

# V3ct3D

## Structuring project

École nationale des sciences géographiques

09 december 2016

# Brainware

## Method Scrum

- ▶ Daily sprints
- ▶ group of 14 people



FIGURE: Brainware

## Personal report

- ▶ Scrum master and part of a big team
- ▶ Tools
- ▶ 3D world
- ▶ Advanced thinking



# BD UNI & BD TOPO

## BD uni

- ▶ Is a database of vector data for the whole of France containing all the themes that constitute the commercial products of the IGN.
- ▶ Its regroup 10 domains : The road network, The building, the vegetation etc. . .
- ▶ The vector component of the RGE

## BD TOPO

- ▶ Is the topographic component of the RGE

# iTowns

- ▶ IGN technology platform : viewing and exploiting 3D geographic data
- ▶ Written in Javascript/WebGL
- ▶ Collective intelligence : Several companies are participating in the project :
  - ▶ IGN
  - ▶ Oslandia
  - ▶ AtolCD
- ▶ Github : <https://github.com/iTowns/itowns>
- ▶ Supported data types :
  - ▶ Panoramic images
  - ▶ Point Clouds
  - ▶ 3D textured models
  - ▶ WFS Vector

# Personnal report

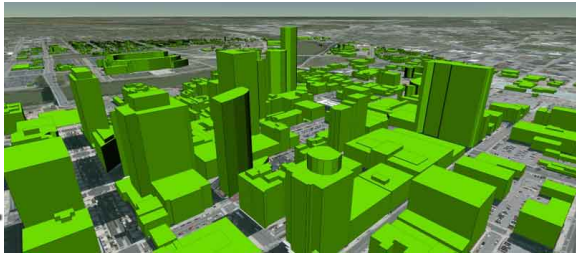
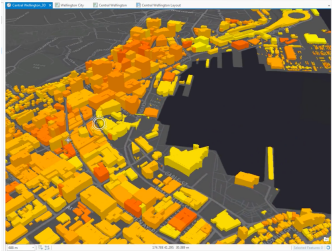
This project allowed me to :

- ▶ Discover iTowns ;
- ▶ Discover cesium ;
- ▶ And be able to write in Markdown.

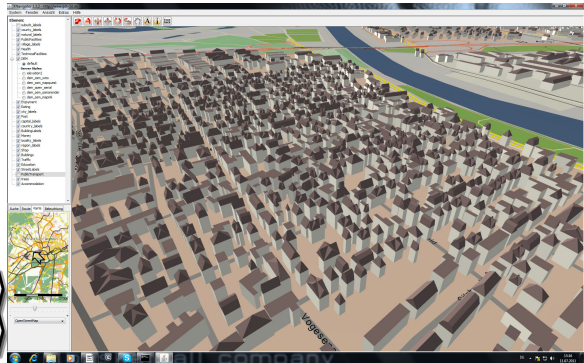
## Different kind of data to do 3D



ArcGIS®



## Different kind of data to do 3D (2)





# Personal report - Victor BRINON

## Computer skills

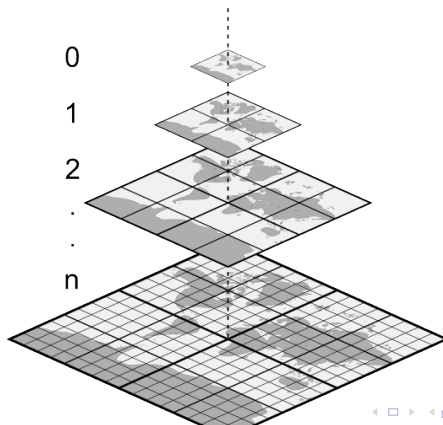
- ▶ Markdown
- ▶ Github
- ▶ Taiga
- ▶ Slack

## Social skills

- ▶ Work in a big group
- ▶ Communication
- ▶ Relationships
- ▶ Daily meeting

# Tiles

- ▶ Vector tiles are packets of geographic data, packaged into pre-defined roughly-square shaped “tiles” for transfer over the web.



# The principle of tiles :

- ▶ The principle of tiling is to subdivide the entire surface of a map into small slabs ,
- ▶ Tiling allows two main advantages :
  1. display on the screen only the tiles needed,
  2. the level of generalization of the information. . .

