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Geographic Communication with Solid Terrain Models

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The Idea is simple

- To tell stories about a given territory, synchronized with the video projection of geographic information on top of a physical model of that same territory

A glance with a video sample

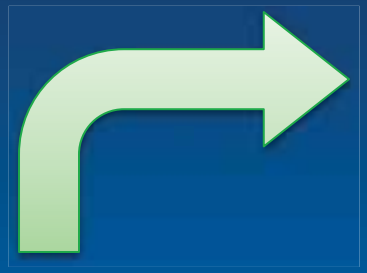
Castro Marim Territory Interpretation Centre

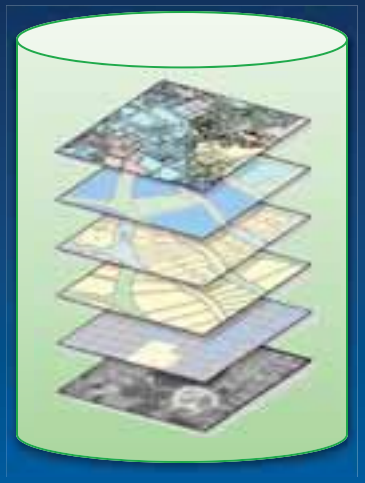
Click the image to see the video on You Tube

The Concept

- From reality to a GIS database and back

Abstraction

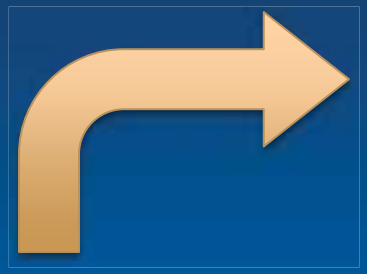




Geographic Database

Reality

Physical Representation

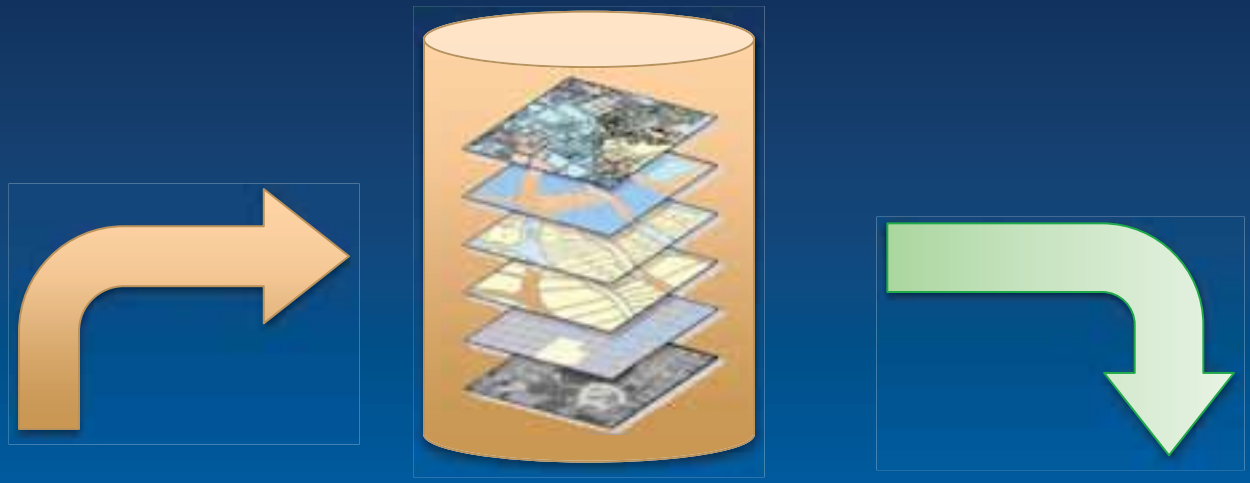


Geographic Database

Reality

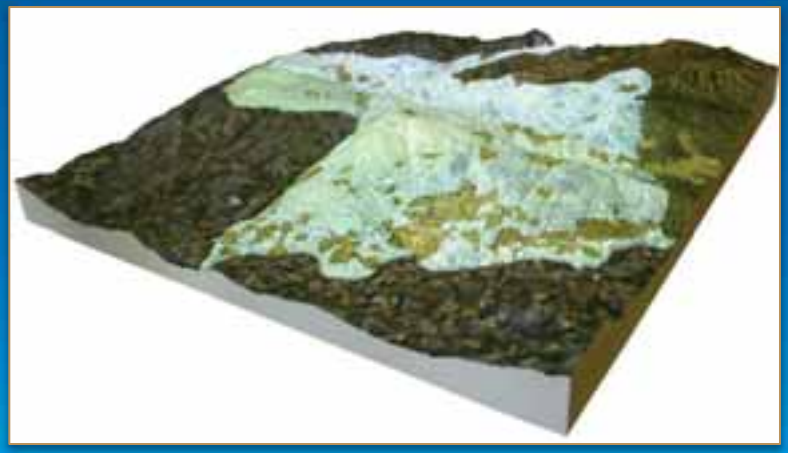
3D Physical Model

Augmented Reality



Geographic Database

Reality



Geographic Data Projection

Why do it with 3D Physical Models?

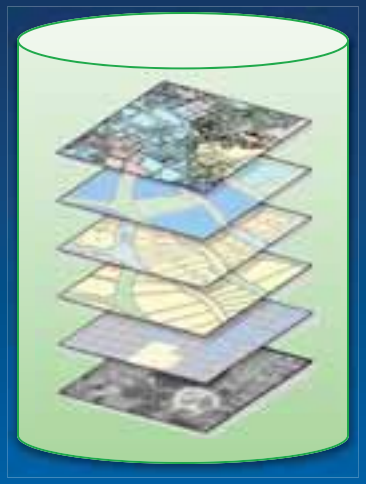
Because...

- 3D physical models are tangible products
- Scale, distance, slope, orientation, sight line, etc., are immediately perceived by everyone in an audience in a clear and consensual way
- Physical models are democratic tools: people will find it easy to understand others and make themselves understood

The result is

- Beautiful communication
- Information easier to understand
- Improved communication with audiences
- Better public participation

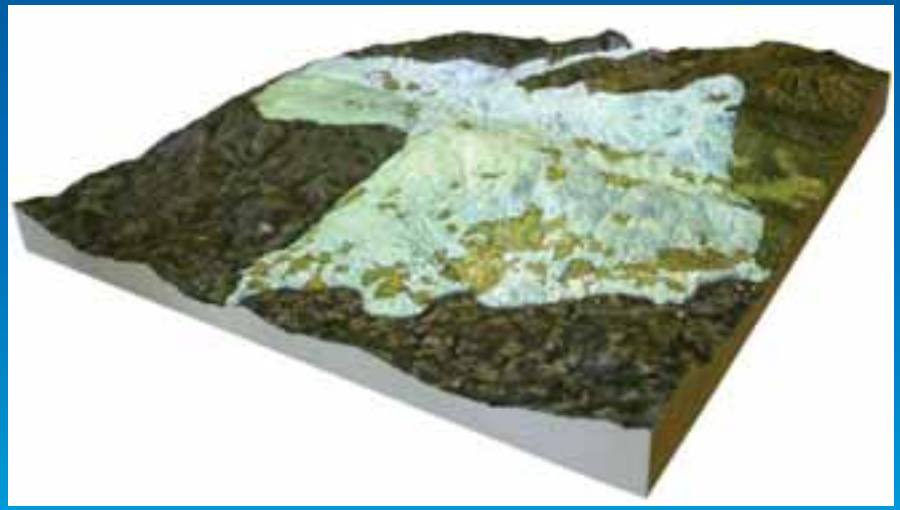
How do we do it?



Geographic Database

gison3dmap

Geographic Data Projection



gison3dmap installations in Portugal

1. Lamas de Mouro Gateway to Peneda Gerês National Park – Thematic Workshop
2. Serra da Estrela Interpretation Centre
3. Coimbra Superior Agricultural School
4. Herdade da Contenda Interpretation Centre
5. RAVE – High Speed Train Network
6. Companhia das Lezírias Visitors Centre
7. Castro Marim County Interpretation Centre
8. Batalha County Community Museum
9. Sintra 3D – Sintra World Heritage Landscape
10. Guimarães County Information Centre
11. River Lima Information Centre
12. Cascais County Urban Information Centre
13. Costa Lopes Arquitects
14. House of Rock Delivering Stones – Arouca Geopark

Lamas de Mouro Gateway to Peneda Gerês National Park

Lamas de Mouro gateway to the Peneda-Gerês National Park

Located at the Lamas de Mouro entrance of the Peneda-Gerês National Park, this was the first gison3dmap system installed in Portugal, in the year 2005.

