

WPLA/CLRKEN - Joint Workshop Land Administration and Land Management in the Information Age

Lausanne, 21 April 2017

The Added Value of 3D for Exploration and Design Activities in Geodata Rich Environments

Prof. François Golay, EPFL

The Added Value of 3D

Why bother
about 3D ? ...

... Google Earth
offers quite
a complete
solution !

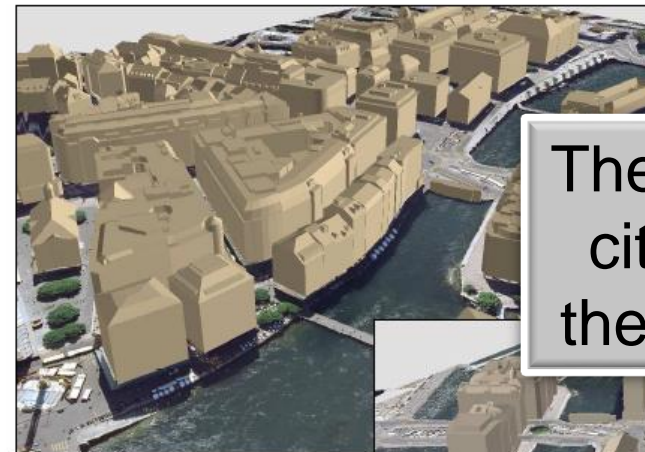


Many cities throughout the world have now developed their own 3D model...

... as for example Geneva, who has released its 3D model on its SITG open platform several years ago.

It includes:

- 3D Objects: building and bridges (LOD 2 with detailed roofs)
- Point objects: trees and antennas
- Surface objects: stairs, roads, sidewalks, equipments



The Geneva 3D city model on the SITG portal



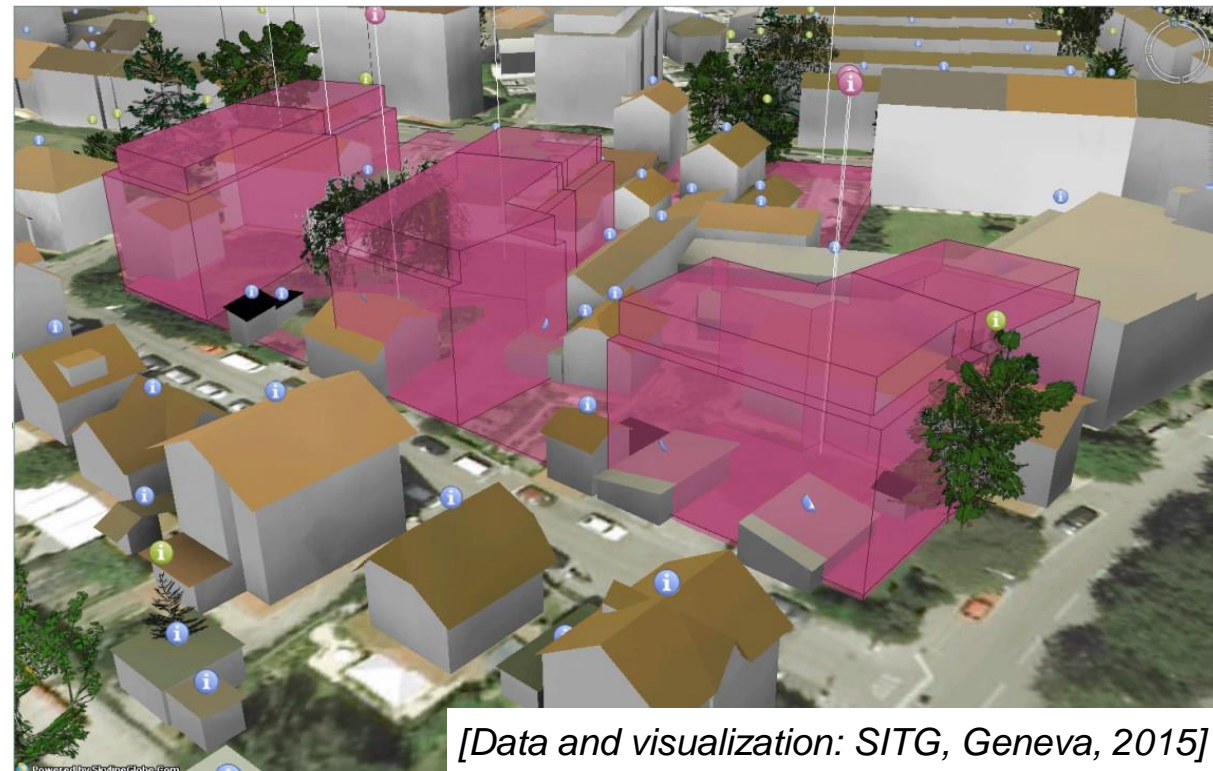
BUT, its usage remains below the expectations !