# Personal report - Hanane DERBOUZ

- ▶ Discovery of 3D libraries
- ▶ Discovery of 3D tiles and their principle
- ▶ Writing standard : Markdown

# Libraries to display 3D



# Cesium



FIGURE: Cesium

# Transverse view of a project

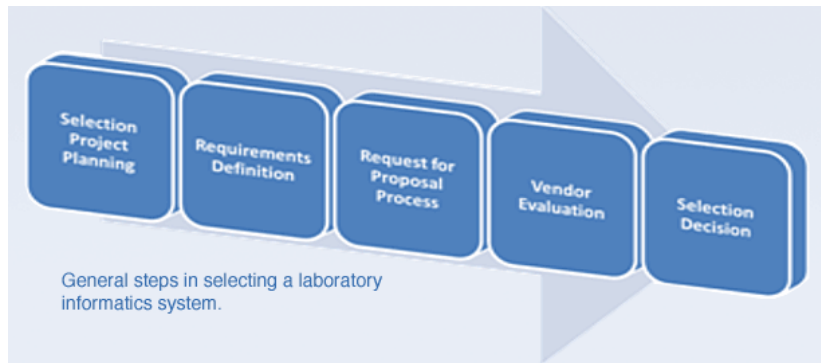


FIGURE: projectsteps

## Processing chain md => pdf

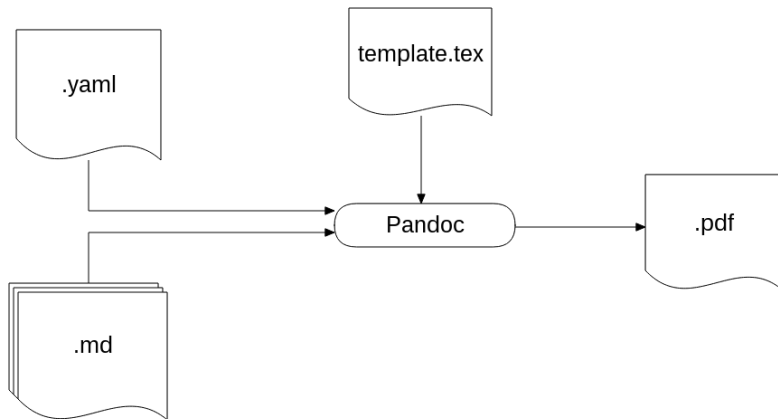


FIGURE: Processing chain



# Use case diagramm

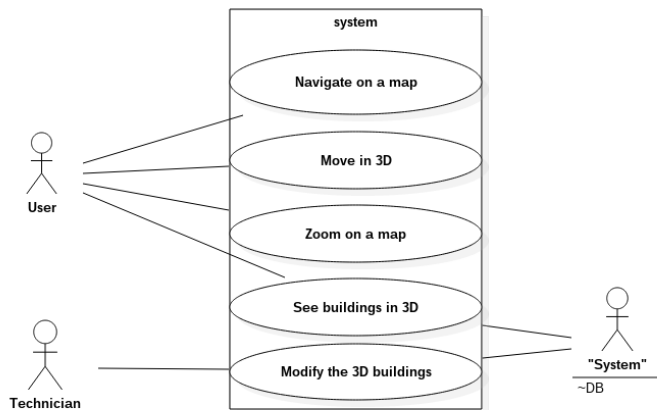


FIGURE: Use case diagram

# Personal report - Hugo BALTZ

## Computer skills

- ▶ Pandoc
- ▶ Markdown
- ▶ UML diagrams
- ▶ 3D-Viewer

## Social skills

- ▶ Organization
- ▶ Relationships
- ▶ Communication
- ▶ Efficiency

# Production chain : global

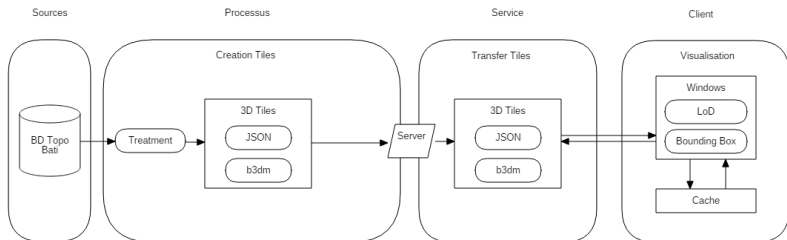


FIGURE: Production chain

# Personal report - Julie MARCUZZI

- ▶ Learn Markdown methods
- ▶ UML diagrams
- ▶ Communication
- ▶ Discover Cesium, file format & library

## BD TOPO (BATI)



Interpret

- (+) basic geometric features
- (+) geolocation
- (+) type
- (-) no relationship
- (-) no hierarchy



Create

Transform

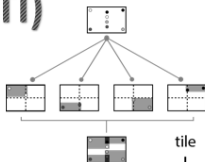
## 3D Tile server



- (+) bounding box
- (+) geolocation
- (+) volume
- (+) metadata

FIGURE: 3DTileGen

## BD TOPO (BATI)



## 3D Tile server



tile

boundingVolume



geometricError

refine

content

- boundingVolume (box, region, or sphere)



- url -&gt; Separate file with tile contents, streamed on demand

children[]

FIGURE: 3DTileGen

# Personal report

## Improved knowledge in Geomatic

- ▶ Vocabulary, geolocation, data representation

## Discovery of current standards and libraries

- ▶ Cesium, 3D Tiles, webGL, postGres, ...