Model: Melgaço County
Scale: 1:15.000
Vertical exaggeration: 1.5 times
Dimensions: 1.46 x 1.73 m
Projection system: 2 XGA projectors
Multimedia: None
Calibration: 2D

Keywords: Sustainable Tourism, Education

Coimbra Superior Agricultural School

Coimbra Superior School of Agriculture (ESAC) - Visulands Project

This system was used by ESAC for the Visulands project final results public presentation, and it is currently used in the context of the forest engineering curricula.

Model: Arganil county
Scale: 1:25.000 (military map)
Vertical exaggeration: None
Dimensions: 1.47 x 0.76 m
Projection system: Mobile with one XGA projector
Multimedia: None
Calibration: 2D
Clients: ArcGIS and mmon3dmap

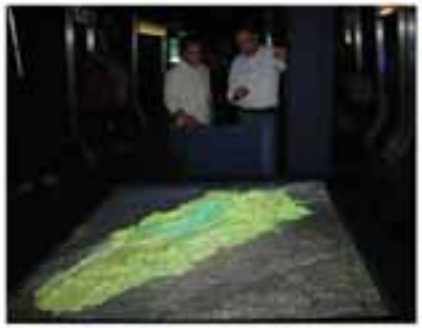
Keywords: Territorial Managment, Public Participation

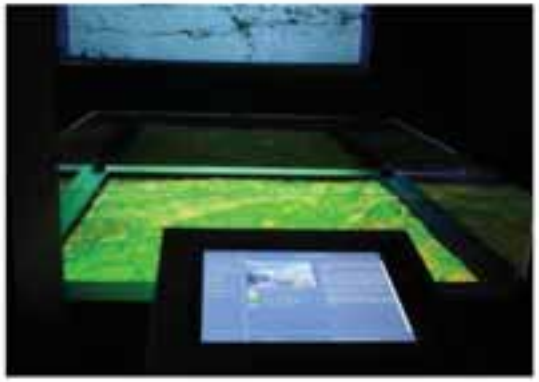
Serra da Estrela Interpretation Centre - CISE

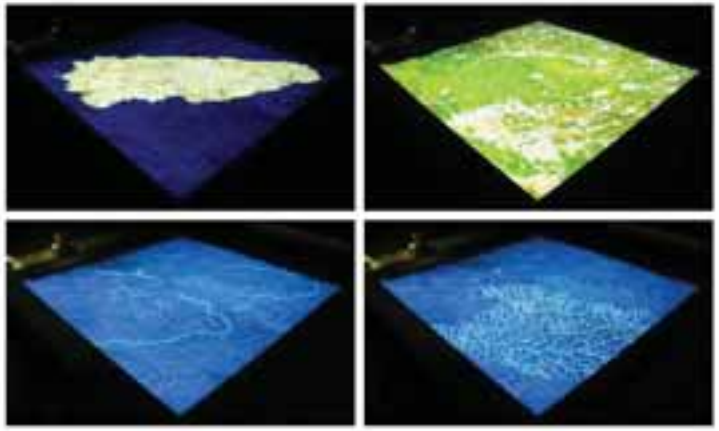
Serra da Estrela Interpretation Centre - CISE

System integrated into the permanent CISE exhibition, in the area dedicated to the Serra da Entrela Natural Park. CISE is open to the public since March 2007.

Model: Serra da Estrela Natural Park and Seia county
Scale: 1:35.000
Dimensions: 1.47 x 1.47 m
Vertical exaggeration: 1.5 times
Projection system: 2 XGA Sanyo PLC XU86 projectors
Multimedia: Touch screen and video projection
Calibration: 2D
Clients: ArcGIS and mmon3dmap







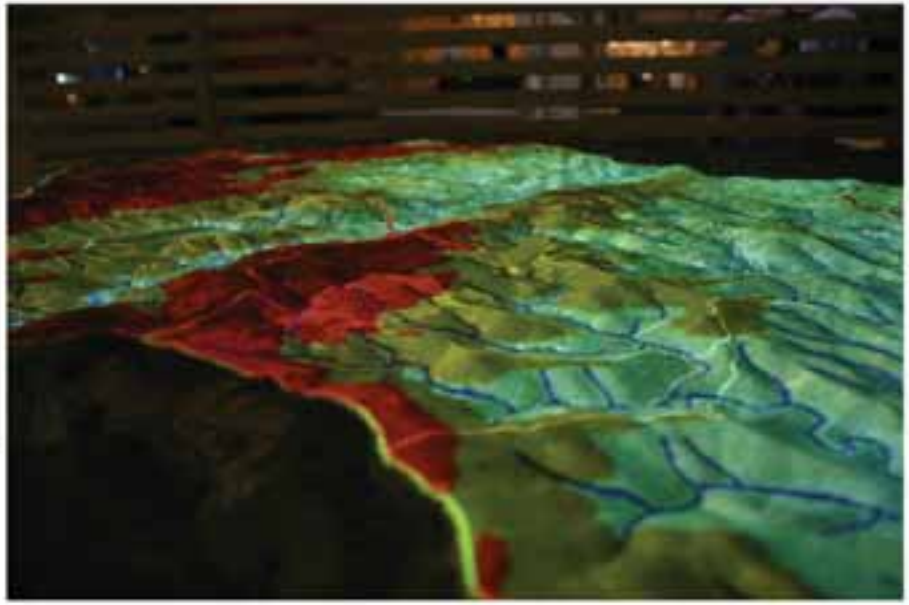
Keywords: Sustainable Tourism, Education

Herdade da Contenda

Herdade da Contenda

This system was used by the Portuguese Forest Agency at Expocaça 2008 (Santarém - May, 9-11), Feciex 2008 (Badajoz – September, 18-21) and Ovibeja 2010 (Beja, April 28 - May 2), to promote Contenda, a public owned 5270 hectares protected area property, with a deer population exceding 3000.

Model: Herdade da Contenda
Scale: 1:5.500
Vertical exaggeration: None
Dimensions: 2.01 x 1.56 m
Projection system: 4 XGA Sanyo PLC XU86 projectors
Multimedia: None
Calibration: 2D
Clients: ArcGIS and mmon3dmap



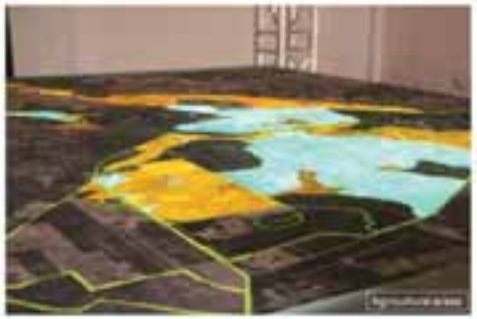
Keywords: Sustainable Tourism, Territorial Managment, Touristic Promotion

Companhia das Lezírias Visitors Centre

Companhia das Lezirias Visitors Centre

Companhias das Lezírias (from Arab. Al-Jazira) is the largest agriculture farm in Portugal. The system used for the promotion of the company agricultural, forest and touristic activities.

Model: Charneca property
Scale: 1:10.000
Vertical exaggeration: 2.5 times
Relief: 63 meter (relief at scale < 2 cm)
Dimensions: 2.02 x 1.58 m
Projection system: 4 XGA Sanyo PLC XU87 projectors
Multimedia: Touch screen and LCD screen
Calibration: 2D
Clients: ArcGIS and mmon3dmap, with an institutional video



Keywords: Education, Sustainable Tourism, Territorial Managment

RAVE – TTT – Third Tejo River Crossing Exhibition

TTT —Third Tejo river crossing Exhibition

This system was used between October 2008 and February 2009, as part of the TTT project public presentation for the high speed train network (RAVE), to presente the new "bridge for the future" ("Ponte para o Futuro").

Model: Lisbon Metropolitan Area
Scale: 1:31.000
Vertical exaggeration: 3 times
Dimensions: Circular with 2.4 m diameter
Projection system: 4 XGA Sanyo PLC XU106 projectors
Multimedia: Touch screen and sound
Calibration: 2D

Keywords: Project Development, Public Participation

Castro Marim Territory Interpretation Centre

Castro Marim Territory Interpretation Centre

Installed at Castro Marim, Algarve, on August 2008, the system was designed to be a county virtual belvedere, in which visitors are invited to depart on a journey to discover the territory history, heritages, people and traditions.