What could be done to foster its usage ?

- Educate people and train professionals...
- Improve the model with more details (textured buildings, LOD 3, ...)...



- Improve its usability for novel usages and city development processes ...



[Data and visualization: SITG, Geneva, 2015]

The Added Value of 3D

... or develop added value products,
as the computation of the solar energy potential...

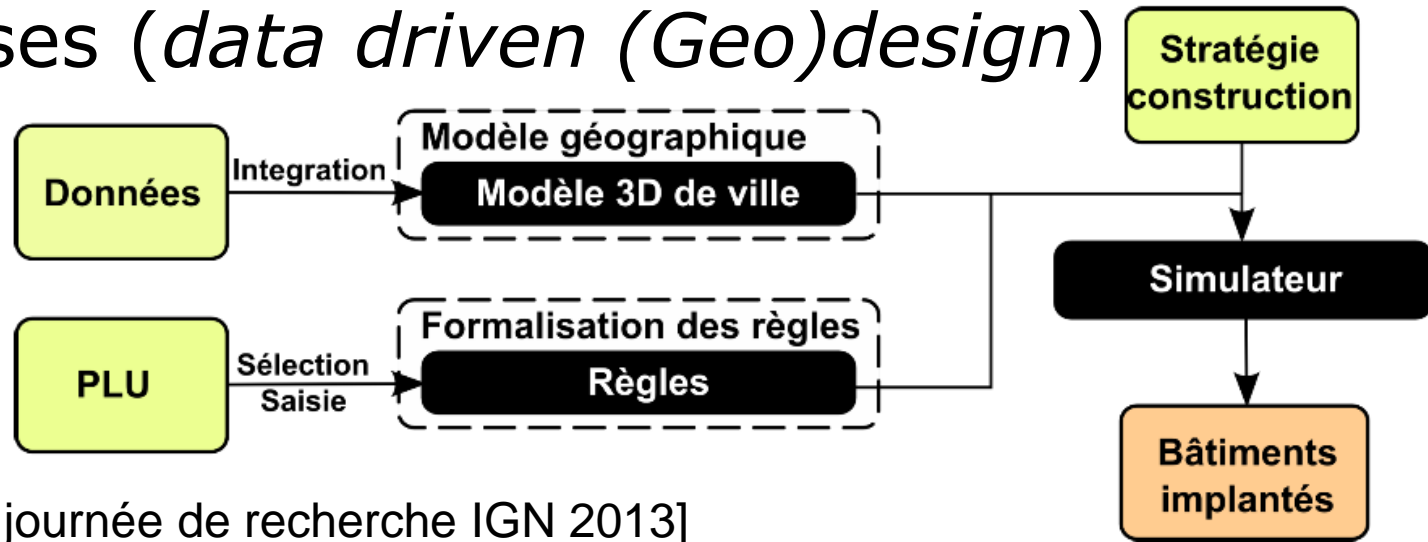


**Combination of 2D / 3D GIS data
with high resolution LIDAR DSM
[SITG, EPFL, HEPIA – 2011/2014]**