## Team work

- ▶ Large team, tiny sprints = hard work

# The PostGIS Database

## BDTopo

- ▶ Select the *bati* Shapefiles
- ▶ MultiPolygonZM

## Import

- ▶ Using shp2psql
- ▶ Result



# Data Processing

## Bounding Box

- ▶ Creation

## Object

- ▶ Geometry
- ▶ Relative positioning

## Result

- ▶ Unique entity

# Personnal Report

The global processing

SQL

Organization

- ▶ Team
- ▶ Sprint

# Data Hierarchization and display improvement

## Bounding Volume Hierarchy (BVH) method

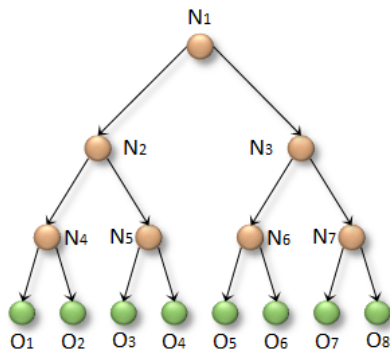
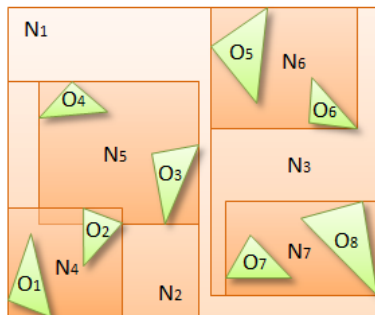


FIGURE: BVH

# Chain of application



FIGURE: Chain of application

# Personal report

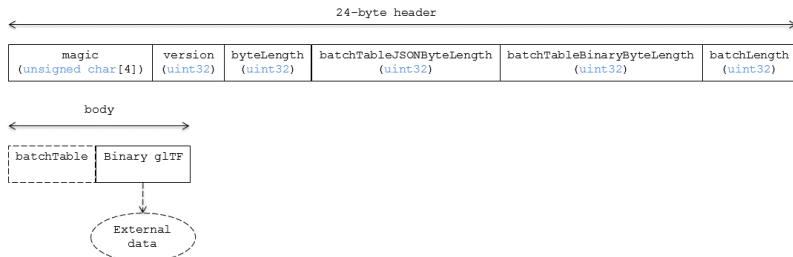
- ▶ Previously unknown formats and compatibility questions
- ▶ Conception at a high level of abstraction
- ▶ Knowledge gathering between all the individuals

## b3dm *Batched 3D Model*

OGC is considering a proposed work item for 3D Tiles as a Community

The Batched 3D Models is an initial tile format proposed by **Open Geospatial Consortium (OGC®)** for **buildings**, terrain, massive models, etc. and the transfer of **3DTiles**.

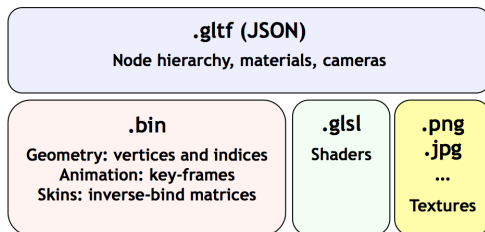
A tile is composed of two sections : a **header** immediately followed by a **body**, i.e. Binary glTF.



# glTF *GL Transmission Format*

## Used by 3DTiles

- ▶ Efficient, extensible, interoperable format (3D transmission and loading)
- ▶ Preserve full hierarchical scenes
- ▶ Making no assumptions about the target application or 3D engine.



# Personal report

- ▶ Rediscovery of **Cesium** & Node js
- ▶ Discovery of streams (WMTS) and **file transfers** (gltf, b3dm ... ) + library js like OpenLayers
- ▶ Knowledge about **Markdown**
- ▶ Curious and Analytical mind