Model: Castro Marim county
Scale: 1:10.000
Vertical exaggeration: 1.5 times
Dimensions: 2.6 x 2.0 m
Projection system: 4 XGA Sanyo PLC XU106 projectors
Multimedia: A 15 min. county history video shown on 4 LCD screens
Sound: Audioguides in Portuguese, English, Spanish and French
Calibration: 3D manual
Clients: ArcGIS, VisualSIG and mmon3dmap

Keywords: Education, Territorial Managment, Tourism

Batalha County Community Museum

Batalha County Community Museum (MCCB)

System integrated in the MCCB permanent exhibition, in the area "All about us". The Museum is open to the public since February 2011.

Model: Batalha county
Scale: 1.10.000
Vertical exaggeration: 1.5 times
*Dimensions:*1.81 x 1.69 m with irregular cut
Projection system: 3 XGA Sanyo PLC XU106 projectors
Multimedia: Touch screen and LCD screen
Calibration: 3D manual
Clients: ArcGIS, VisualSIG and mmon3dmap

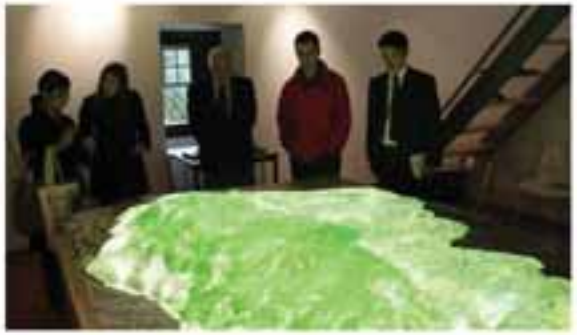
Keywords: Education, Tourism

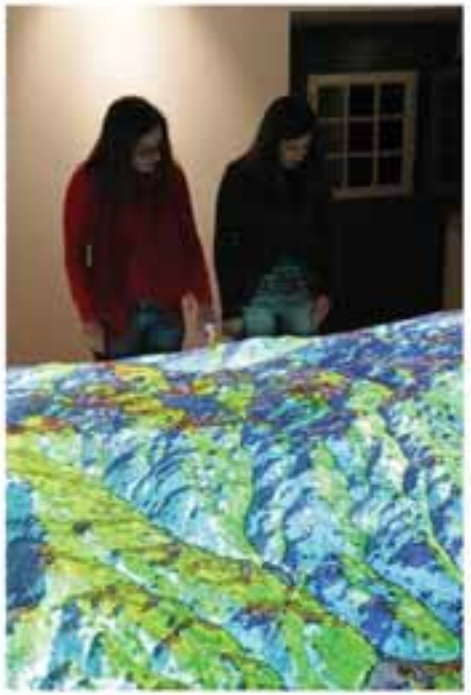
Sintra World Heritage Landscape

Parques de Sintra Monte da Lua - Sintra 3D

System integrated into the permanent Sintra
3D exhibition, open to the public since April 2011.

Model: Cultural Landscape of Sintra - World Heritage
Scale: 1:3.000
Vertical exaggeration: 1.2 times
Dimensions: 2.12 x 1.80 m
Projection system: 4 XGA Sanyo PLC XU106 projectors
Multimedia: Touch screen kiosk and 2 LCD screens
Calibration: 3D manual
Clients: ArcGIS, VisualSIG and mmon3dmap





Keywords: Education, Sustainable Tourism, Territorial Managment

Guimarães County Master Plan Revision Public Participation

Guimarães County Master Plan System

Installed on July 2011, the initial purpose of this gison3dmap system was the presentation and public discussion of the county master plan revision. It is currently used for touristic and county managment purposes.

Model: Guimarães county
Scale: 1:10.000
Vertical exaggeration: 1.5 times
Dimensions: 2.33 x 2.08 m
Projection system: 2 FullHD Mitsubishi FD630U projectors
Multimedia: Touch screen kiosk and 2 LCD screens
Calibration: 3D automatic

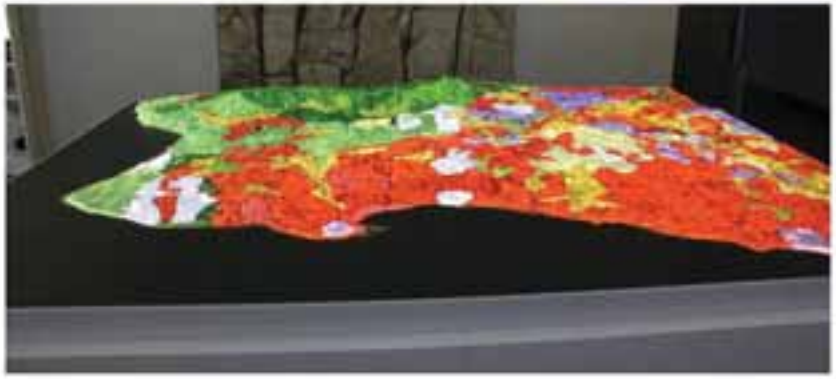
Keywords: Territorial Managment, Public Participation

Cascais County Urban Information System

Cascais County Urban Information Center

Installed in the beginning of July 2012 at the Cascais Cultural Center, the system is used for touristic information and county planning purposes.

Model: Cascais county
Scale: 1:7.000
Vertical exaggeration: 1.5 times
Dimensions: 2.51 x 1.93 m
Projection system: 3 FullHD Mitsubishi FD630U projectors
Multimedia: Touch screen kiosk and 2 LCD screens
Calibration: 3D automatic
Clients: VisualSIG, Powerpoint and mmon3dmap



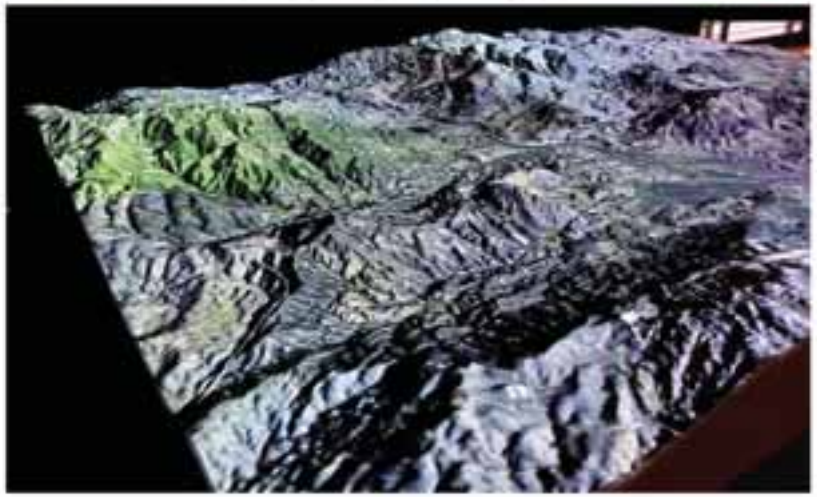
Keywords: Education, Territorial Managment, Tourism

River Lima Information Centre

Lagoas de Bertiandos e S. Pedro d'Arcos™ Interpretation Center (CILBSPA)

The Lagoas Environmental Interpretation Center gison3dmap system installation was completed on August 2012, and will open to the public on October 1st. The system will be used for informative and educational purposes related to the Lagoas protected lanscape area and the river Lima watershed.

