

## Replacing Local Data by Web Services Using ArcGIS Desktop, SDI

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## Stuttgart University of Applied Sciences

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

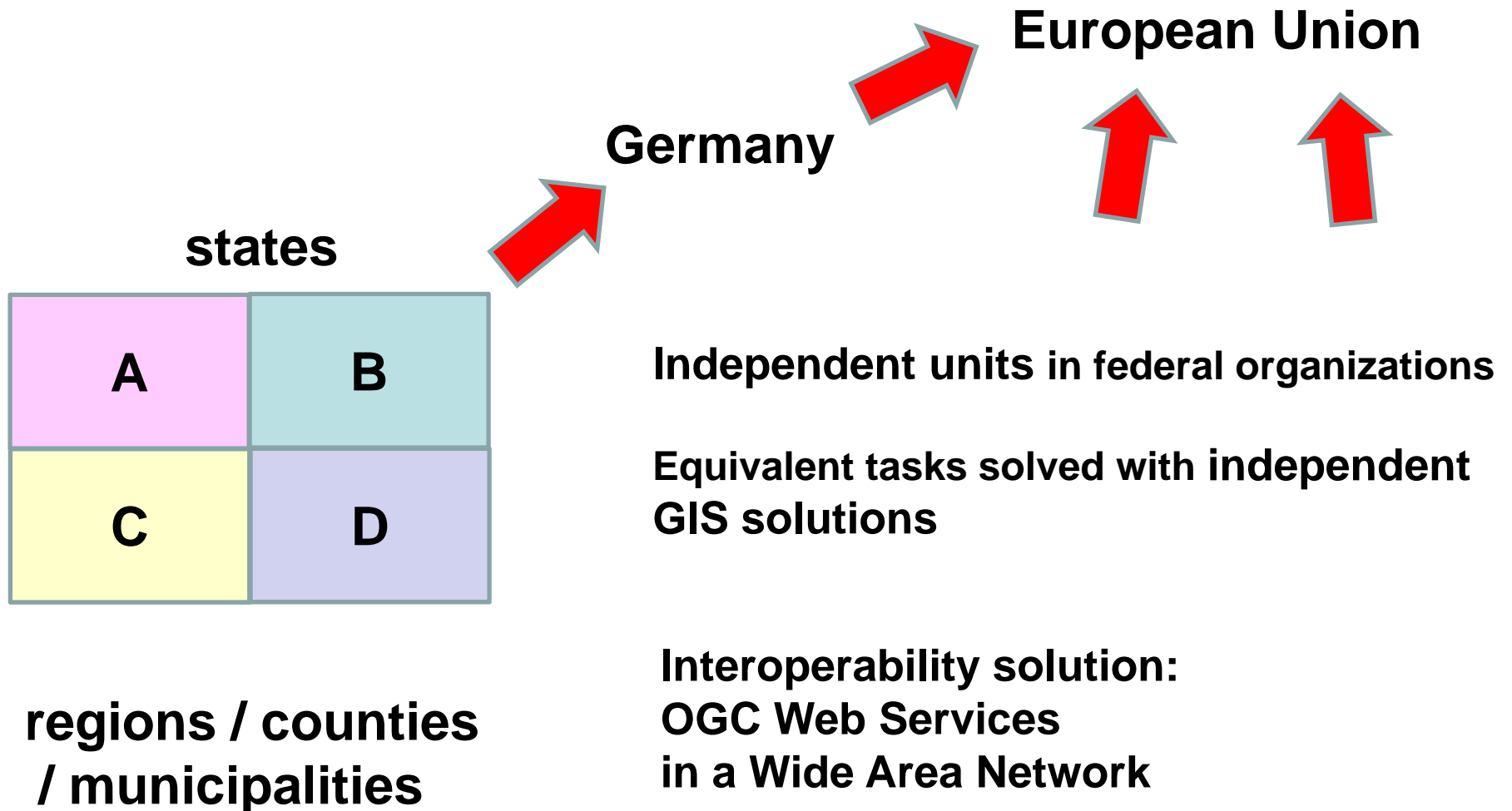
**Data interoperability based on common (open) data formats in DBMS, e.g. Oracle SDO\_Geometry**