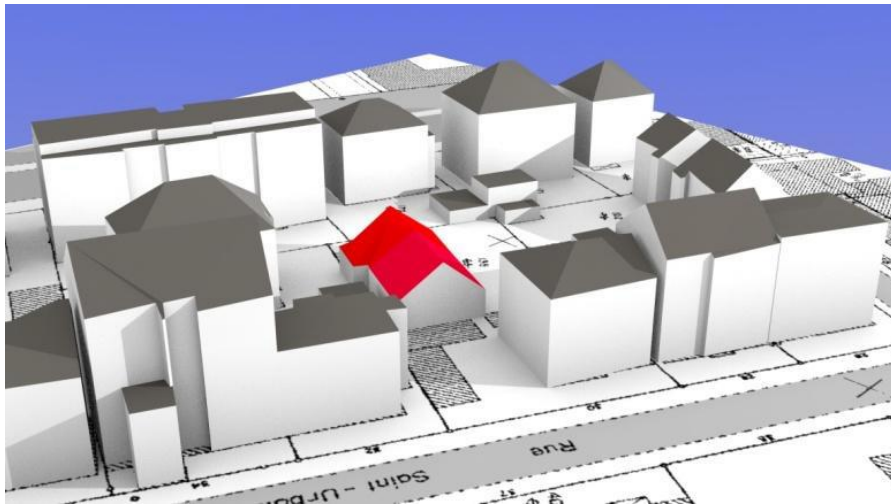
The Added Value of 3D

... or better integrate the models into design and decision processes (*data driven (Geo)design*)

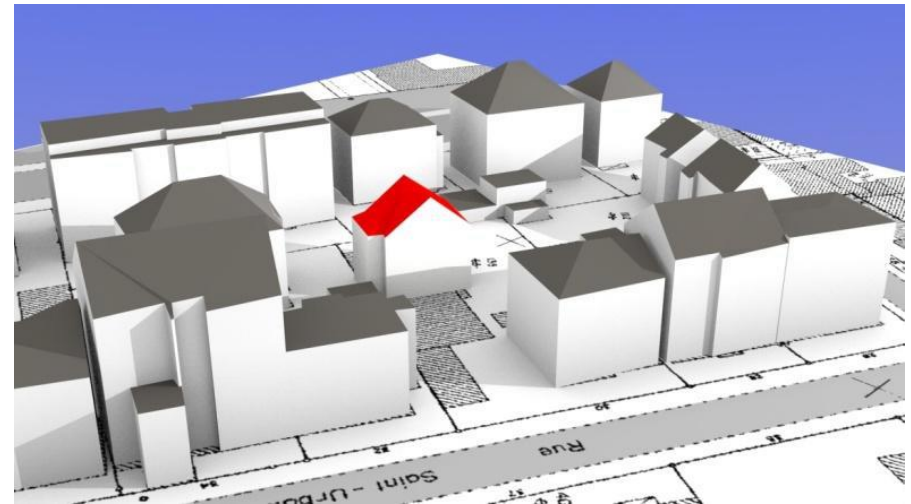
Optimization of building insertion into the urban fabric



[Mikaël Brasebin, COGIT, journée de recherche IGN 2013]



Limitation to 1 floor...



Best possible distance to service road...

The Added Value of 3D

3D data are not only representing cities...
... forestry also relies on LIDAR-based point clouds



[EPFL-LASIG – M. Parkan 2017 – LIDAR data SITN 2016]