Model: Ponte de Lima county
Scale: 1:10.000
Vertical exaggeration: 1.5 times
Dimensions: 2.51 x 1.93 m
Projection system: 4 XGA Sanyo PLC-XU106 projectors
Multimedia: Touch screen kiosk and 1 LCD screen
Calibration: 3D automatic
Clients: VisualSIG and Powerpoint



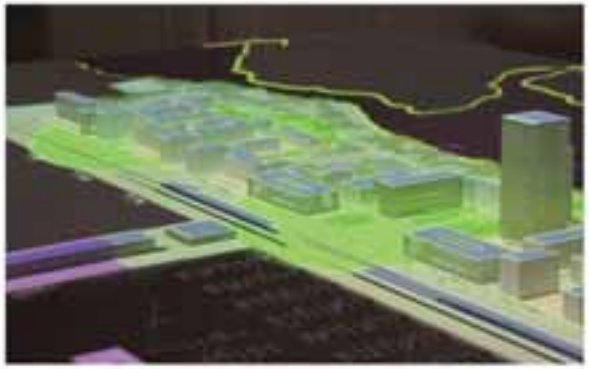
Keywords: Education, Sustainable Tourism, Territorial Managment

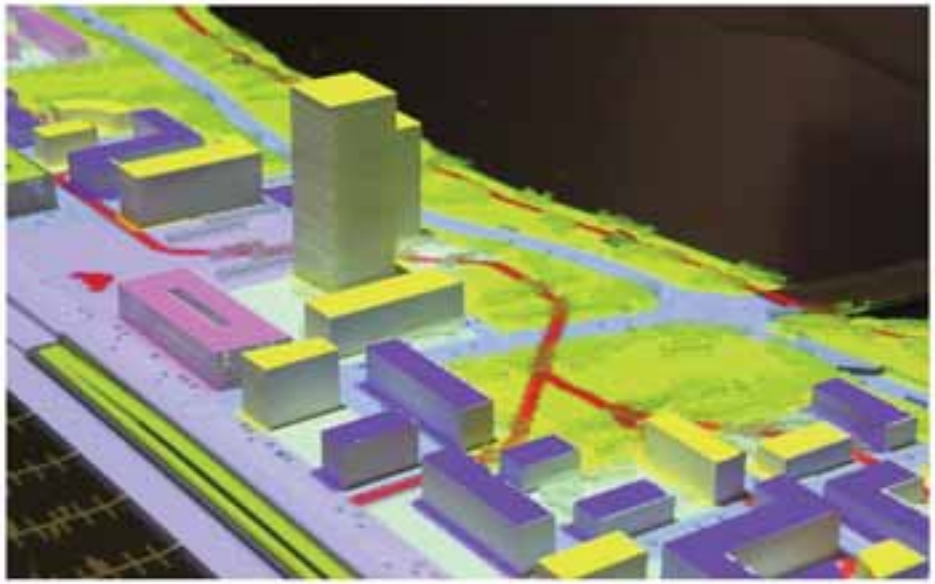
Costa Lopes Arquitects – Luanda Marina Development Plan

Architectural Models

Since June 2012, gison3dmap can also be used sucessfully in architectural models. In this case the system was used to highlight an urban development plan in a coastal area.

Model: Urban scale model
Scale: 1:1.000
Vertical exaggeration: 1 times
Dimensions: 2.3 x 2 m
Projection system: 2 WXGA Casio XJ-A251 projectors
Multimedia: 1 LED screen
Calibration: 3D Automatic
Clients: VisualSIG and Android





Keywords: Project presentation, Real Estate Promotion

House of Rock Delivering Stones – Arouca Geopark (UNESCO Geoparks Network)

Pedras Parideiras Interpretation Center

Located at Arouca Geopark, since December 2012, this system is mainly used to inform visitors of the Geopark's geological and environmental heritage and also its activities.

Model: Freixa's Plateau
Scale: 1:5.000
Vertical exaggeration: 1.2 times
Dimensions: 1.17 x 0.88 m
Projection system: 1 XGA Casio XJ-M150 projector
Multimedia: 1 LED screen
Calibration: 3D manual
Clients: VisualSIG and Android

Keywords: Education, Sustainable Tourism

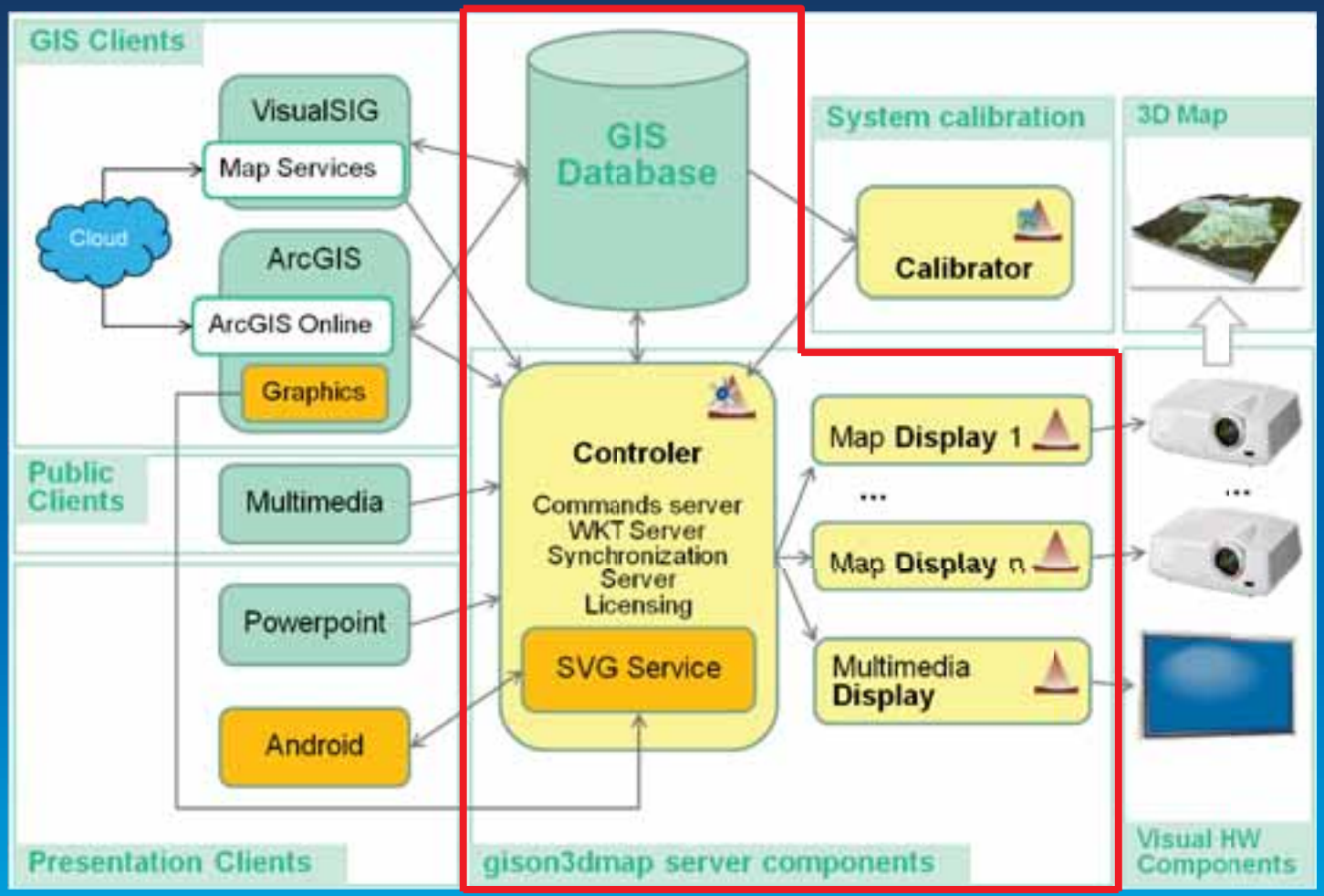
From user feedback

- Adding GIS data to a 3D physical model (terrain or architectural):
  - Has proven to be a very effective way to communicate geographic information to audiences
  - Enhances the perception of reality and facilitates the communication of information, events and development scenarios
  - Contributes to better and faster decisions in public participation processes

How was this system architectured?