***Presentation***

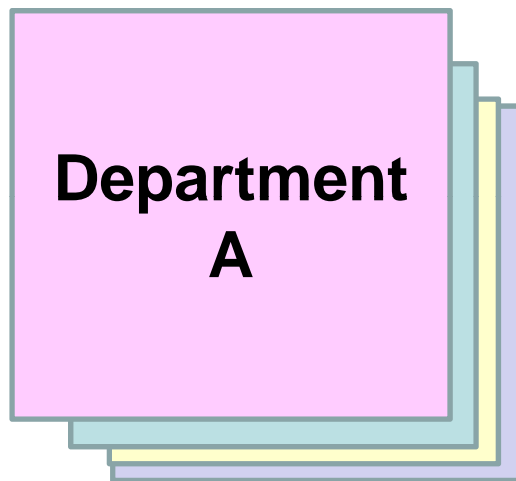
***“Integrating ArcGIS desktop in data interoperability environments with heterogeneous GIS clients“, Abdurasyid Moestofa , Prof. Rainer Kettemann***

**Data interoperability based on OGC Web Services,  
Web Map Service (WMS) and  
Web Feature Service (WFS)**

- Regional separation – interoperability in hierarchical structures



- Task based separation – interoperability in coequal structures



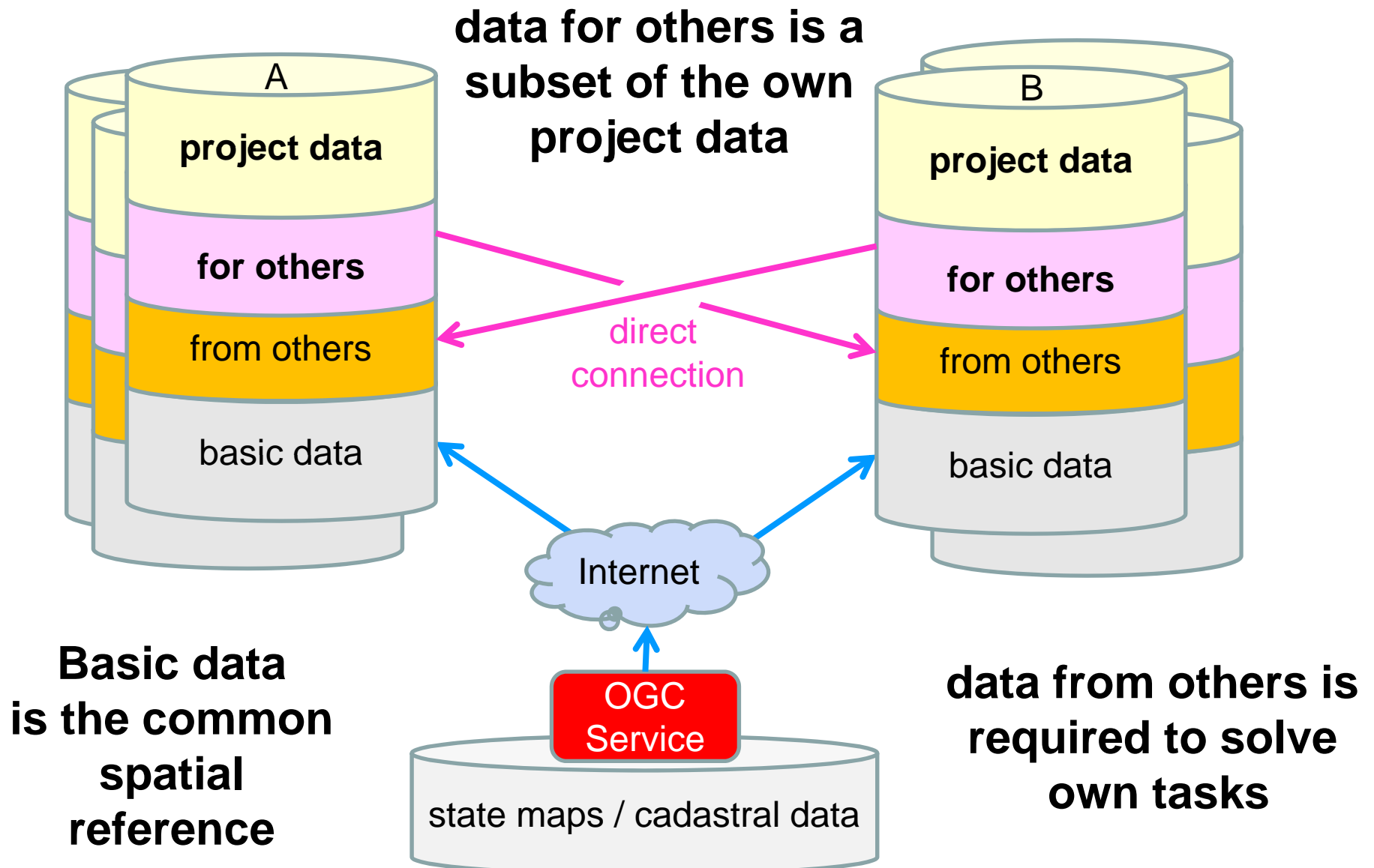
**Same spatial  
responsibility**

**Independent organizations  
ministries / departments**

