gvSIG: towards 4D GIS

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Contents

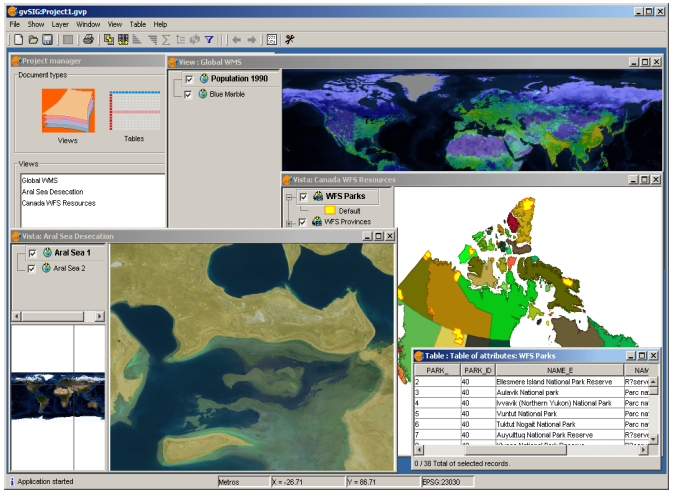
- gvSIG's background & updates
- 3D visualization in gvSIG
- Time and Animation in gvSIG
- Implementation plan
- Demo

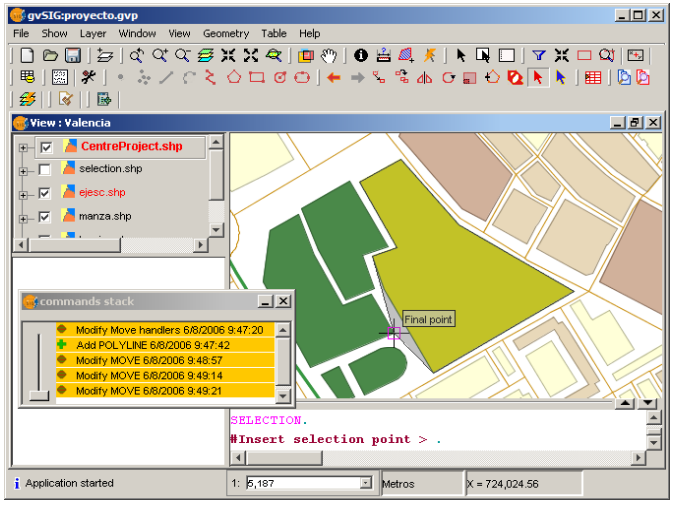
gvSIG Background

- Mostly funded by Regional Ministry of Infrastructure and Transport of Valencia, Spain & EU Funds
- Developed by IVER, Prodevelop & other companies and universities
- GPL License
- Java. Multiplatform support (Windows, Linux, Mac)
- GUI in 12 languages, Spanish & English manuals
- First released in October 2004
- Version 1.1 is available now!

gvSIG Background

- Rich desktop GIS client
- Multiple vector, raster, DB support
- Integration with OGC web services (WMS, WFS, WCS, CSW, WMC)
- Remote catalog and gazetter search
- Editing, vector and raster geoprocessing





gvSIG News

- gvSIG is now in the ***OSGeo*** *Project Incubator* !

- You are invited to the **3rd gvSIG Conference**:

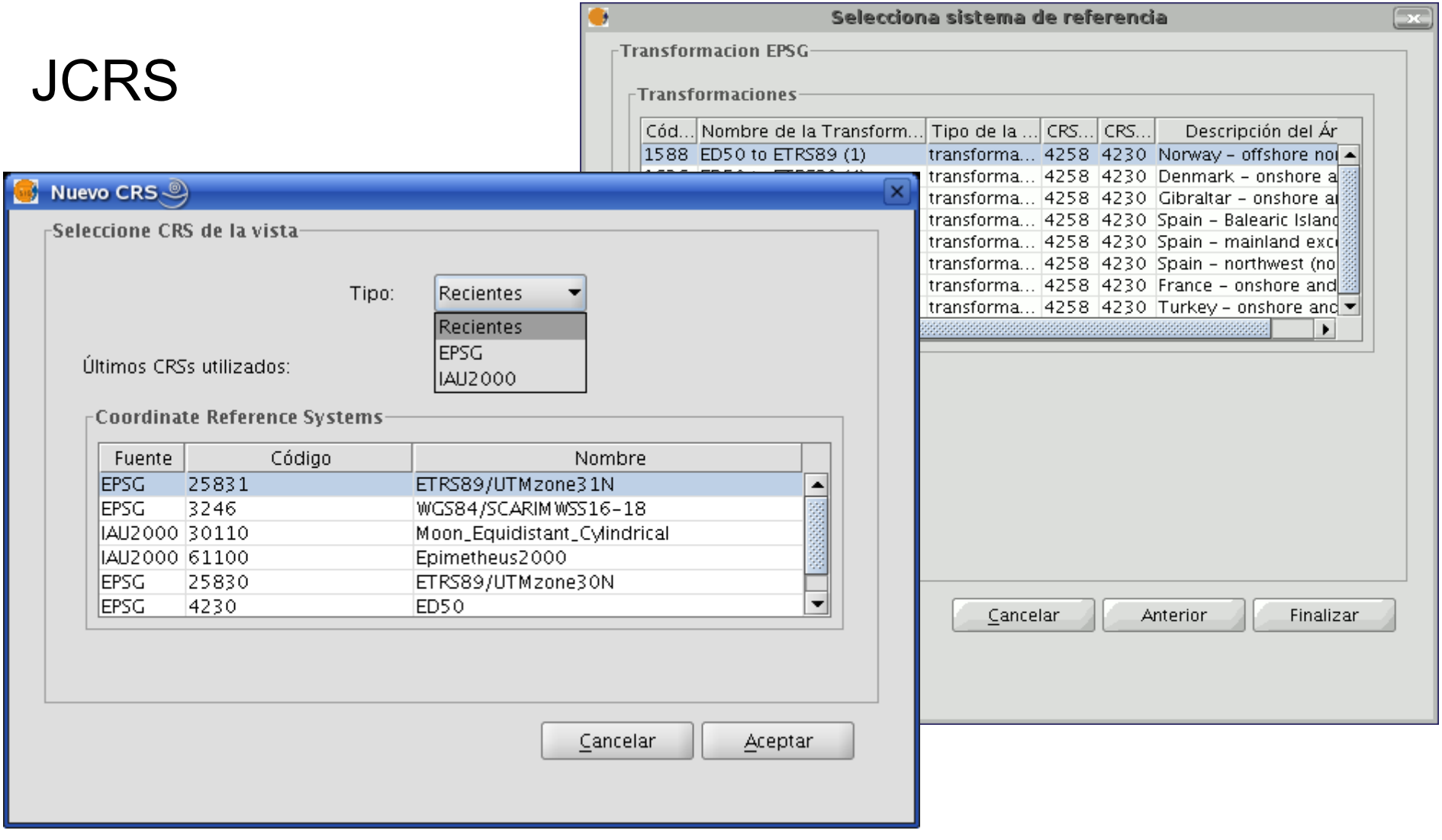
November 14th to 16th in Valencia, Spain

gvSIG Updates

- Recent improvements:
  - JCRS Extension to manage Coordinate Reference Systems and transformations
  - Field calculator
  - ArcSDE and Oracle DB connectors
  - DB connection manager (GeoDB)
  - Field calculator
  - Loading DWG R14
  - SEXTANTE integration