# Bounding Box

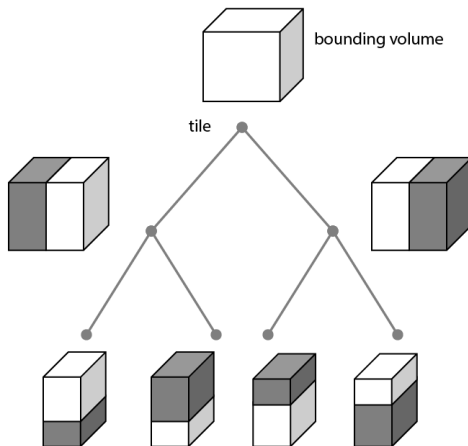


FIGURE: bounding\_box

# Level of Details

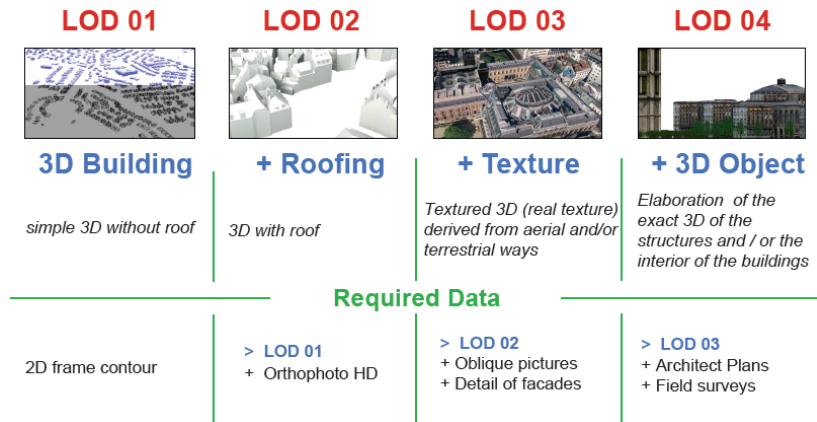


FIGURE: LoD

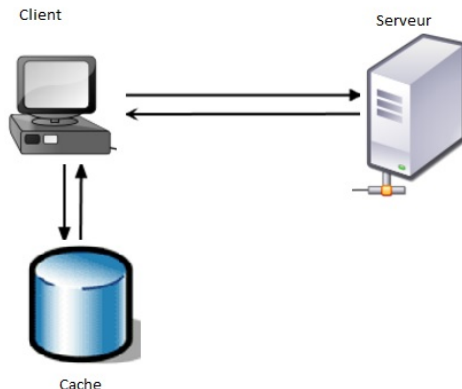
# Feedback

## Summary

- ▶ Production line of 3d vector tiles
- ▶ iTowns
- ▶ 3D Tiles
- ▶ LoD
- ▶ Bounding Box
- ▶ TileSet
- ▶ glTF
- ▶ iTowns

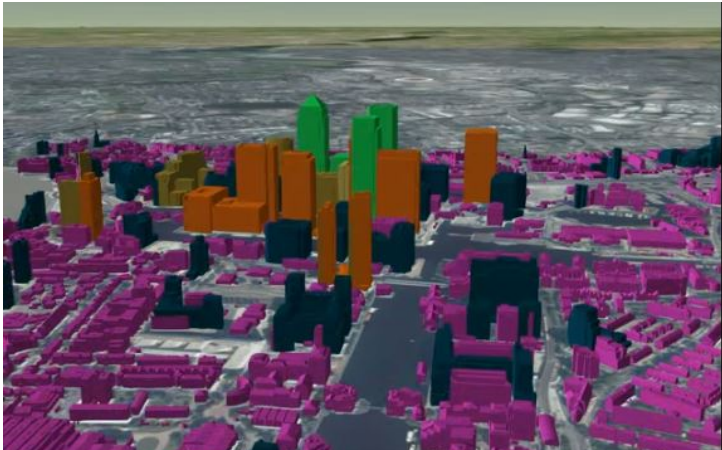
## Visualisation : Process

- ▶ Initialisation : Global tileset
- ▶ Request : Bounding Box, LOD
- ▶ Cache



# Visualisation :Response

- ▶ 3d tiles format : gltf
- ▶ GLTFLoader : three.js

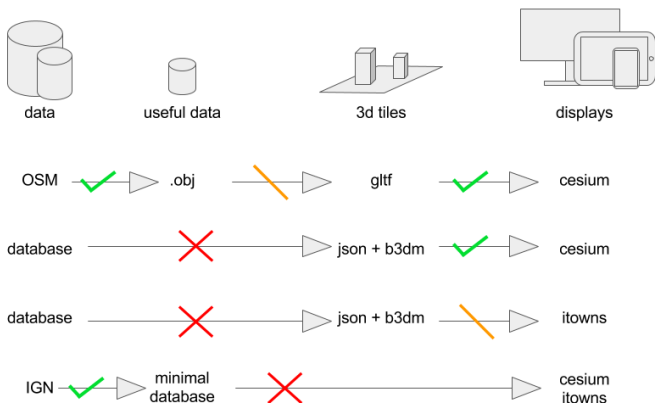


# Personal report - Hind HAMYA

- ▶ Discovery of 3D libraries
- ▶ Discovery of an open standard XML schema : Collada
- ▶ Writing standard : Markdown

# Demonstrator

## Explanations



# Demonstrator

Movie time



# Personal report

## Relationship

- ▶ Oslandia team
- ▶ IGN team

## Technical skills

- ▶ 3d data mechanisms
- ▶ cesium exploration
- ▶ iTowns exploration

## Team skills

- ▶ team splitting
- ▶ feedbacks

# Conclusion

- ▶ Suggestion of a chain of production
- ▶ Creation of an interest

