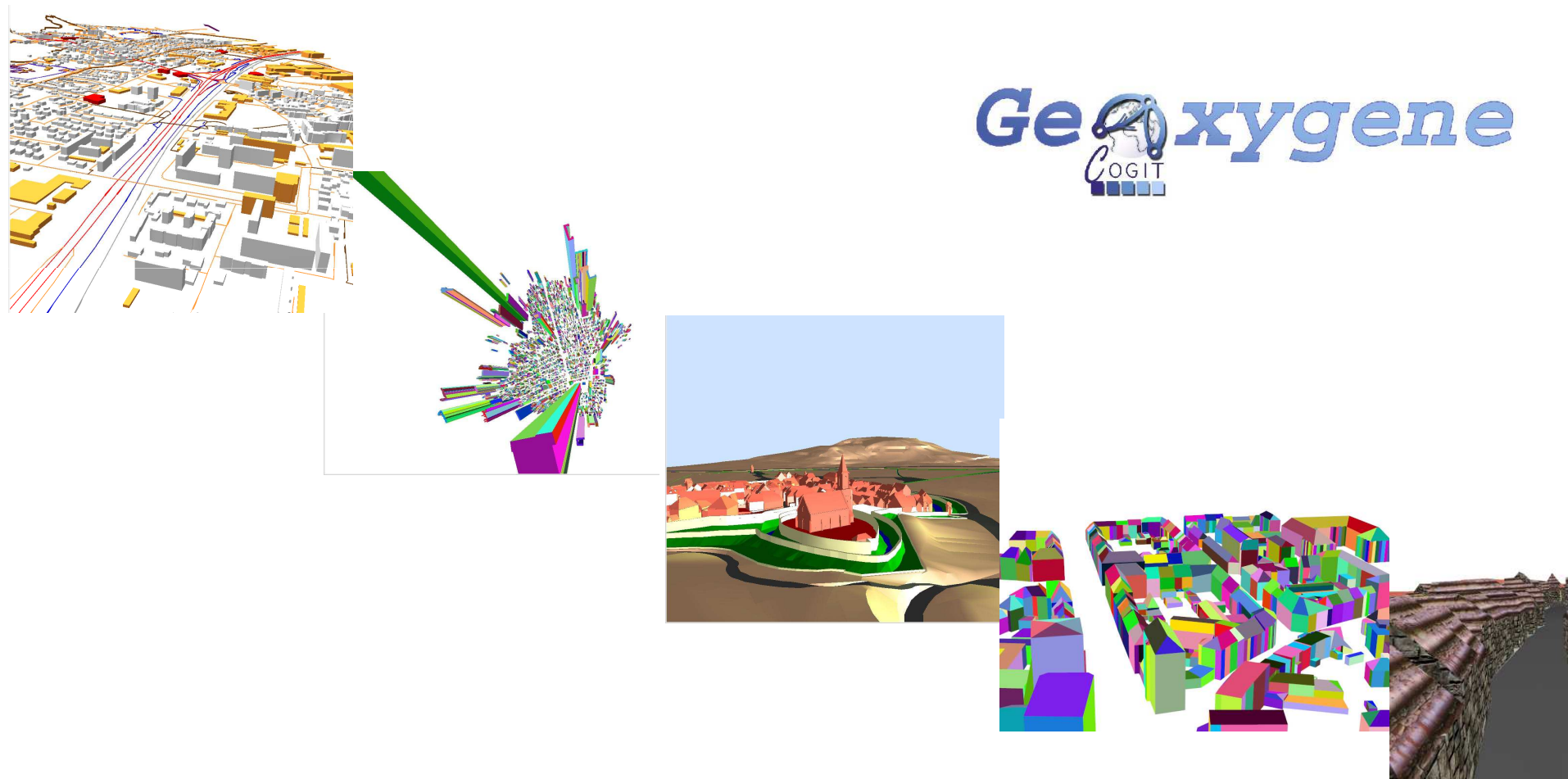


Enriching a 3D world with synthetic and visible information about the distribution of points of interest