Land Administration and Land Management in the Information Age

The Added Value of 3D

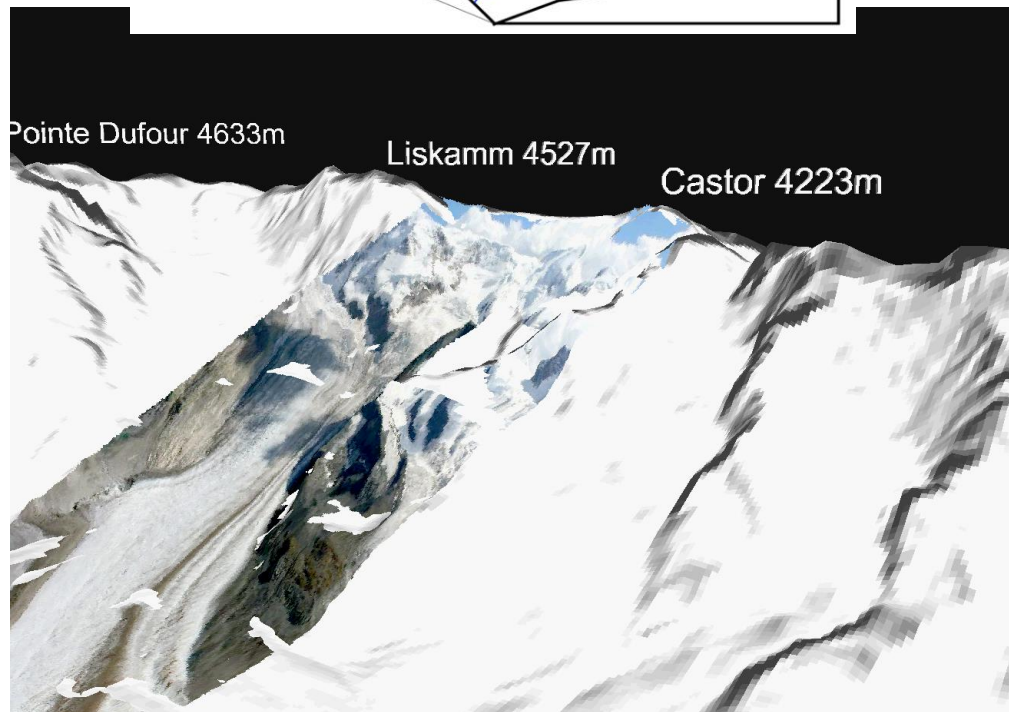
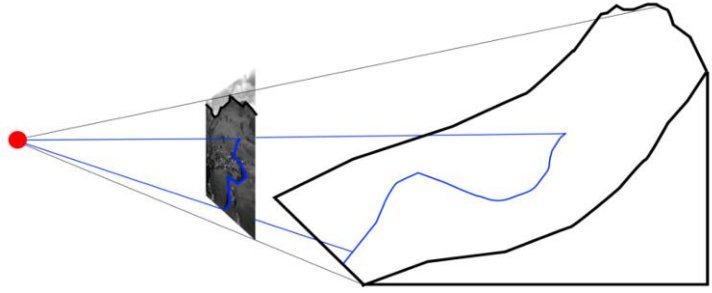
**... 2.5D landscape models can also be of interest,
e.g. to add value to a legacy collection of postcards**
[Collection Perrochet/Plein-Ciel, EPFL-ACM]

- Legacy of 30'000 oblique aerial photographs of Swiss landscapes and cities 1960-1964
- Intuitive idea of value-added «geocontextualization» in a digital globe
- Development as an exploration platform of the evolution of land use



The Added Value of 3D

Opportunity for geodata to help (semi-) automatic position estimation of oblique historic images



- Common approach in **computer vision** and **photogrammetry** does not work (poor overlapping, differing image quality)
- Features shared between images and 3D models are salient edges:
 - structure extraction from synthetic landscape images (e.g. GoogleEarth), or
 - looking for existing databases (raster: ortho-images, vector: promising TLM !), and then
 - match detection (local image intensity descriptors, form recognition)

→ *PhD Thesis of Timothée Produit (2015)*

The Added Value of 3D

Information

Show place names

Anecdotes

Forum

We need you

Share with Facebook

Geolocalization: ★★★★★

Picture: ★★★★★

Progress:

79.1% 20.9%

20 images are not geolocalised in this map area.



