To Visualize History...

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Historical Information System
Know-how and Application

• Basics ... an idea in mind!
• The Instrument ... IS ... GIS - SIS - HIS
• How to Use?
• Motivation to do it!

Basics ...

Information

Database
Interdisciplinarity
Solution and Problem

Potential user of spatial information
"external integration"

GIS
RIS
GeblS
WAWIS
FM

business-processes
IS

geophysists
geologists

civil engineers

Environmental informatics
Geoinformatics

GIS
RIS
GeblS
WAWIS
FM

archeologists
historians

Environmental informatics
Geoinformatics

Business processes

Visualization
2D $\Rightarrow$ 3D
Basics ...

Space and Time

3D ⇒ 4D

which problem is not space or time dependent?

The idea!

historical analysis

Use of GIS to ...

- administration
- presentation
- processing

of spatial data.

... database management systems are perhaps the brain!

Einsatz von GIS

Besonderheit oder Normalität?

A new one? Not at all ...
GIS =
- methods/techniques
- concepts

areas of application

GIS = integrated component of „mainstream IT“ „spatial aspect“ in information technology.

GIS means ...
Data and information

- HW+SW
- Geographic data: vector- und rasteroriented
- Map + database
- GIS-functionalities!
  - Combination of information! on any topic ...

GIS-functionalities:
Analysis of spatial data as a model of reality!

- analysis of attributes
  (sort of tiles, measures of stones, sort of mortar ...)
  databases

- analysis according to topologic criteria
  ... distances - neighbourhood - buffer

Spatial Analysis Functionalities of a GIS

Features near other features: orders ... 
- Buffer
- Dissolve
- Merge
- Intersect
- Union
- Spatial Join

Horizontal dimension:
computation of distances

Vertikal dimension:
analysis of the relation between different themes, such as topography, vegetation etc.
GIS offers ... Tools for Spatial Analysis

- **Analysis of distances**
  - Buffer: View - Theme - Create Buffers ...

**GeoProcessingWizzard**

**About Dissolve**
This operation aggregates features that have the same value for an attribute that you specify.

**About Merge**
This operation appends the features of two or more themes into a single theme. Attributes will be retained if they have the same name.

**About Clip**
This operation uses a clip theme like a cookie cutter on your input theme. The input theme's attributes are not altered.

**About Intersect**
This operation cuts an input theme with the features from an overlay theme to produce an output theme with features that have attribute data from both themes.

**About Union**
This operation combines features of an input theme with the polygons from an overlay theme to produce an output theme that contains the attributes and full extent of both themes.

**About Assign Data By Location**
This operation joins only the data for features of Theme2 to the features of Theme1 which share the same location.
Know-How
- Coordinate systems
- Map projections
- Georeferencing

Use it!

How to use?

HIS
Historical Information System

ArcView

Generalization
- Topography
  = land forms or surface configuration
- Topics
  = different aspects in space and time
Status quo: 2D maps!

Hydrologic Simulation Engine Graphical User Interface (HSE GUI) development using ArcView
Client: South Florida Water Management District
Status: Ongoing
Related Technologies: Geographic Information Systems, Software Development, Database, Flood Inundation Mapping
Related Projects: Burntfork Geographic Information System, Croke Canal Geographic Information System

HSE GUI showing model mesh, water surface elevations, and flow directions

3D view of model mesh, water and land surfaces

In 2001, the State of Colorado selected the FTS team to perform a feasibility study for implementing a DSS (decision support system) for the Rio Grande.

Toolbox
- Spatial analysis
- Spatial transformation
- Spatial statistics
- Analysis of networks
- Image analysis
- Geocoding
- 3D-Modelling

Instruments
- ArcView
- ARC/INFO
- SPANS
- IDRISI
- ...

The Rio Grande DSS

In 2001, the State of Colorado selected the FTS team to perform a feasibility study for implementing a DSS (decision support system) for the Rio Grande.
Data

- Topographic Map M 1:5000
- Point coordinates ≈ 2000
  - \( x,y \) Gauss-Boaga
    Transverse Mercator Projection, the center of projection is in Monte Mario near Rome and two different great translations are applied to the east and west fuses. The False Easting for Zone 32 is 1,500,000 meters, and 2,500,000 for Zone 33.
  - \( h \) height
- Point attributes

Result of digitization

Result of observation
Processing of input

- Observed points
- Digitized points

⇒ TIN
  Triangulated Irregular Network
Visualization

- Height classification
- Photorealistic representation
  - 3D Nature: World Construction Set5
  - 3D Studio Max
  - LightWave 3D

Modelling

- Symbolized objects
  - points → polylines between 2 points → polygon between n points → block by adding a height!
  (by extensions)
New data!

- GUI for adding new data
- GUI for adding new attributes
- GUI for adding new objects
  - description + measuring
  - computation
  - integration in topography by extruding

Export

- .dxf
- .shp
- .vrml
- ascii
World Construction Set gives you a powerful set of real-world features:

To be the best, you need the best tools. Our goal with World Construction Set has always been to bring you five very best photorealistic terrain visualization, rendering and animation tools on earth.

Everyone and artists agree, World Construction Set goes far beyond less sophisticated terrain programs, while improving on the award-winning features of earlier version of WCSE.