COST TU0801 : Workshop



Geoxygene
COGIT

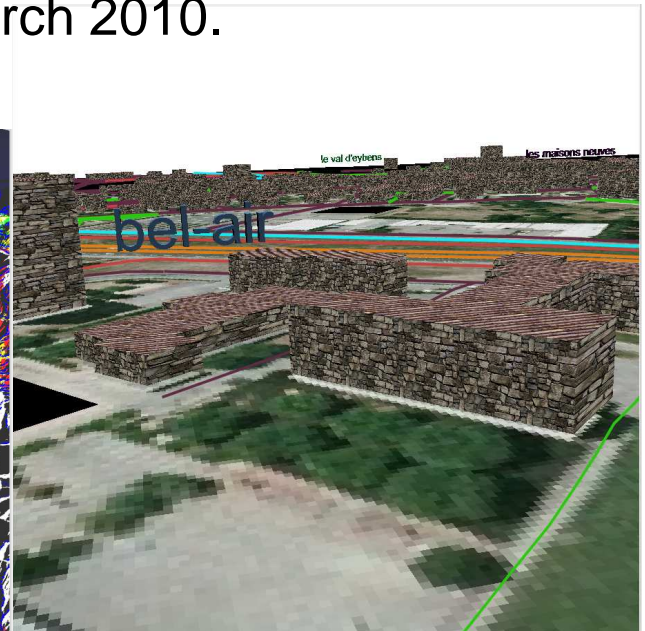
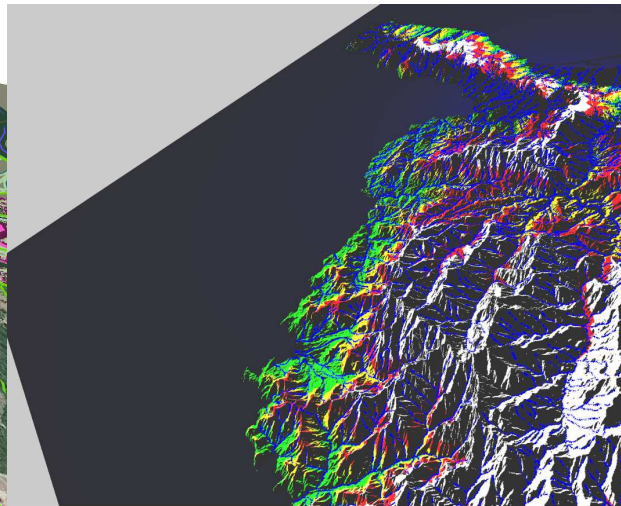
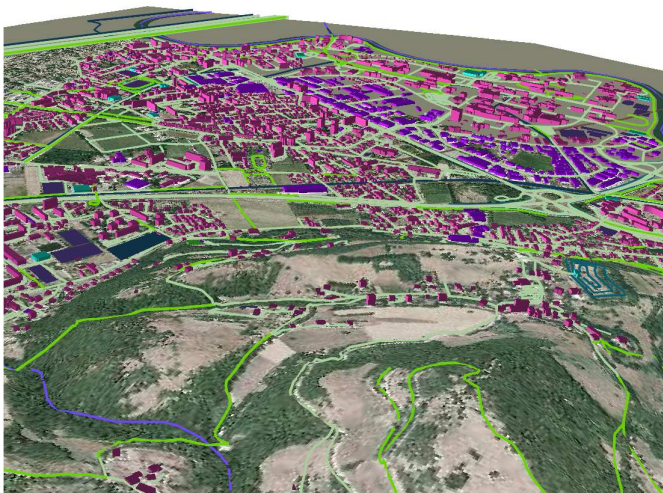
- **Mickael Brasebin – COGIT Laboratory**
(Dynamic Analysis Research Axe)
- **Main topic is Spatial Analysis in 3D**
- **Representative Works**
 - Conception of a 3D GIS for Spatial Analysis
 - TerraMagna Project