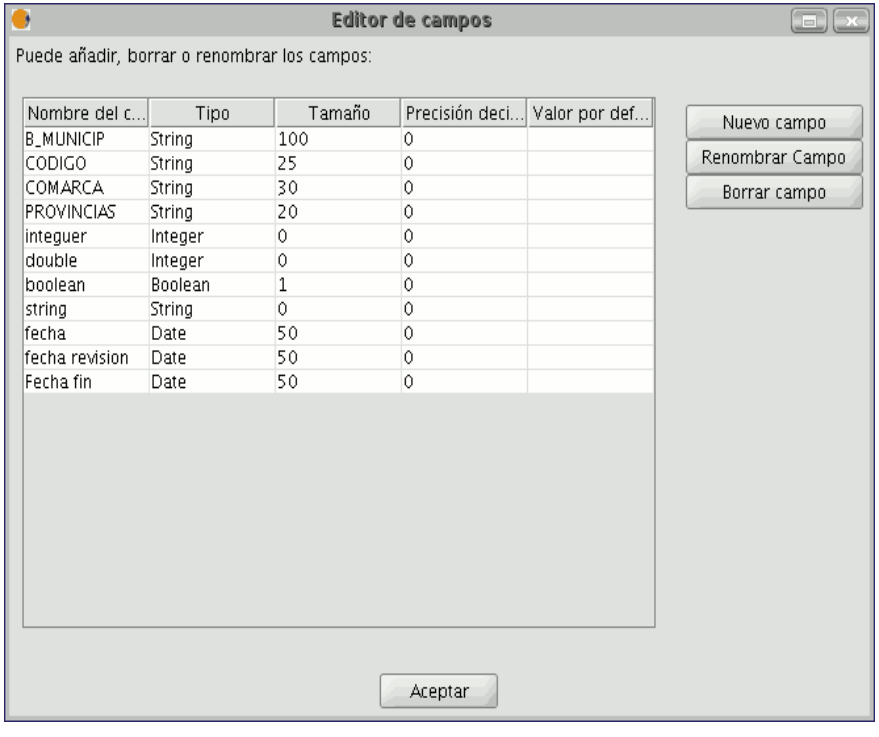
gvSIG Updates

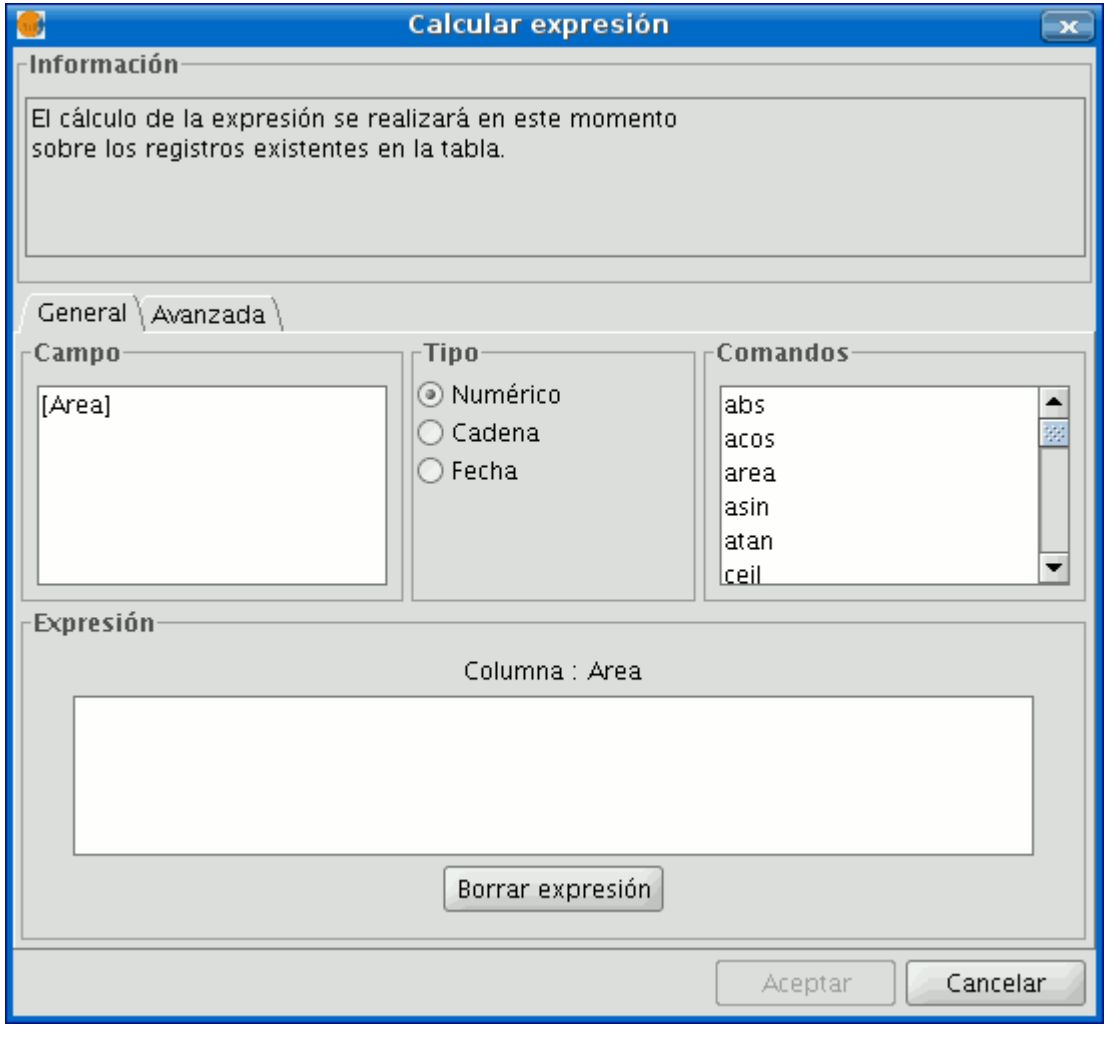
- JCRS



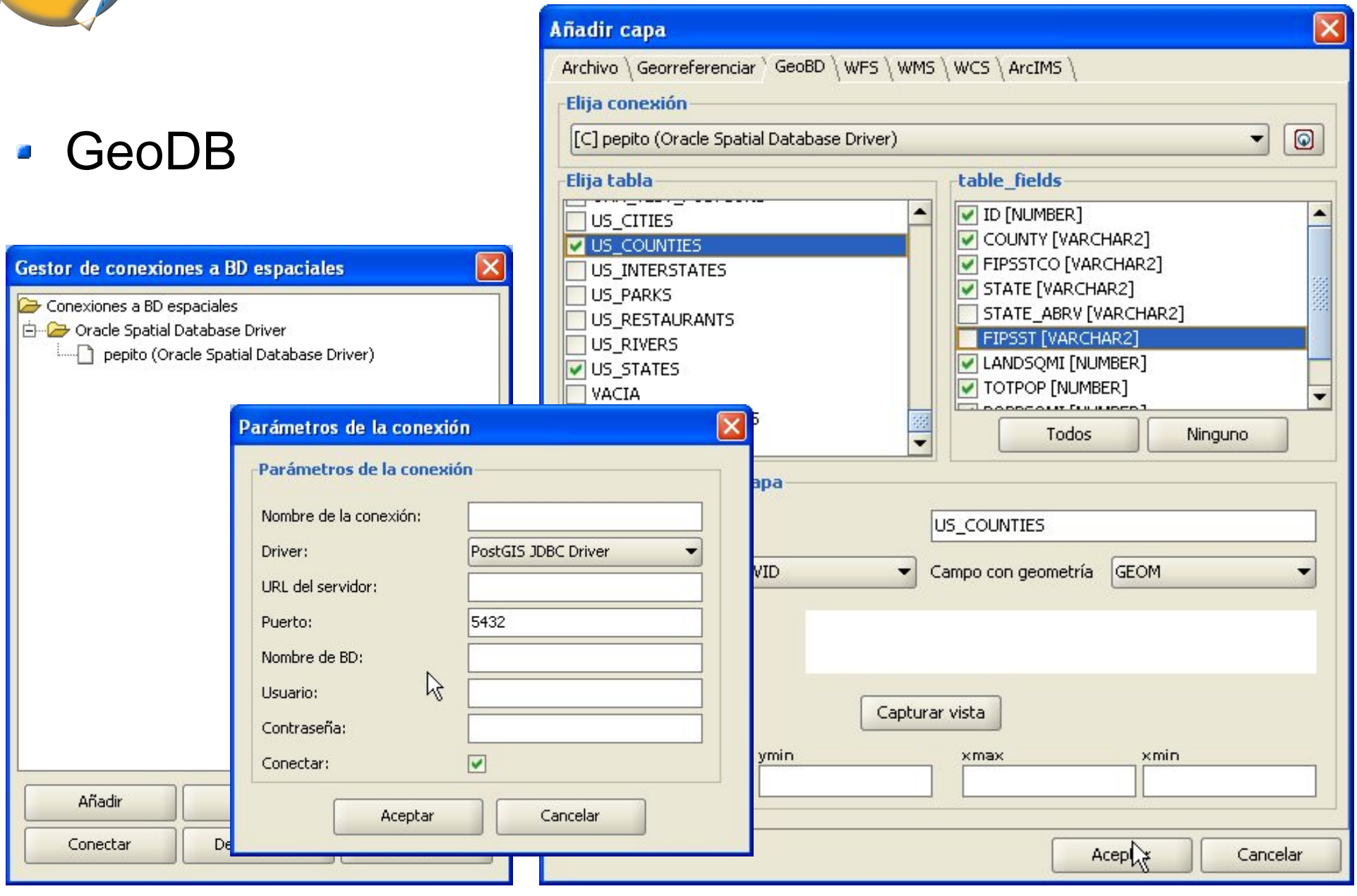
gvSIG Updates

- Field calculator





- GeoDB

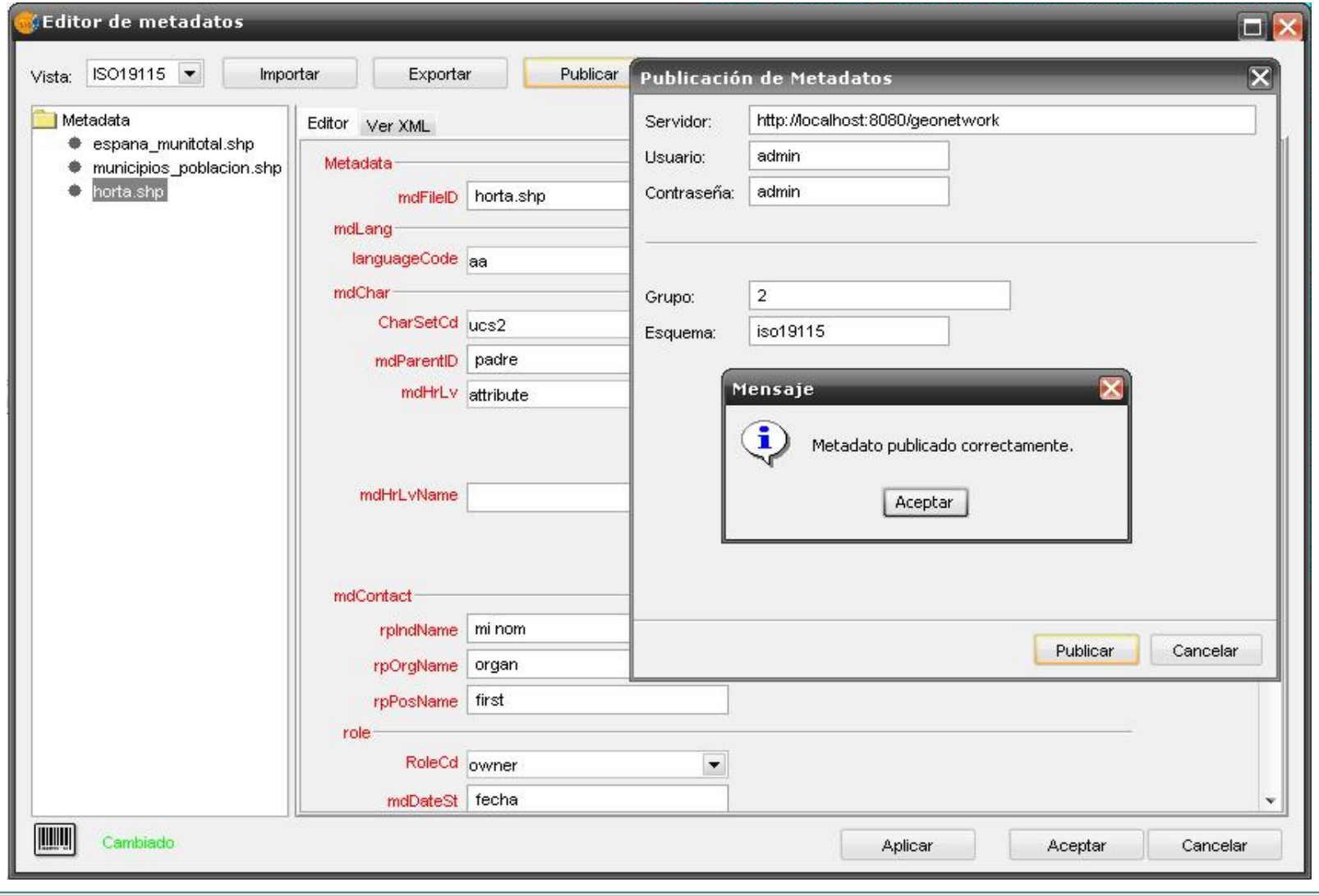

Gestor de conexiones a BD espaciales
Conexiones a BD espaciales
Oracle Spatial Database Driver
pepito (Oracle Spatial Database Driver)
Añadir
Conectar
Parámetros de la conexión
Parámetros de la conexión
Nombre de la conexión:
Driver:
PostGIS JDBC Driver
URL del servidor:
Puerto:
5432
Nombre de BD:
Usuario:
Contraseña:
Conectar:
Aceptar
Cancelar
Añadir capa
Archivo
Georreferenciar
GeoBD
WFS
WMS
WCS
ArcIMS
Elija conexión
[C] pepito (Oracle Spatial Database Driver)
Elija tabla
US_CITIES
US_COUNTIES
US_INTERSTATES
US_PARKS
US_RESTAURANTS
US_RIVERS
US_STATES
VACIA
table_fields
ID [NUMBER]
COUNTY [VARCHAR2]
FIPSSTCO [VARCHAR2]
STATE [VARCHAR2]
STATE_ABRV [VARCHAR2]
FIPSST [VARCHAR2]
LANDSQMI [NUMBER]
TOTPOP [NUMBER]
Todos
Ninguno
US_COUNTIES
Campo con geometría
GEOM
Capturar vista
ymin
xmax
xmin
Cancelar

gvSIG Current Development

- Raster Analysis tools (pilot published)
- Network Analysis tools (pilot published)
- **3D and Animation extension (pilot coming soon)**
- Metadata editing and publishing extension (prototype completed)
- Web service publishing extension (architecture completed)
- gvSIG Mobile (prototype completed)
- Extended symbology (prototype completed)

