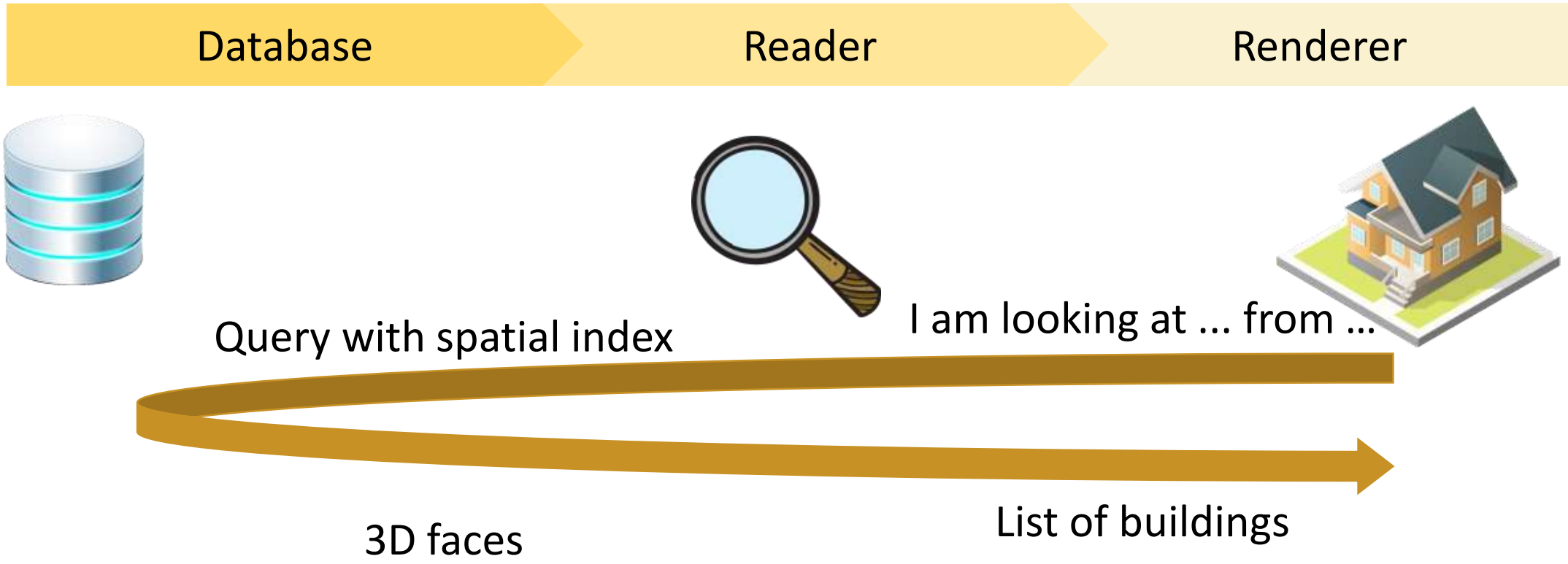
CityGML → Database → Reader → Renderer

How to prepare and store data ?

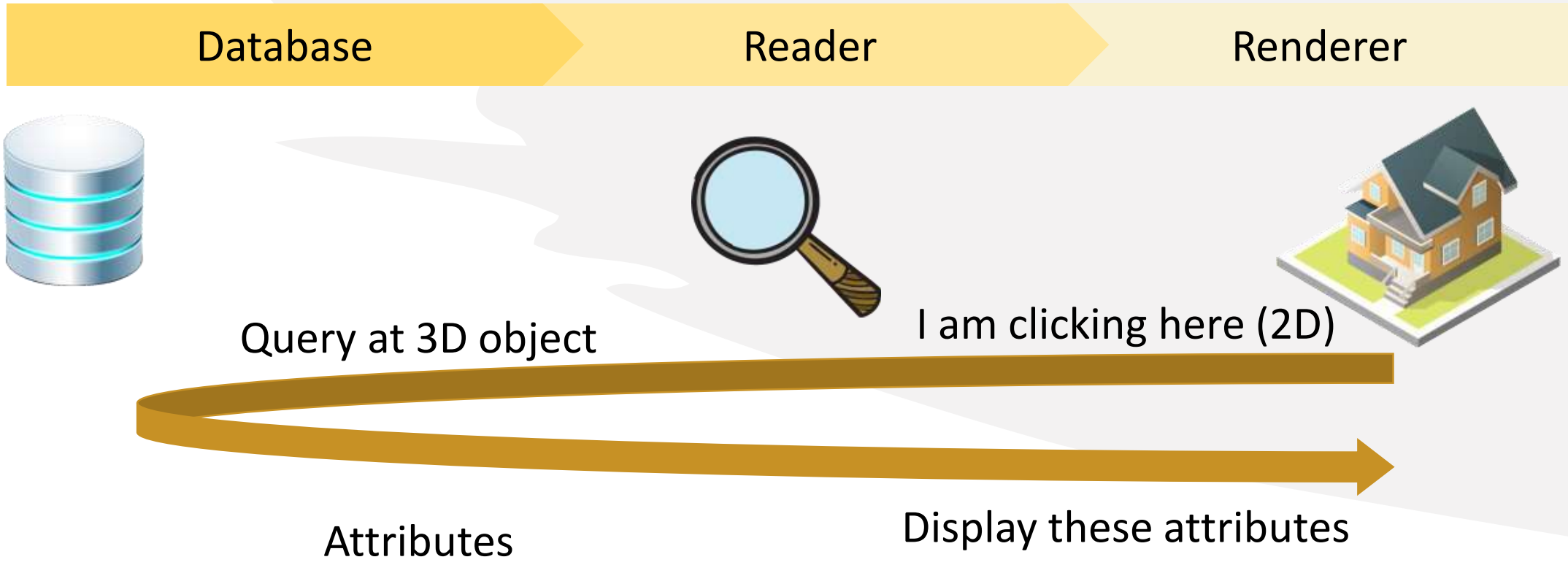
What buildings to display ?
- 3D-coordinates
- Images
- …

How will these builgings be displayed ?
- Camera
- User interface
- …

Displaying 3D buildings



Picking elements on 3D buildings



Issues encountered during the project

General issues

Working on different tasks inside teams

Managing everyone skills

Estimating tasks difficulties

Solutions

Trello

Daily meetings

Experience gained

Technical issues

Maintenance of the Géoplatform website

Creating a Docker container for both databases

Running the application on Virtual Machine

Technical issues - solutions

Communicating with Géoplatform's Team

Running docker tests and working with other

Install QGIS libraries

Contribution status

Construct a GIS with two modes of visualisation (2D and 3D)

Capital gain : focus on the switch 2D/3D

Perspectives

Geoprocessing on 2D vector layers (buffer, intersections…)

Change layers symbologies in 2D and 3D modes

Being able to use TiSIG on Mac or Windows

Thank you for your attention

Do you have questions ?

8 December 2023

TSI (Information Systems Technologies)

Class 2023