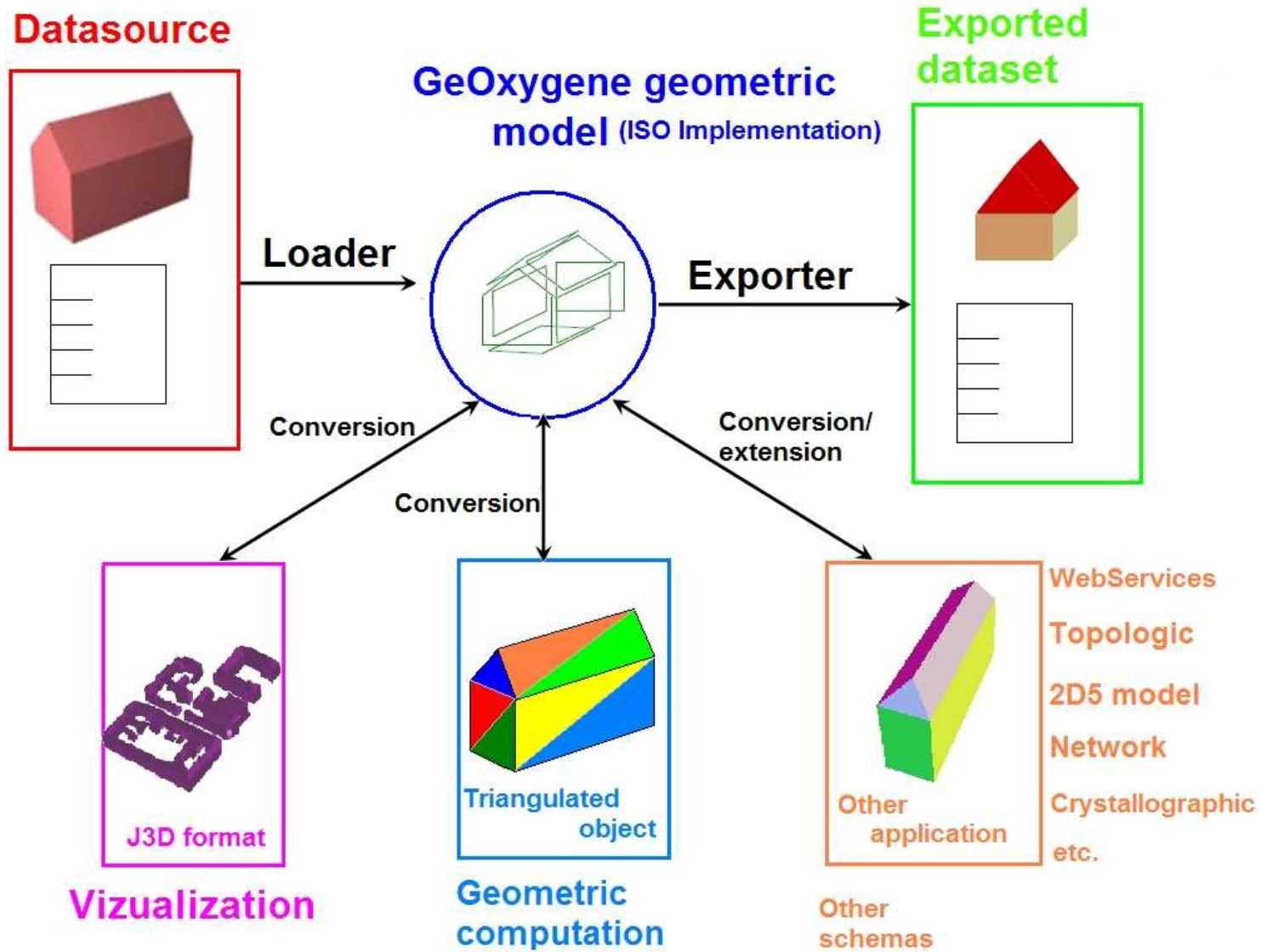
GeOxygene - 3D module

- GeOxygene 3D (Brasebin [2009] (AGILE))



- Extension of GeOxygene,
 - Open-Framework for the development of 3D research applications (Semiotics, Spatial Analysis ...),
 - Centralization of the laboratory codes.
- **Specificities**
 - Developed in Java,
 - Java3D for rendering,
 - Geometry spatial schema based on ISO 19107 specifications,
 - Will be released as Open-Source Project in March 2010.