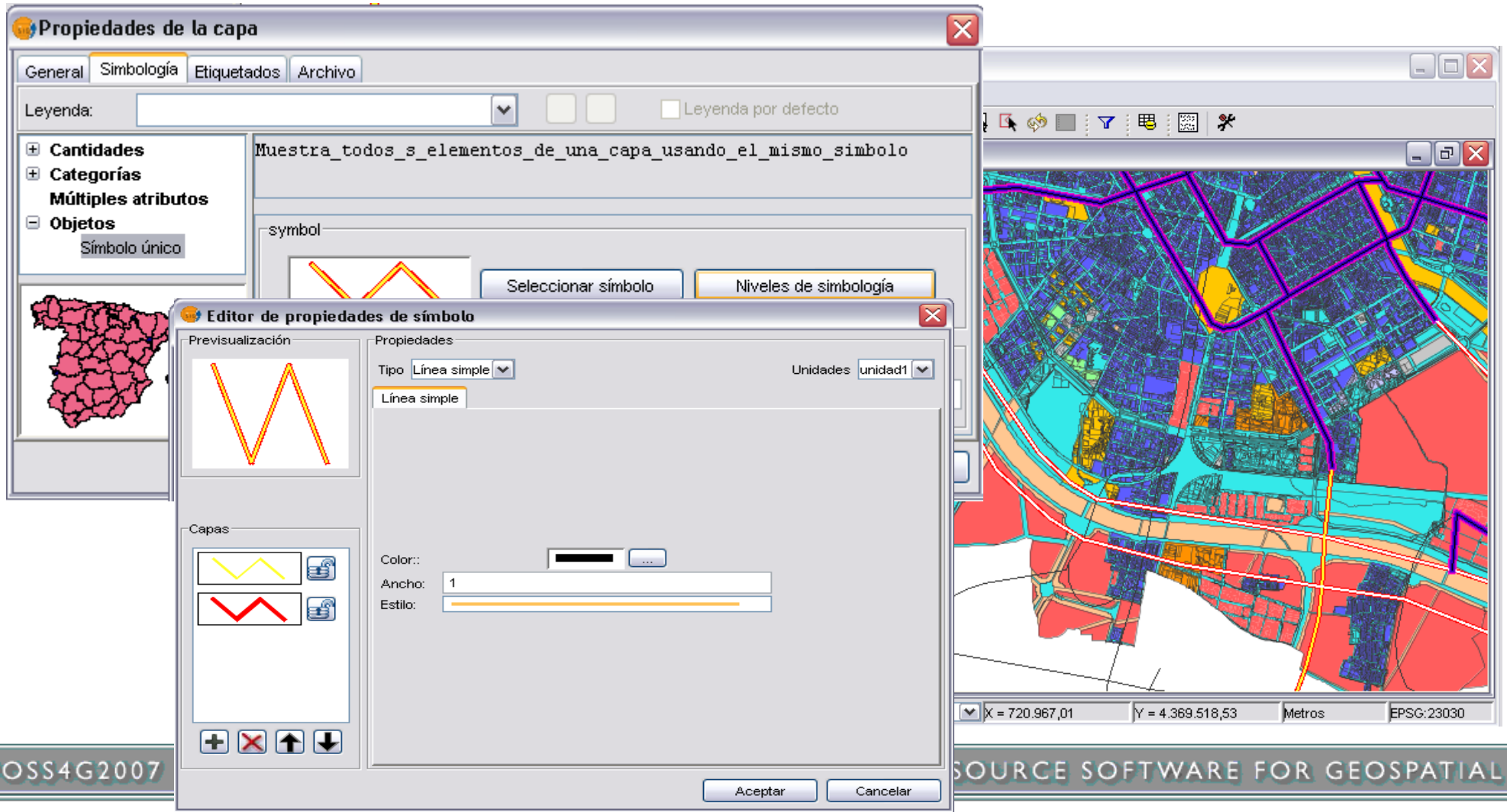
gvSIG Current Development

- Metadata editing & publishing



gvSIG Current Development

- Extended symbology

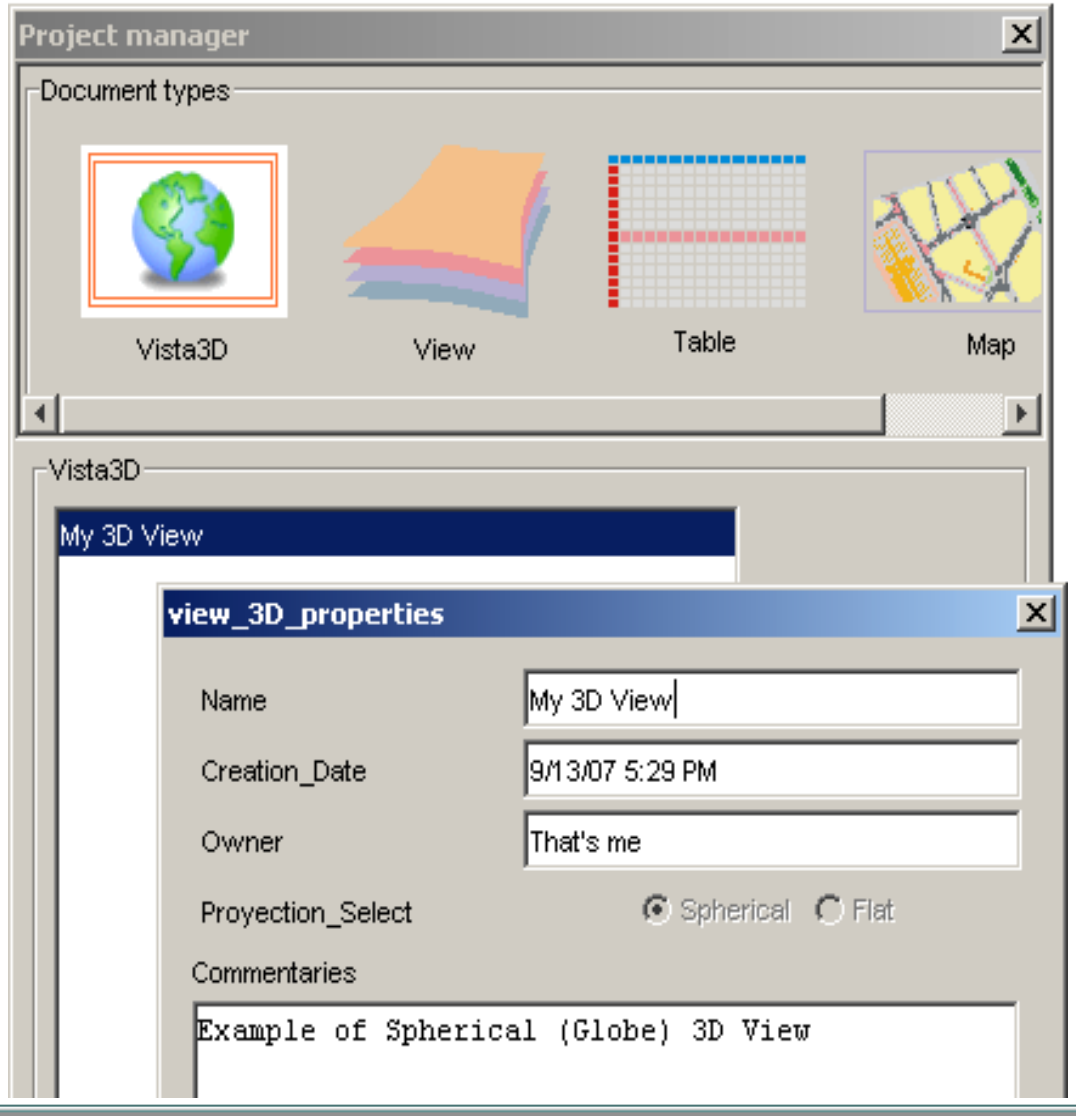


3D Visualization

- Objectives:
  - Cool navigation and pretty pictures... but also...
  - Fully integrated with regular GIS layers and tools
  - Use of local and remote data
  - Dynamic change of layer properties
  - Both globe-like and XY+Z views
  - On-the-fly terrain data fusion and multiple surfaces