The snapshot viewer
J. Ingensand, T. Prodiut,
HEIG-VD 2017

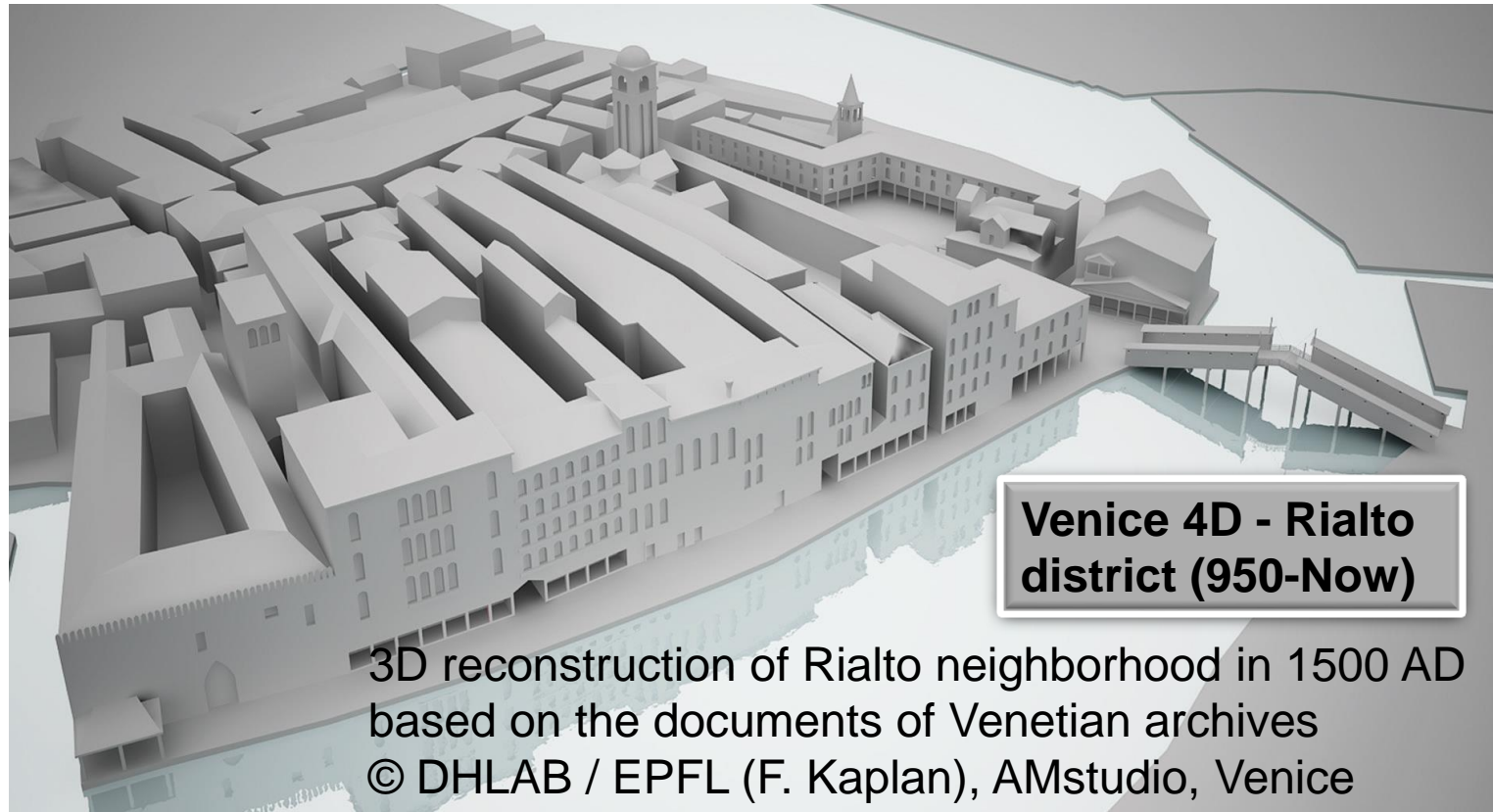


Guided tour ▾

Navigation icons: back, home, forward, eye, map, search, and help.

The Added Value of 3D

Let's go back to the city scale and figure out the *Venice Time Machine* for integration and exploration



... and why not go back to a multi-scale, integrative time machine ?
→ be welcome on board of the planned *FET Time Machine* !

Open issues and Perspectives: How to get more value added from 3D Big Data ?

- How to manage and explore the huge volumes of (4D) data produced by EO satellites, from archives, and other sources ?
- How to merge them in a common exploratory *Time Machine* ?
- How to make sense of them through novel (machine learning) algorithms ?
- How to develop the usability of the resulting models for better analysis, decision-making, and design ?

***3D geodata and augmented reality
for data-driven design and serendipity !***