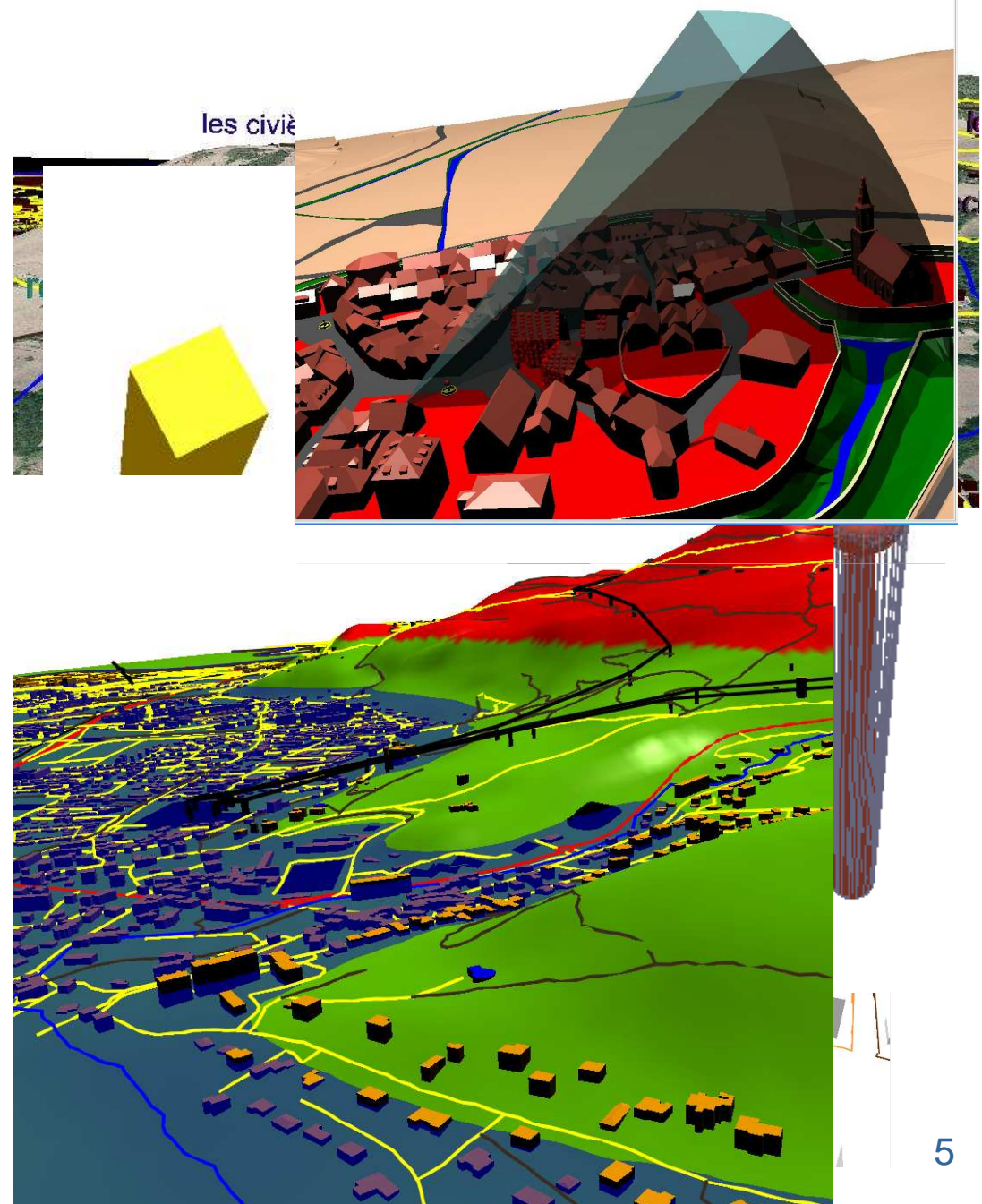




Abilities of the 3D module

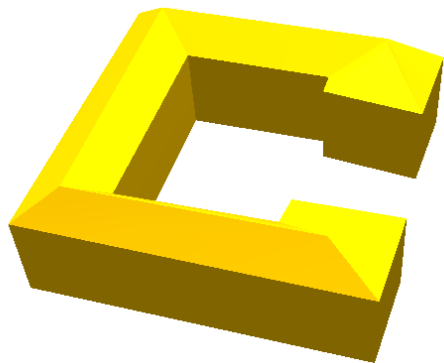


- **Data Management :**
 - .shp, DTM, CityGML, PostGIS, Collada, .3DS ...
- **Rendering :**
 - 3D Label, textures, layer management ...
- **Geometric operations :**
 - Intersection, union, convex hull, ...
- **Analysis tools :**
 - Intervisibility calculation, shape comparison ...

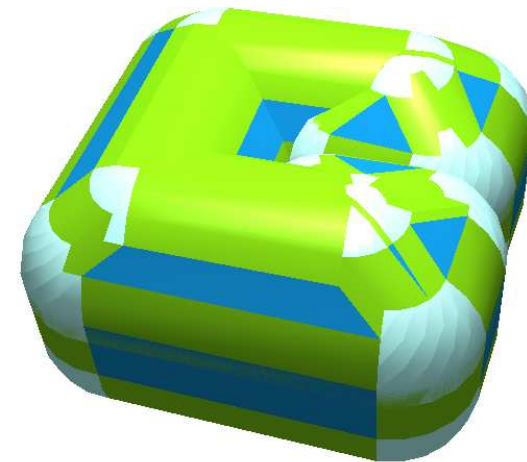


- Collaboration with French IT industries
 - Leadership : StarApic
Anne-Lise Poplavski : alpoplasvsky@star-apic.com
 - Internet site : doc.terramagna.org
- Realize a 3D GIS on the sustainable topic
 - Development of a 3D platform
 - Simulation of urban management (Vegetation & [Urban Rules](#))
 - Sustainable platform
 - 3D Webservices – 3D wiki

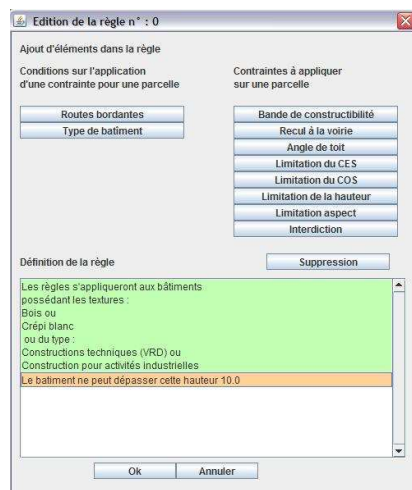
- Thoughts about
 - Data storage (CityGML server)
 - Geometric operations
 - Libraries,
 - Use cases
 - Implementation of algorithms (3D offsetting, ...)



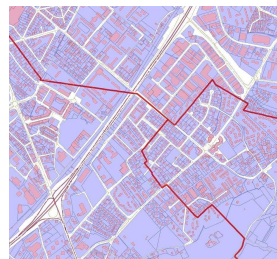
3D offsetting



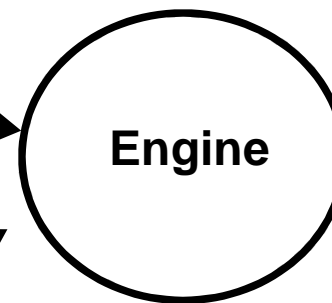
- Aim : to express the constraints of urban rules in a GIS
 - Distance from roads,
 - Height of the building,
 - Textures ...
- Results :
 - Buildable envelope,
 - Semantic information.