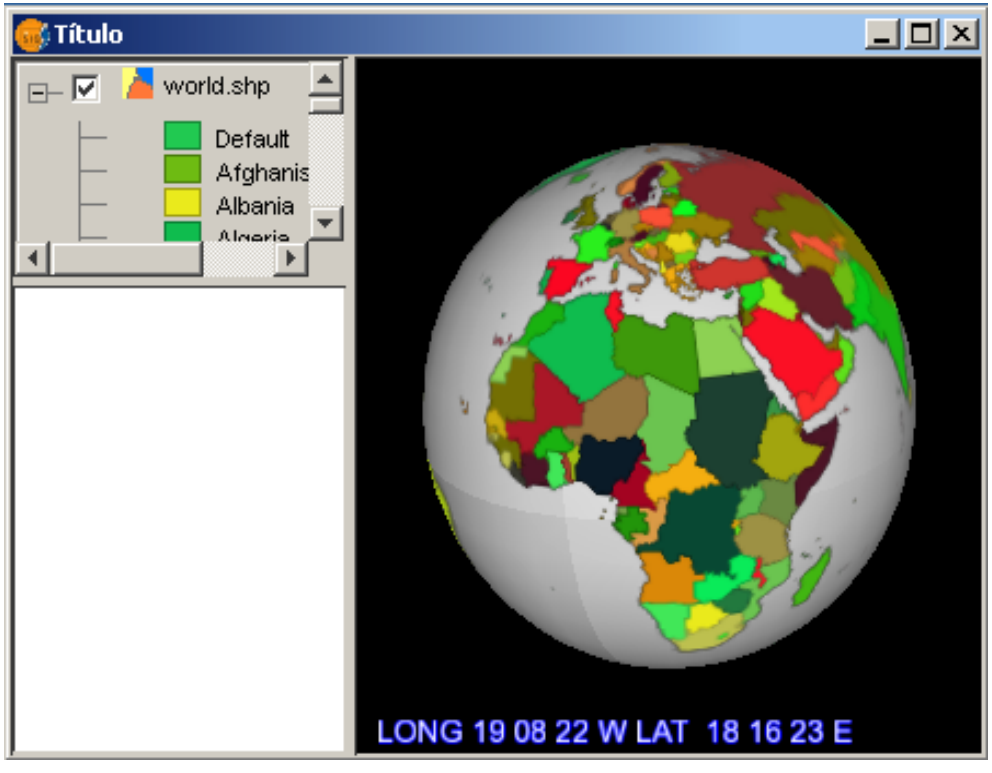
3D Views in gvSIG

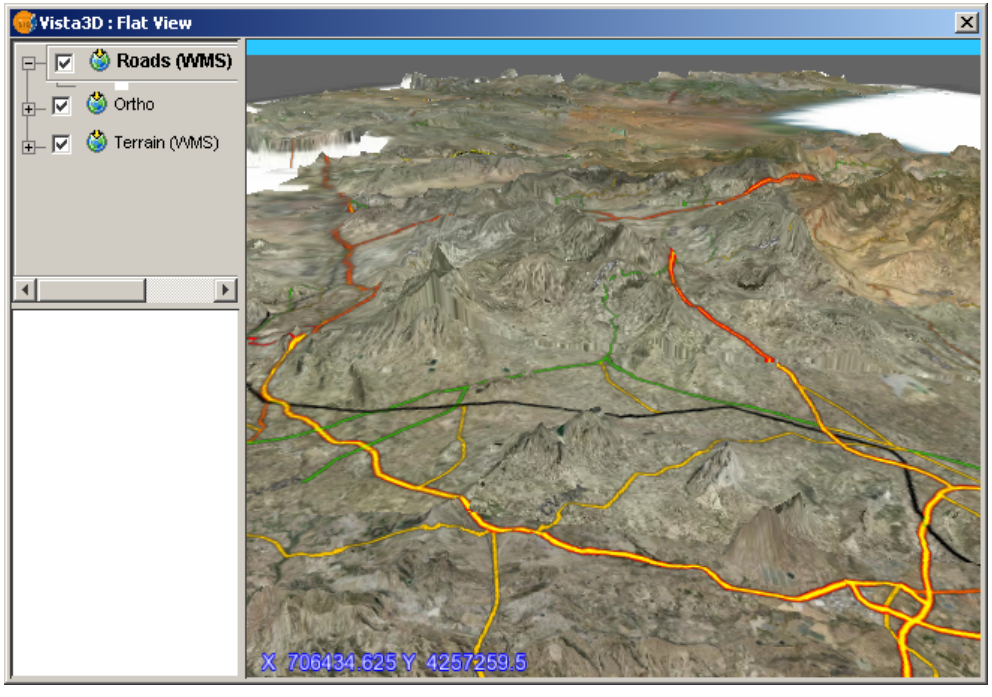
- Use gvSIG's document-type extensibility
- Share most properties with 2D Views



3D Views in gvSIG

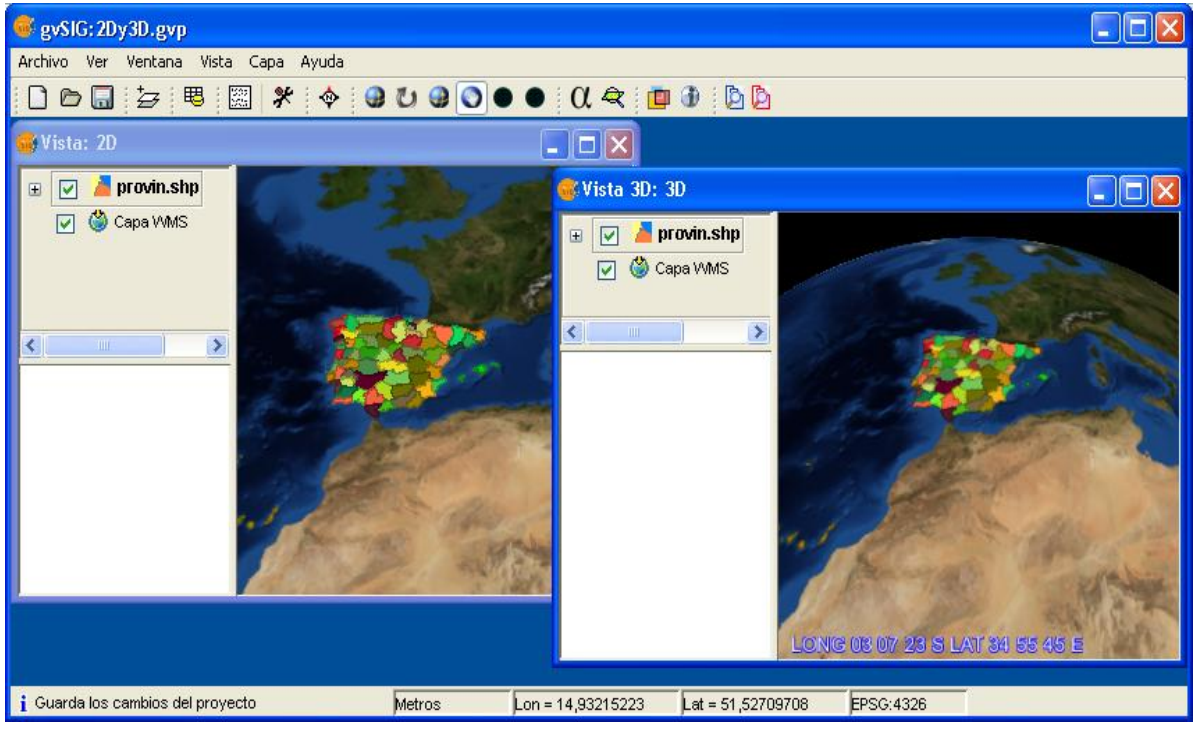
- Can be spherical or 'flat' (projected XY + Z)





Layers in 3D

- Layers are the same in 2D and 3D (can be copied/pasted), with some additional properties in 3D
  → **all gvSIG data sources are supported in 3D**