- GIS Database
- Client server application: gison3dmap
- Clients:
  - GIS
  - Multimedia
  - Presentation (Powerpoint and Android)
  - Custom develloped

System Architecture



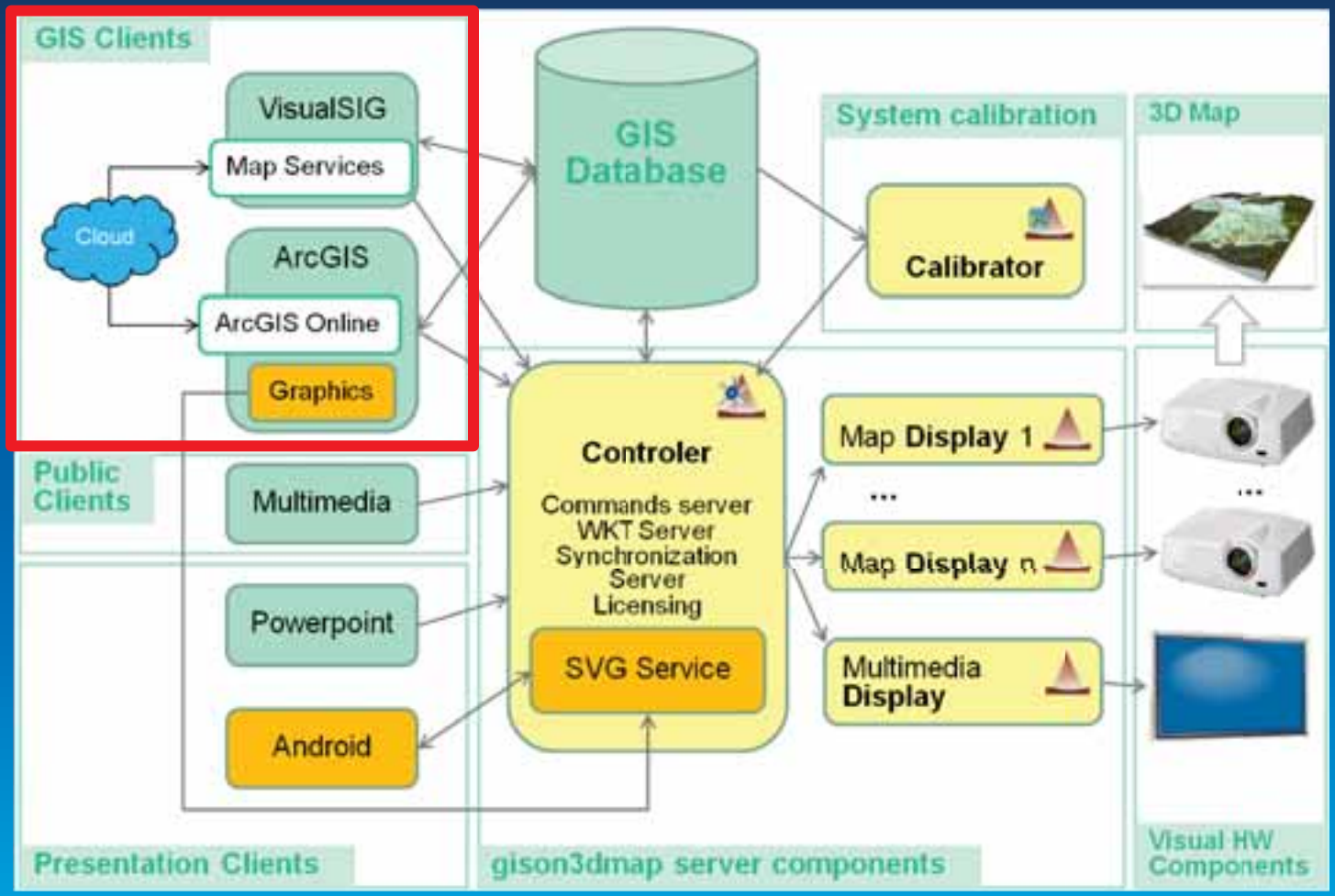
gison3dmap is a GIS

- The gison3dmap core is a GIS engine
- The GIS Database is central to the system – All projections are database driven and are consequently dynamic
- Controler manages projection requests
- Map displays are associated with video projectors
- Multimedia displays are used to show images and videos synchronized with GIS data projections on the 3D map

Clients

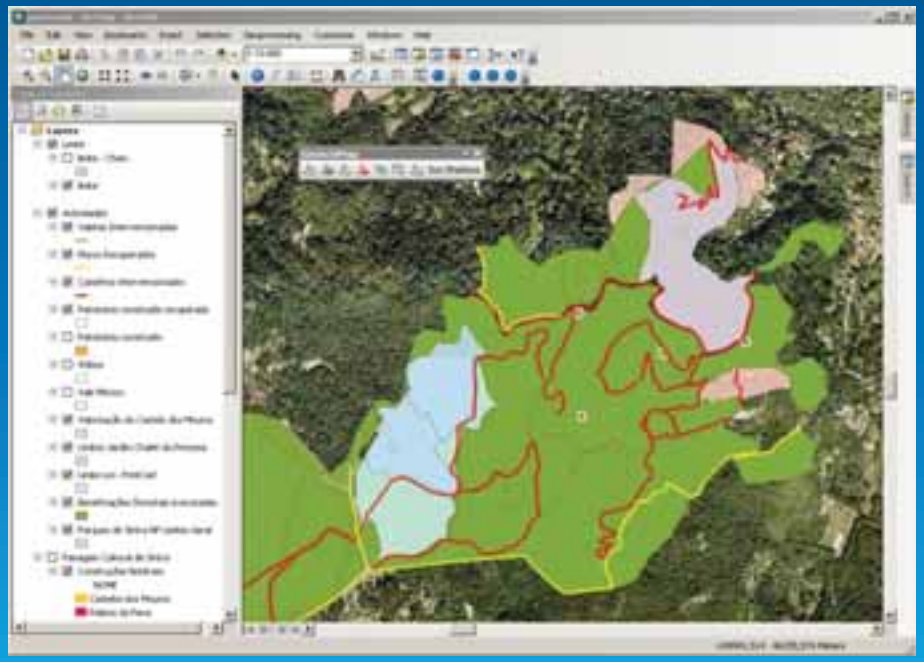
- Each type of user interaction requires a specific user interface:
  - GIS – for GIS users
  - Multimedia – for visitors
  - Presentation – for technicians
    - **Powerpoint: to geographically illustrate a presentation**
    - **Android: to control the system (maps, videos, animations, free hand drawing, ...)**
  - Custom develloped:
    - **Geographic games, multiple users interaction with tablets and smartphones, natural interfaces, ...**

GIS clients


GIS Clients
VisualSIG
Map Services
Cloud
ArcGIS
ArcGIS Online
Graphics
Public Clients
Multimedia
Powerpoint
Android
Presentation Clients
GIS Database
Controler
Commands server
WKT Server
Synchronization Server
Licensing
SVG Service
gison3dmap server components
System calibration
Calibrator
Map Display 1
Map Display n
Multimedia Display
3D Map
Visual HW Components