Geographic information



.XML File



Buildable envelope

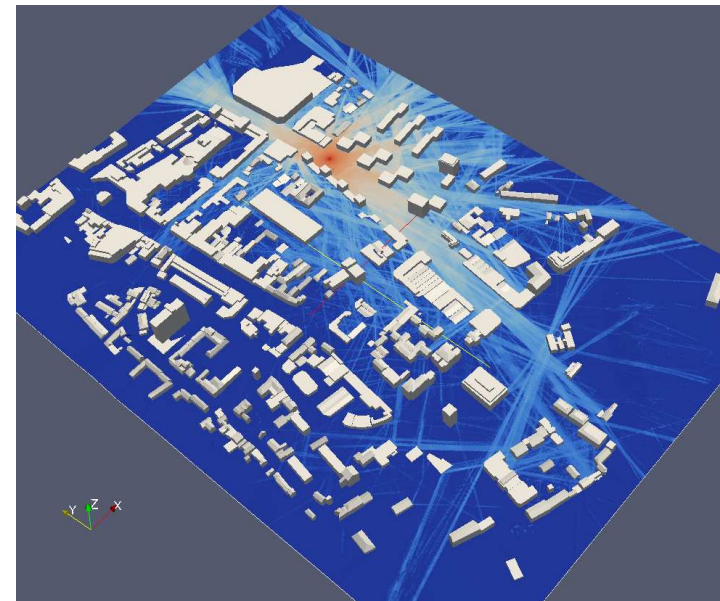
TerraMagna : Sustainable platform

- Indicator calculations in 3D cities
 - Air quality,
 - Noise pollution,
 - Urban traffic
- ... and integration of the results in the 3D platform with CityGML

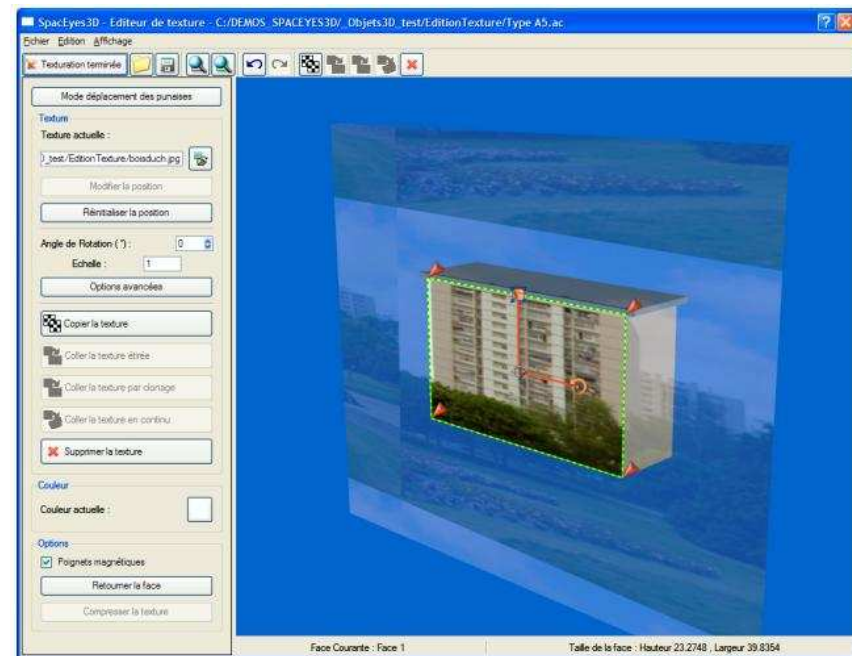
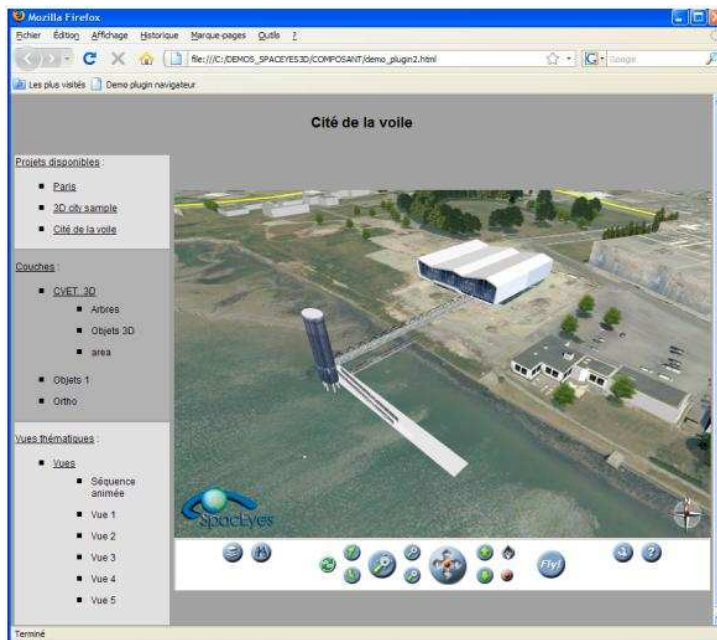
THALES