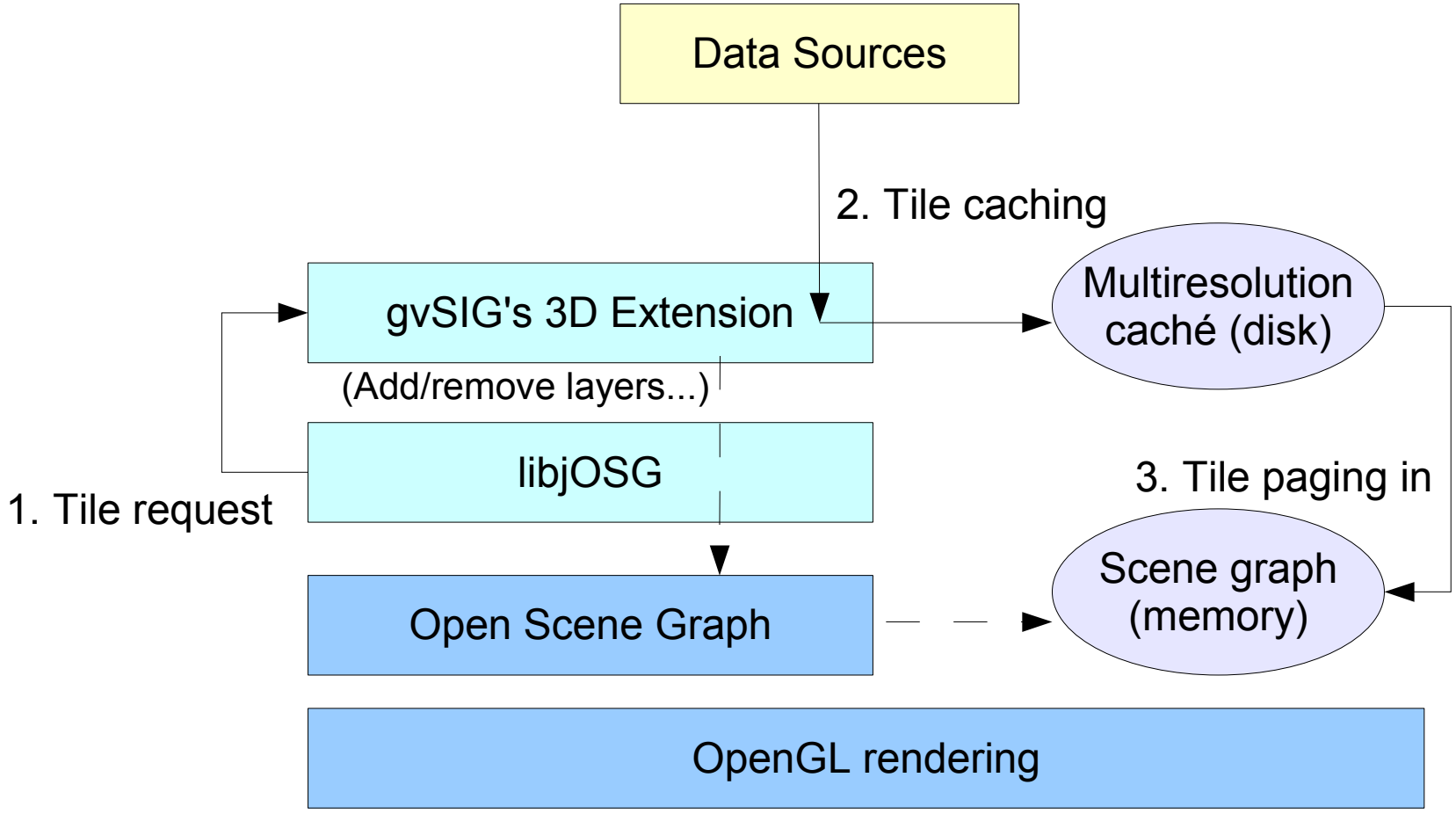
Layers in 3D

- Raster layers (and eventually TINs) can be
  - Displayed as images (textures) on terrain
  - Used to define the terrain elevation
- Feature layers can be
  - Rasterized and displayed as textures
  - Displayed as 3D objects

Architecture of 3D extension

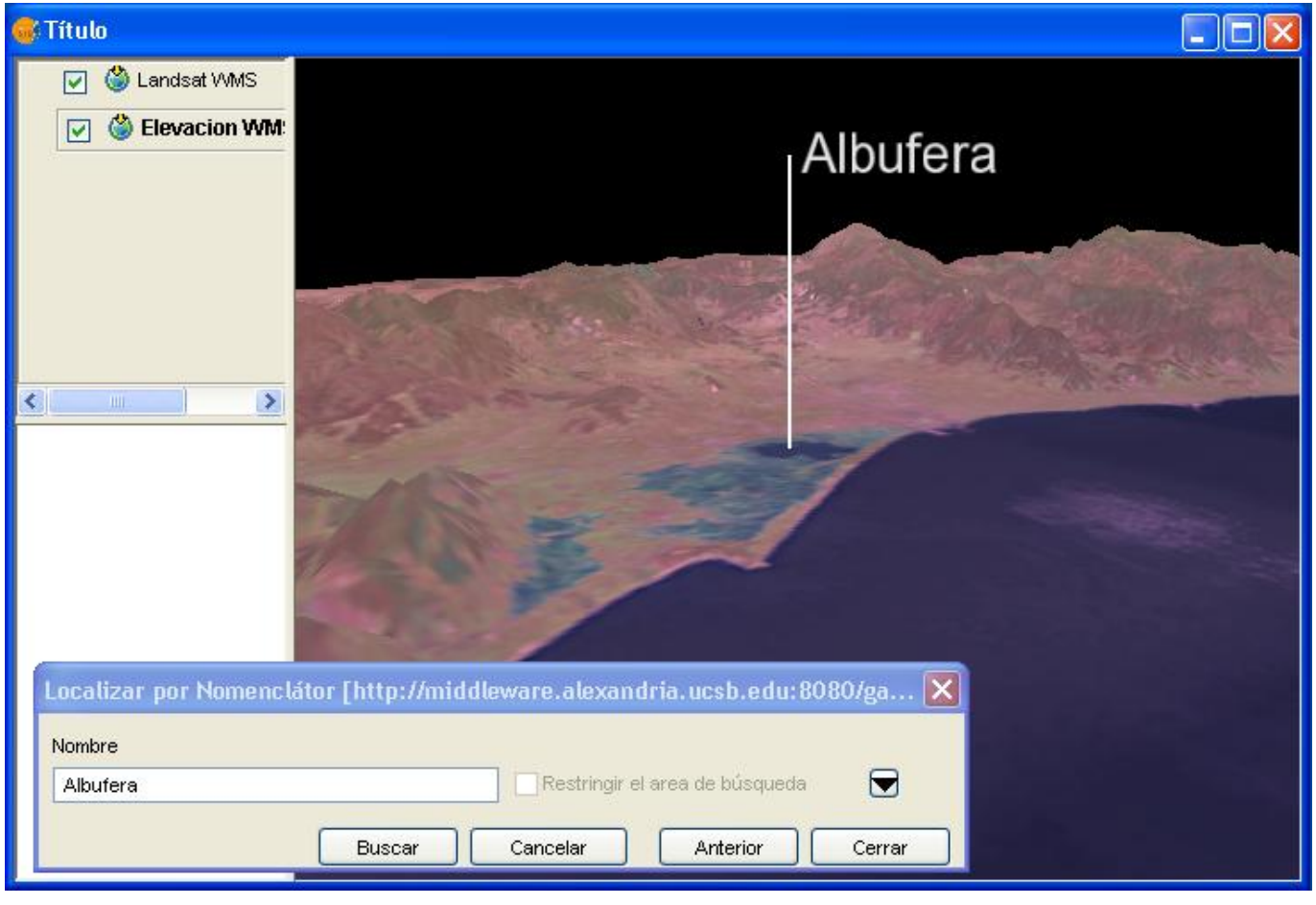
- Use of multiresolution tiling (as NASA Worldwind, Google Earth, TileCache) in disk & memory caches
- Collaboration with OpenSceneGraph (OSG) project to use and extend C++ rendering library (osgTerrain in particular): Universidad Politécnica de Valencia
- Java wrapper built on OSG → jOSG
- gvSIG's 3D extension provides tiled data on-demand to the caches
- 3D geometries and symbols in gvSIG translate into OSG objects, and viceversa

Architecture of 3D extension



Integration with gvSIG tools

- Example: gazetter service search



Time in GIS

- Time stamping (time series)
  - Layers
  - Features / grids
- Events / processes
  - At fixed locations (grids, networks)
  - On dynamic objects
- Real-time tracking
  - GPS

Time in GIS

- A set of related problems:
  - Temporal sources, acquisition
  - Data model
  - Storage
  - Query / Visualization / Animation
  - Analysis

