Replacing Local Data by Web Services
Using ArcGIS Desktop, SDI

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11 bachelor and
13 master programs

Photogrammetry and Geoinformatics
and
3 more GIS related courses

GIS Laboratory with current focus on data interoperability

Host of an annual ESRI User Group Meeting in the State Baden-Württemberg
Content

- Reasons for data interoperability
- Data interoperability based on common data stores
- Data interoperability based on OGC Web Services
- Experiences with ArcGIS 9.3.1 and OGC Web Services
  - Web Map Services (WMS)
  - Web Feature Services (WFS)
- Conclusion
Data interoperability based on common (open) data formats in DBMS, e.g. Oracle SDO_Geometry

Presentation

“Integrating ArcGIS desktop in data interoperability environments with heterogeneous GIS clients“, Abdurasyid Moestofa, Prof. Rainer Kettemann

Data interoperability based on OGC Web Services, Web Map Service (WMS) and Web Feature Service (WFS)
Regional separation – interoperability in hierarchical structures

- European Union
- Germany
- Independent units in federal organizations
- Equivalent tasks solved with independent GIS solutions
- Interoperability solution: OGC Web Services in a Wide Area Network
Task based separation – interoperability in coequal structures

Department A

Independent organizations
ministries / departments

Individual tasks solved with
independent GIS solutions

Same spatial responsibility

Interoperability solution:
Common data store
in a Local Area Network
Data classification and connection types

Data for others is a subset of the own project data.

Basic data is the common spatial reference.

Data from others is required to solve own tasks.

Basic data

Project data

For others

From others

Basic data

For others

From others

Basic data

Project data

Internet

OGC Service

State maps / cadastral data
OGC Web Map Services

- Supported by most GIS clients.
- Can also be used by web browsers.
- Easy to connect time.
- Deliver spatial data usually as raster format, Vector formats (SVG or CGM) are not supported.
- WMS Services available in Germany have been used, services from:
  - Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW).
  - Landesamt für Geoinformation und Landentwicklung (LGL)
• Service Types

- Scale independent: Servers offer layers in all scales or in a specified scale range only (LUBW).

- Scale dependant: Server offers one layer with scale dependant content (LGL).
• Printing WMS maps:

- Servers are restricted to a specific number of pixels, without an ERRORR MESSAGE!
We can overcome the limitation, if the client divides the requested areas automatically into smaller tiles (currently not realized in ArcGIS).
OGC WMS - Limitations

- Provided services for the border areas of Germany states are not unique.

- Can be solved by harmonizing geometry along boundaries of different responsibility.
Interoperability using OGC WMS - Conclusion

- WMS now is the state-of-the-art in the field of services based on raster data.

- Maximum number of pixels problem should be solved.

- Additional interfaces needed to be developed by GIS vendors.
Web Feature Services (WFS)

- Returns feature classes (as vector).
- Still under research and development.
- Only few WFS services are available in Germany.
- ESRI Uses **FME** Data Interoperability Interface.
Interoperability using OGC WFS

- Consuming WFS using ESRI ArcGIS 9.3.1:
  - Connecting in ArcCatalog ones, and enables the use in different map windows (MXDs).
  - Connecting requires independent Internet settings (proxy user name and password is not taken from IE).
  - Standard WFS requests retrieve irregular results in some cases.
  - Unusual, non practical Spatial Filter settings.
Interoperability using OGC WFS - Example

- WFS Supports all GIS functionalities:
  - Overlay Analysis.
  - Spatial Analysis.
  - Thematic Mapping.
  - Identify.
WFS - Limitations

- Standard WFS requests retrieved a **rotated** map of Baden-Württemberg state of Germany

- **Correct** Map of Baden-Württemberg state retrieved after defining SRS into the service link !!!!
Some feature can be dropped when the maximum number of features is reached. There would be no ERROR MESSAGE!
**WFS - Limitations**

- Non-unique attribute data structure, between local data and its corresponding web service.
WFS provided by LGL contains around 30 million parcels, and due to this high number of features the service is restricted to specific number of feature to be loaded (in the contract of HFT Stuttgart 100 features per request).

For this reason the user must define a Bonding Box for the requested area.

ArcGIS 9.3.1 interface is not assigning a dynamic BBOX depending on the map window, so BBOX must be attached to the WFS link!

Some feature can be dropped when the maximum number of features is reached. There would be no ERROR MESSAGE!
Conclusion

- Currently mixing copied data (local data) with WFS data is the best solution, by switching to WFS data when up to date geodata are needed.

- Web Services are the future for geodata interoperability, especially in Spatial Data Infrastructures.

- By now GIS developers like ESRI and data providers (in our case: LGL or LUBW) are on a good way to enable an interoperable use of geodata for users.

- Some improvements are necessary on the site of GIS and data vendors.
THANK YOU FOR ATTENDING THIS PRESENTATION!