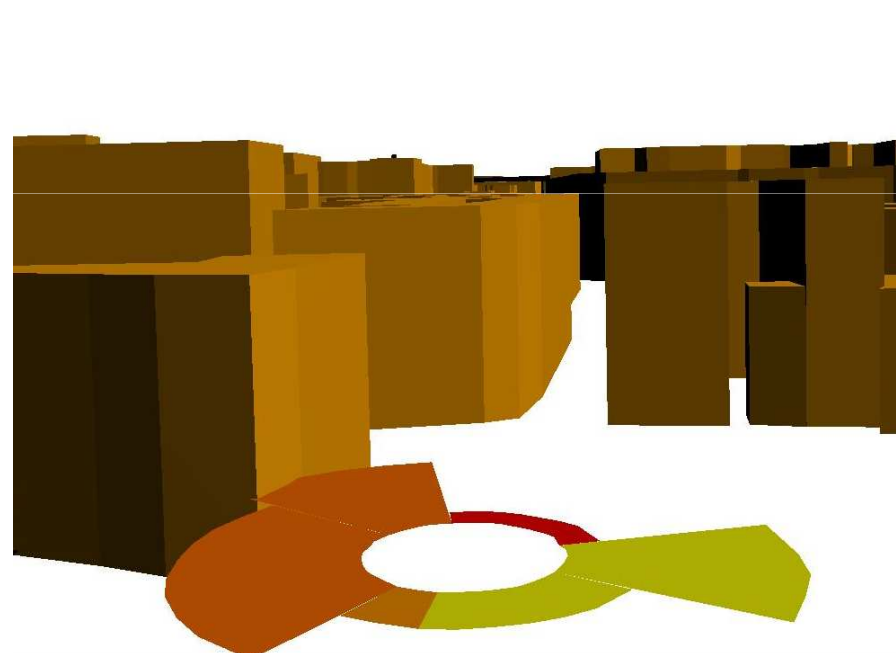
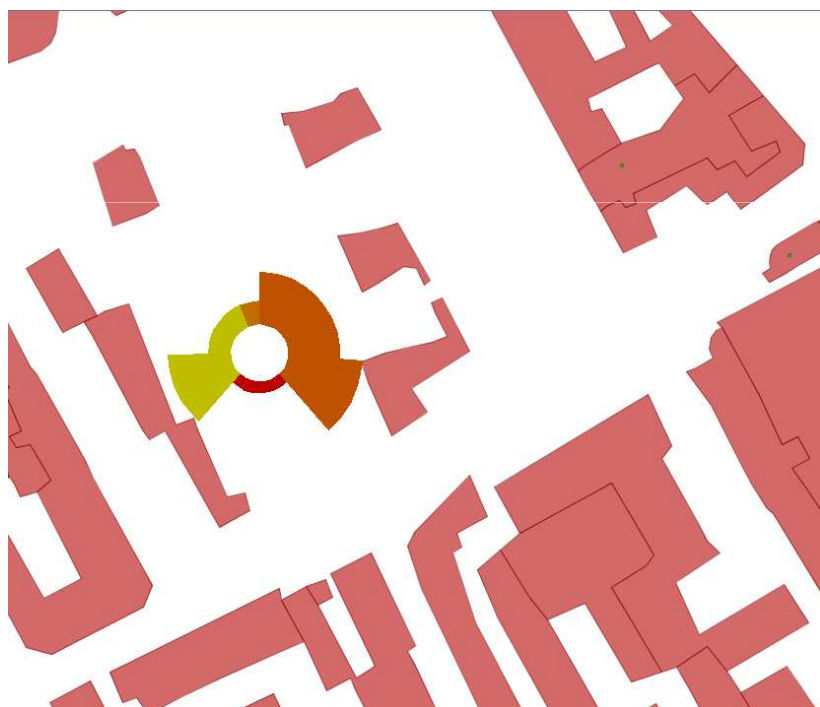
CSTB
le futur en construction



- Web interface to add information in a 3D environment
 - New 3D models,
 - Texture from photos on buildings,
 - Semantic information



Enriching a 3D world with synthetic and visible information about the distribution of points of interest



Context

- It can be difficult to navigate in a 3D world to find information
 - In a global view, it is difficult to zoom in the right zone
 - In a local view, the zone is often too small to know in which direction to pan the window

• Would sequences to be informed on my neighborhood?