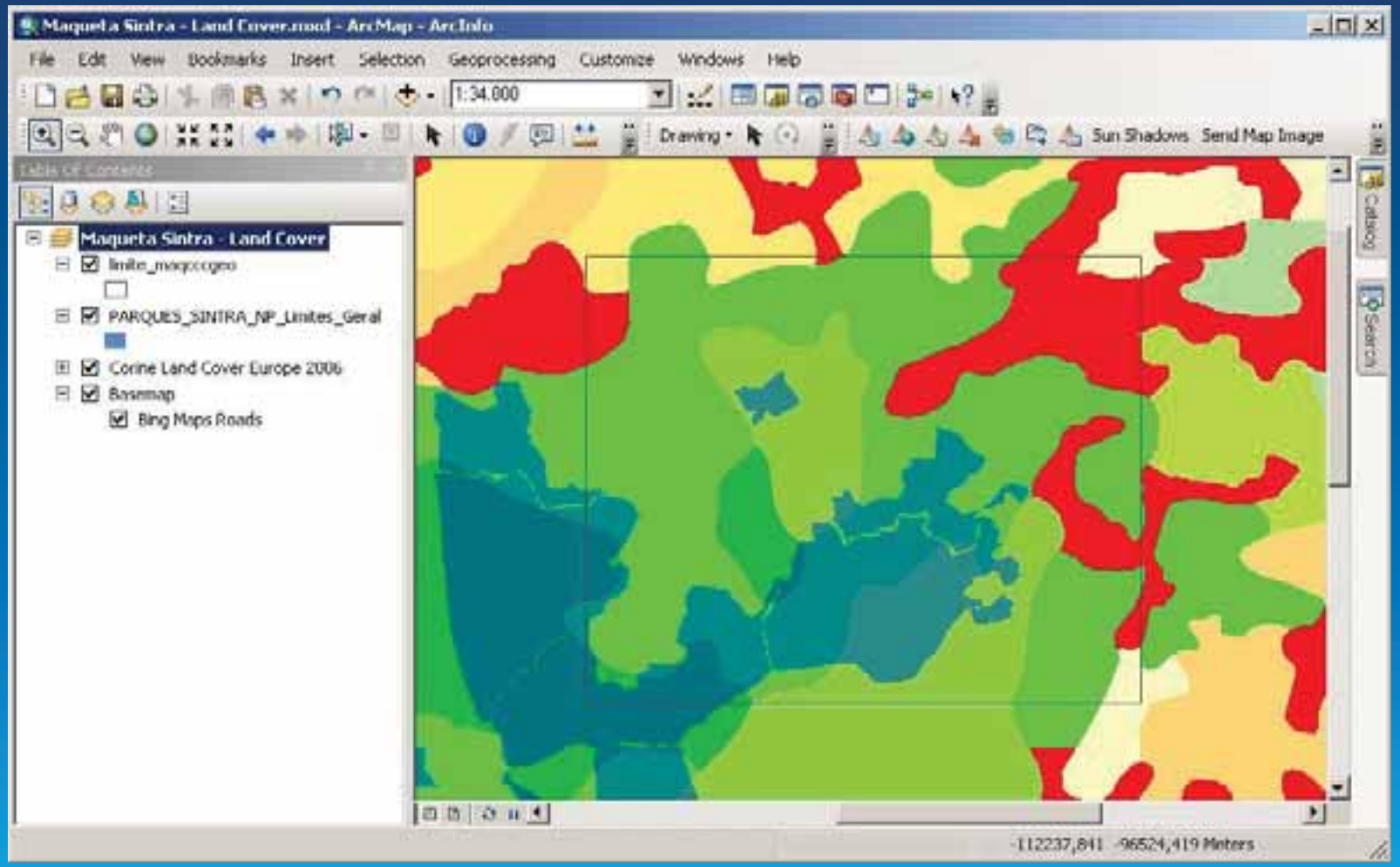
GIS Clients

- GIS Clients (ArcGIS and VisualSIG) are central to the gison3dmap system
- All projection requests access GIS data dynamically
- GIS clients are used to define what to project and how
- gison3dmap projection requests can be capured using the GIS clients to use within non GIS clients, such as Powerpoint