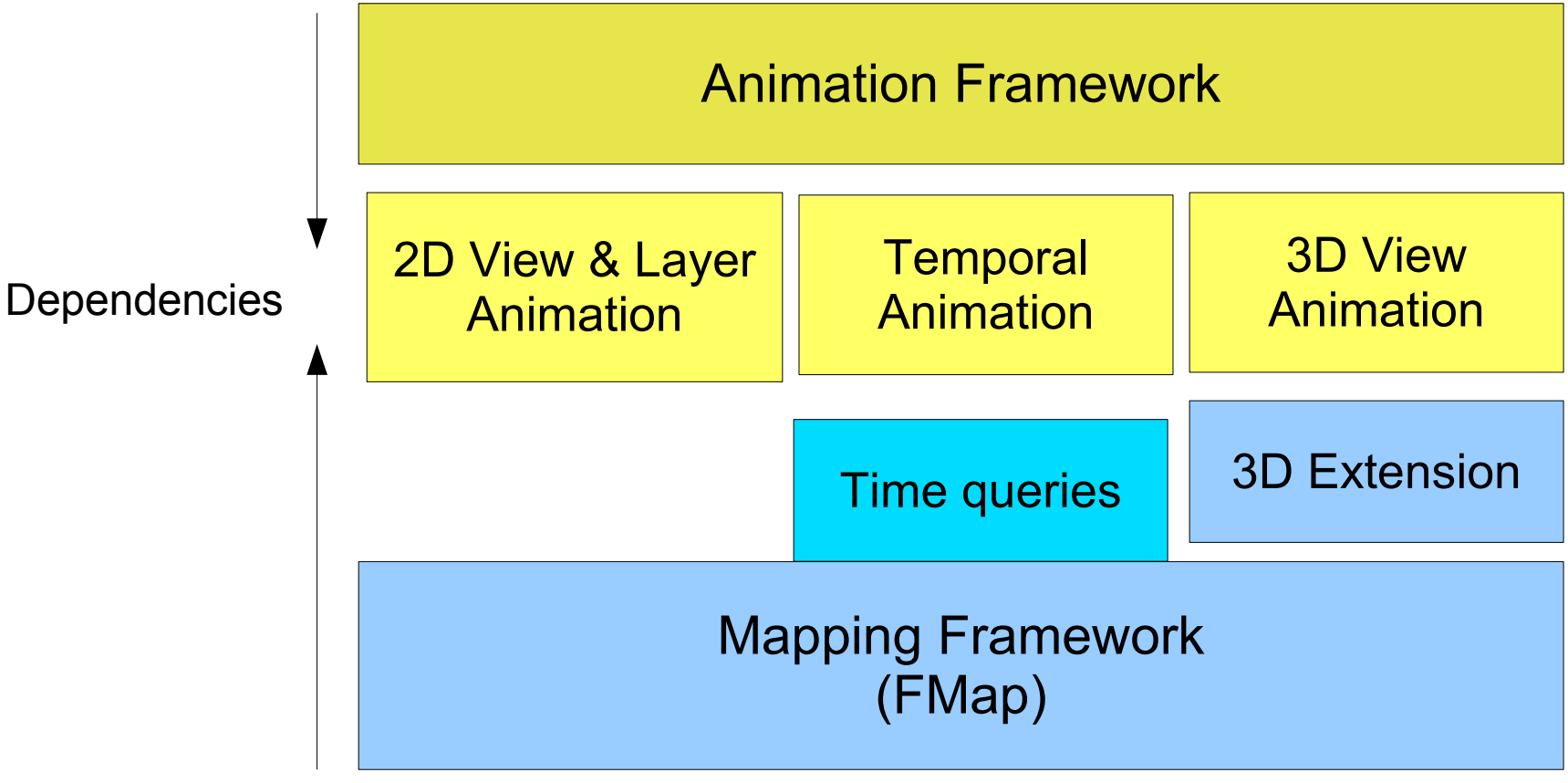
Time in gvSIG: approach

- First steps:
  - Time-stamped data support
    - Features (time as an attribute)
    - Raster
    - Time dimension in web services
  - Visualization / animation framework
    - Combine out-of-the-box animation types:
      - For temporal data
      - View and layer animation (important for presentation purposes)
    - Extensibility of animation types

Time in gvSIG: approach

- Future steps:
  - Time Reference Systems, 4D extent control
  - Time-dependent symbology
  - Events and processes
  - Dynamic simulation framework
  - 4D analysis & geostatistics

Time in gvSIG: architecture

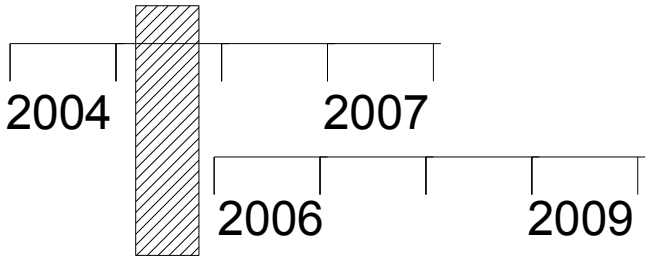


Animation Framework

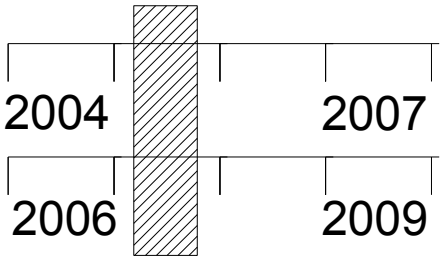
- Each project contains one or more *Animation Tracks*, each of a specific *Animation Type* (view, layer visibility, temporal...) and controlling a specific object
- Two kinds of tracks:
  - 'Arbitrary time' tracks: $t \in [0, 1]$ (e.g. for view animation). Can be defined by keyframes or functions
  - 'Dated time' tracks: t defined by year, month, day... but also mapped to arbitrary time [0, 1] (these are used for temporal data animation)
- Both kinds of tracks can be played simultaneously with any desired duration or number of frames

Temporal Data Animation

- Dated time tracks interpolate a dated 'time window' (e.g. a week) between starting and ending dates
- The changing time window is applied as a 'temporal filter' to display the layer for each new animation frame
- Multiple dated tracks have consistent dates by default, but user can introduce shifts to superimpose data from different times



Consistent (not shifted)



Superimposed (shifted)

Animation GUI

- The Animation GUI works with all Animation Types registered by gvSIG Extensions
- Simple tools allow users to create view and temporal animation tracks
- Animation play controls provide a simple way to control the animation by duration or number of steps

Implementation & Release Plan

- Pilot (install on gvSIG 1.1) 2007 Q4
- Basic 3D & Animation 2008 Q1
- Temporal Data Animation 2008 Q3
- Full functionality 2009 Q1

Thanks!

- Find more about gvSIG at

  www.gvsig.gva.es

- Subscribe to mailing lists for info and support

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