- Multiple movements to reach the right zone (Difficult on mobile devices)
- Time loss because of overloading

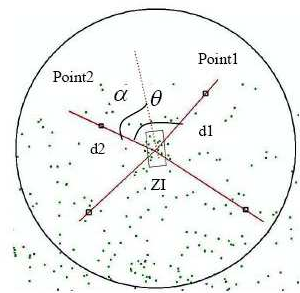
• ⇒ We propose solutions to help the navigation by the aggregation of the information given by the POIs

- 3 steps

- Spatial analysis on server

- Service between server

- Representations with specific visual variables on mobile phone



2D Spatial Analysis



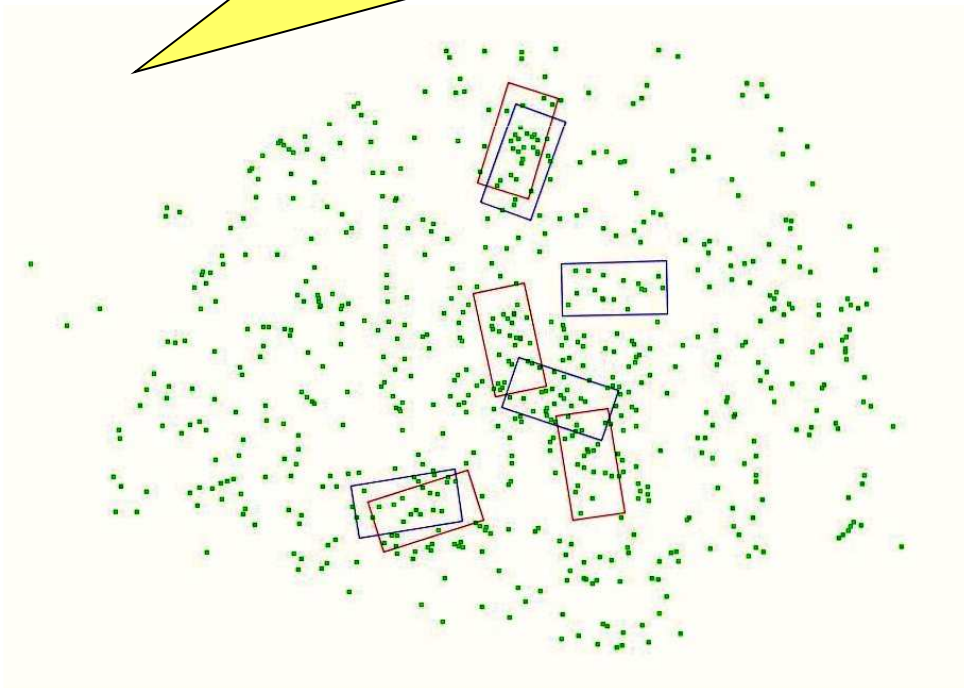
Server



Client

Proposition for global zone

I am interested at first by nurseries and then by banks . Propose me zones



TERRANUMERICA SERVICES
Calculate **zooms of interest**
in accordance with relevant
information and the screen
size

2 different methods :
- cellular automata,
- K-means

The solution is a list of interesting
zooms

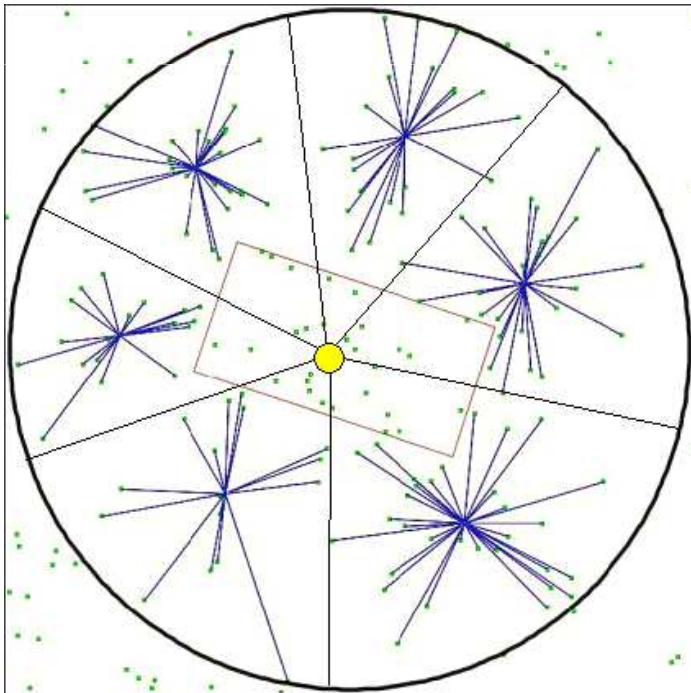
... in a 3D world



- Proposition of a specified number of zones of zoom
- A zone is equivalent to the size of a mobile screen
- The number of interesting POI in the neighborhood is indicated
- ▶ The user can select a zone of zoom to get its point of view

Proposition for local zone

I am in a local mode and i want to explore virtually the neighborhood. Help me choose the right direction