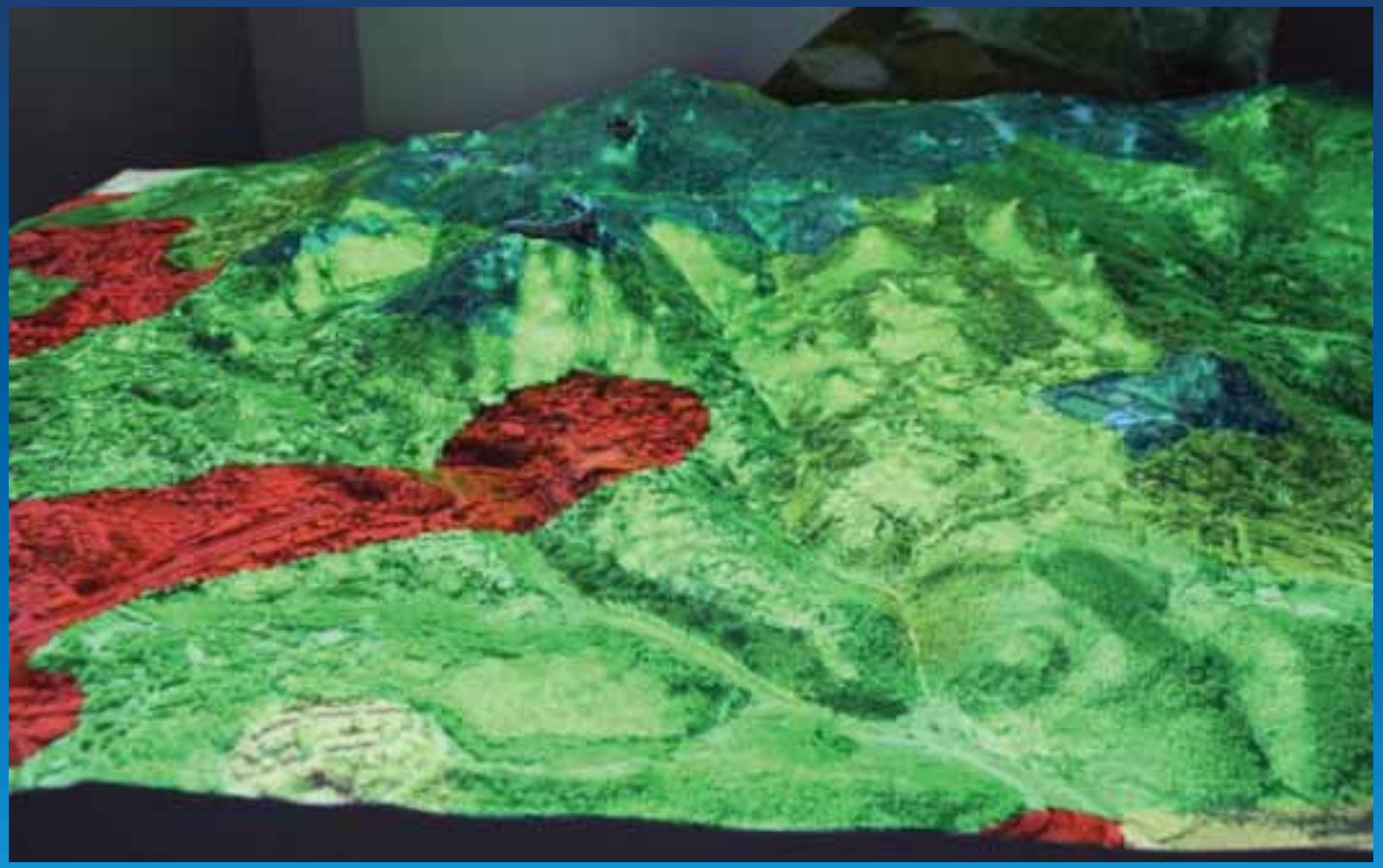


ArcGIS 10 client

ArcGIS Online

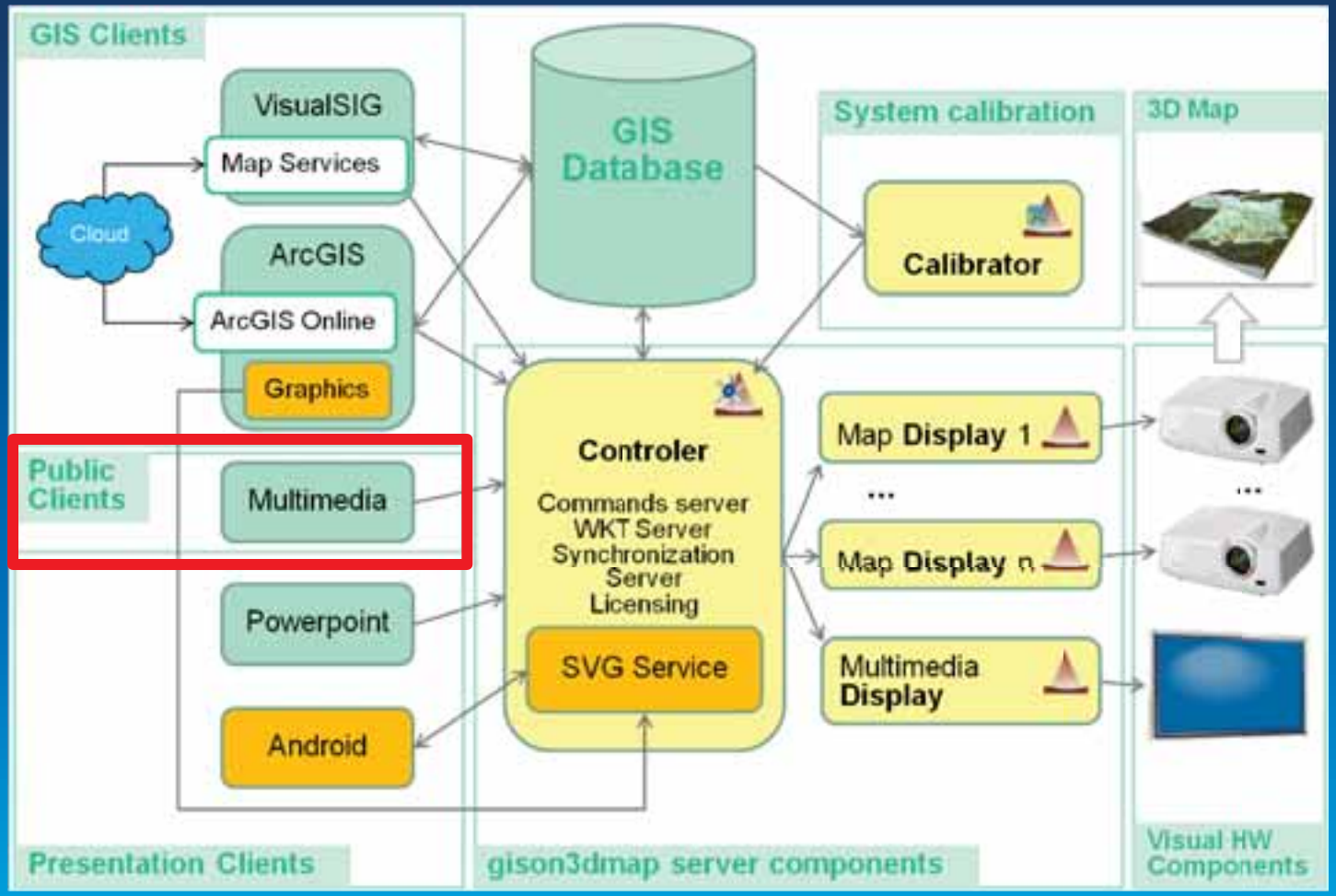


ArcGIS Online



ArcGIS Online map projected on a 3D model

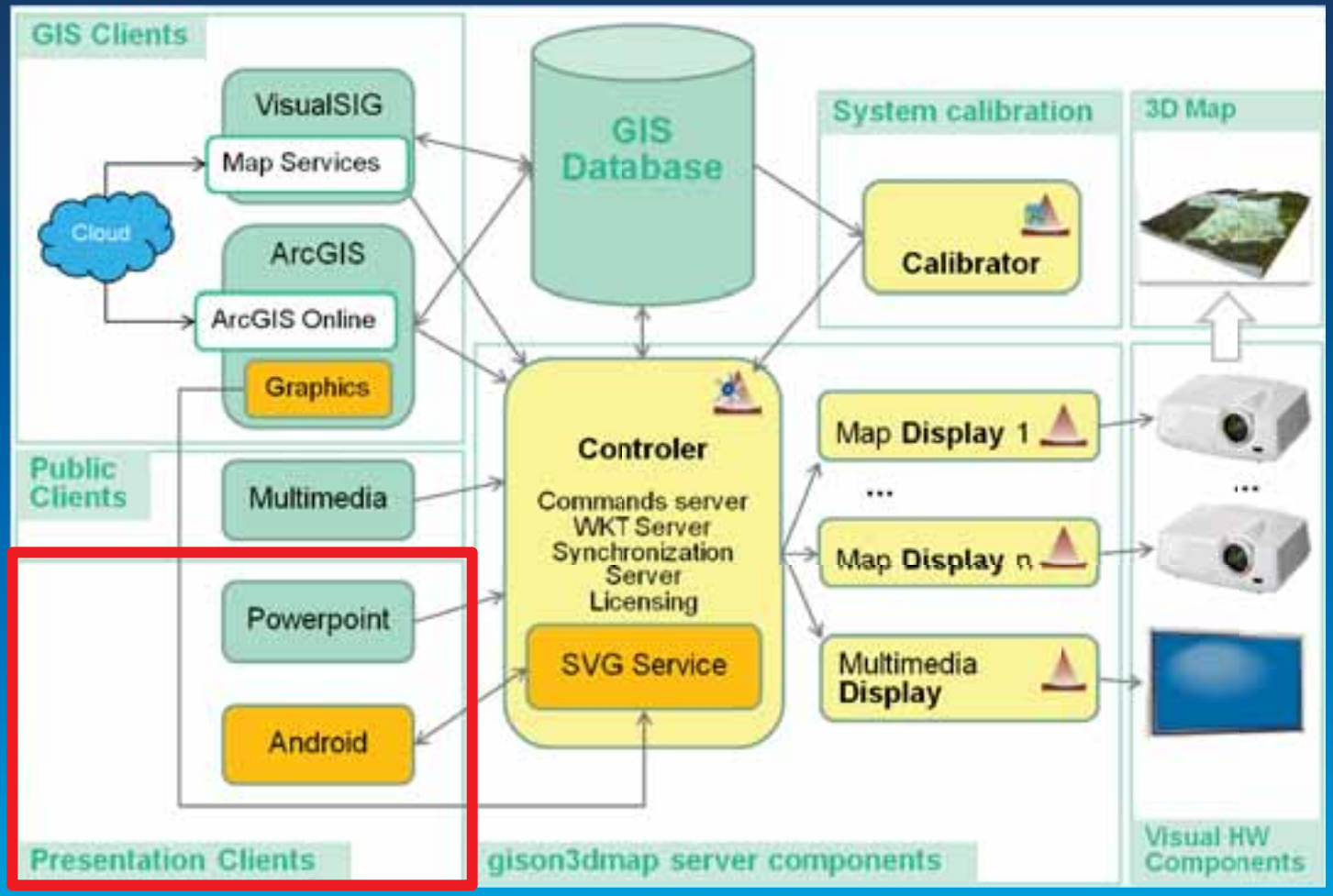
Multimedia Clients



Multimedia Clients

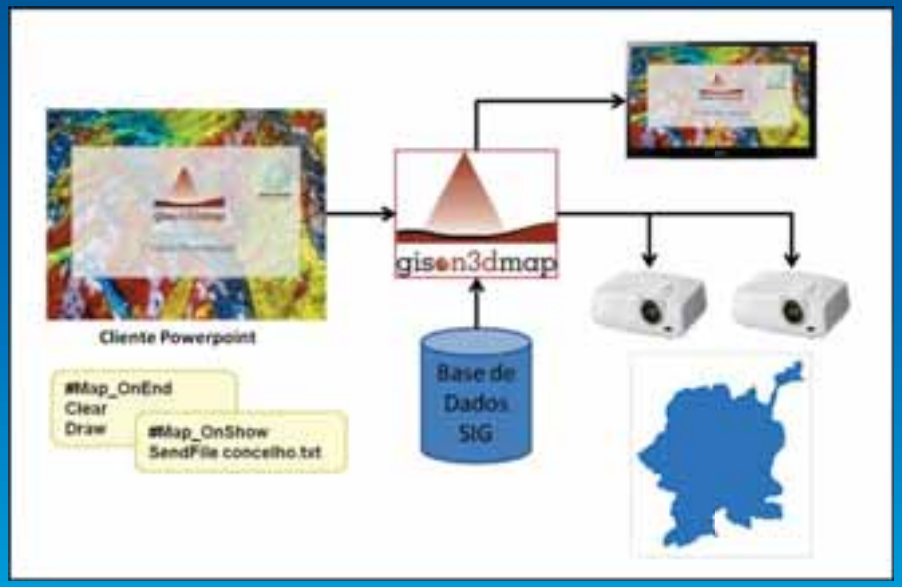
- Simple interfaces (menu driven or more flashy) oriented to the general public
- Automatic and user controled map projections synchronized with images and videos

Presentation Clients



Powerpoint Client

- Used to geographically illustrate a Powerpoint presentation
- Slides are shown on multimedia displays
- Map projections are trigered by slide transitions



Powerpoint client schema

Andoid Client

- Used to control map projections and videos, execute command sequences (sun-rise to sun-set shadows, flood simulations, etc.) and draw graphics
- Maps available on the client interface are defined using a GIS project

Android Client – Freehand drawing

Click the image to see the video on You Tube

Other Clients – gison3dmapQuiz

- Clients can be developed using the gison3dmap API or sending commands via a TCP/IP socket
- gison3dmapQuiz is an example of an application develloped to implement geographic games