TERRANUMERICA SERVICES
Description of a zone around
the screen

Several methods of analysis

The answer is a list of sectors

... in a 3D world

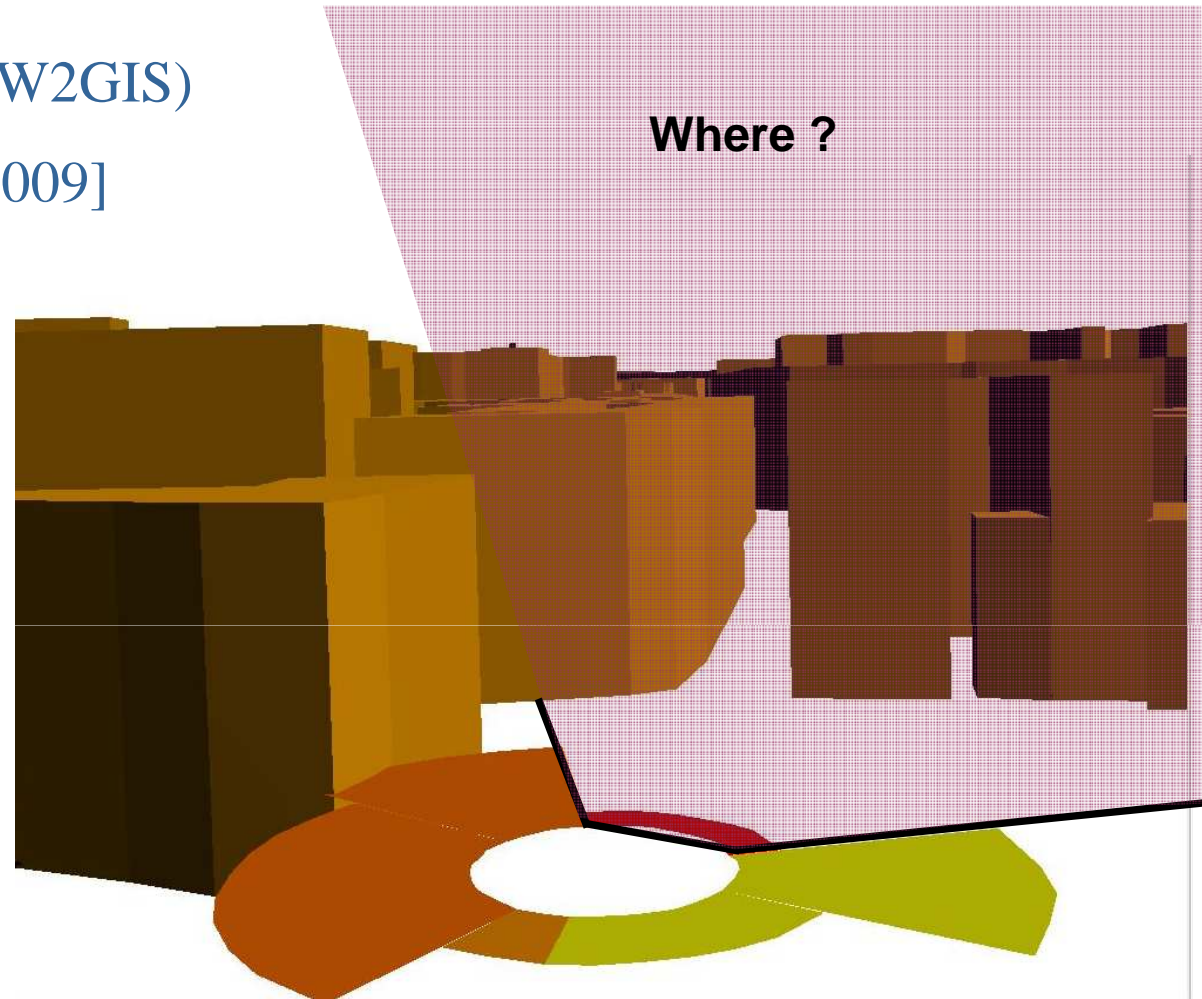
- Paolino and AI [2007] (W2GIS)
- Hoarau, Boucheritte [2009]
- 3 information

– Angles : partition of homogenous direction

– Color : density of POI in a direction

– Width of a sector : the mean distance to the POI

- Updates with user displacements



■ How many ? => 13 = max

↔ How close ? => near

- A method to enrich a 3D world with 2D analysis
- Thoughts about aggregation of information in mobile device are recent at the laboratory (already developed in 2D)
- Tests on user to assess the interest of these variables
 - Several configurations
 - Width for density or distance ?
 - Number of sectors ?
 - Utility
 - Different functions of integration
- Use cases :
 - Tourism (Looking for shops, restaurants, monuments)
 - Rescues (Direction with damaged buildings, unexplored zones after an earthquake)
 - Others ?

My perspectives

- Publication of the 3D module during March
- Research on 3D labeling
- Beginning of a PhD on the topic of 3D analysis for risk management

Any questions ?

COGIT : <http://recherche.ign.fr/labos/cogit/>

GeOxygene: <http://oxygene-project.sourceforge.net/>

Email : mickael.brasebin@ign.fr

TerreMagna : <http://doc.terramagna.org>