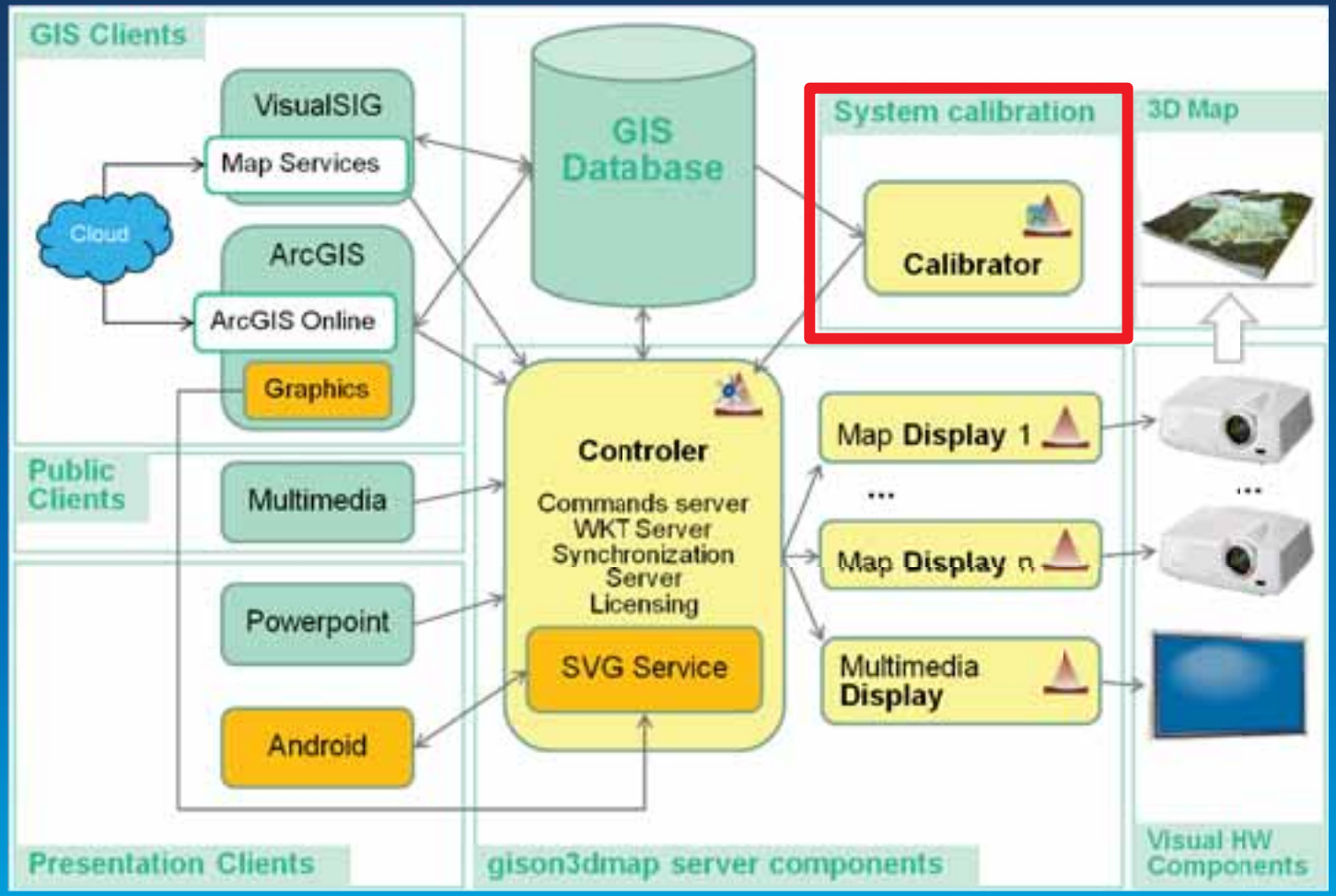
Other Clients – gison3dmap Overview

- Navigate on Web map application while using for each user the 3D map as a overview map, and to show locations, lines of sight, etc.
- This is the way to go to integrate 3D virtual scenes, 3D animations anf fly throughs with a solid terrain model

Special interfaces

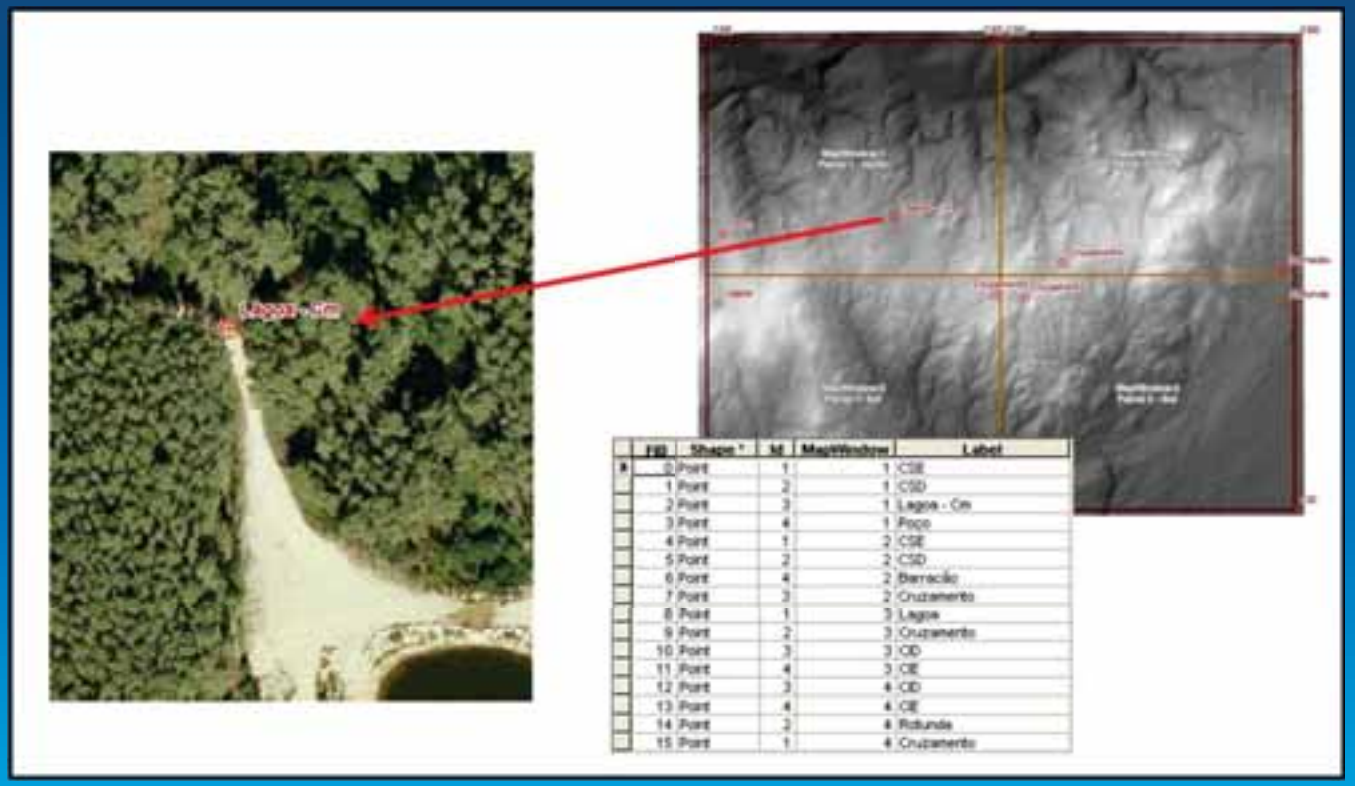
- Natural (gestures)
- Laser pointer

Calibration



Projection calibration

- Match calibration targets projected on the 3D map surface with previously defined calibration points



Automatic Calibration

- Calibration can be partially automated, using fiber optics installed at the calibration points locations, and a PCB with light sensors and a Arduino board

Automatic Calibration

Road and water lines are out of place and can be repositioned automatically

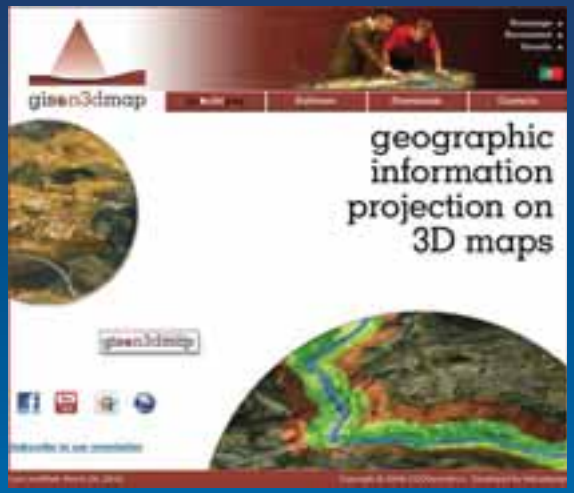
Click the image to see the video on You Tube

Geographic Communication with

- gison3dmap transforms a 3D physical model into a 3D physical screen, by projecting GIS data themes on the 3D physical model surface
- Adding thematic value to a 3D physical model:
  - Has proven to be an efficient and effective way to communicate geographic information to audiences
  - Enhances the perception of reality and facilitates the communication of events and development scenarios
  - Contributes to better and faster decisions in public participation processes

How to get more info

www.gison3dmap.com



Visit us at Orbits Engineering booth on the GIS Solutions Expo

Thanks for listenning

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