**Individual tasks solved with  
independent GIS solutions**

**Interoperability solution:  
Common data store  
in a Local Area Network**

# Data classification and connection types

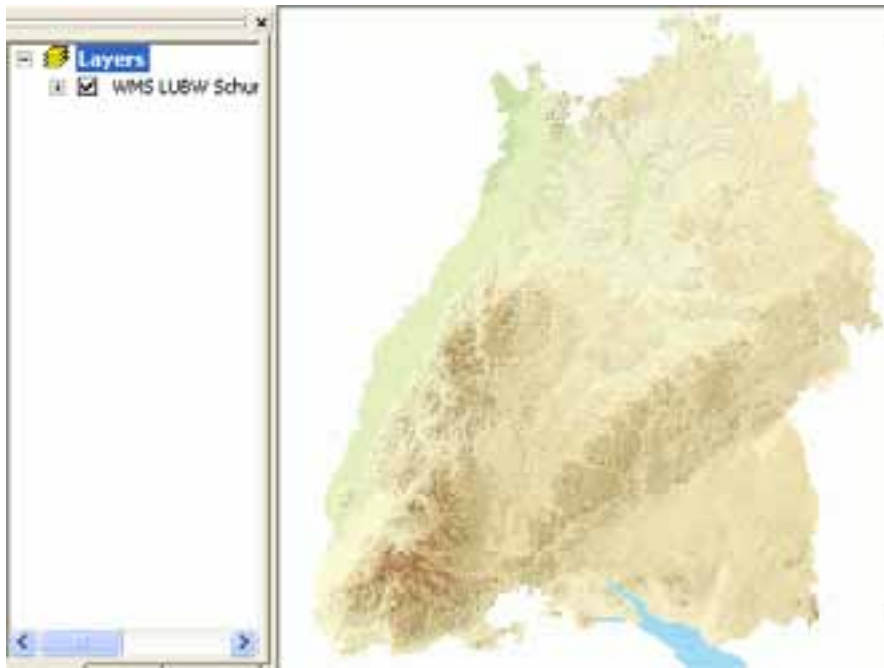


- Supported by most GIS clients.
- Can also be used by web browsers.
- Easy to connect time.
- Deliver spatial data usually as raster format, Vector formats (SVG or CGM) are not supported.
- WMS Services available in Germany have been used, services from:
  - Landesanstalt für Umwelt, Messungen und Naturschutz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

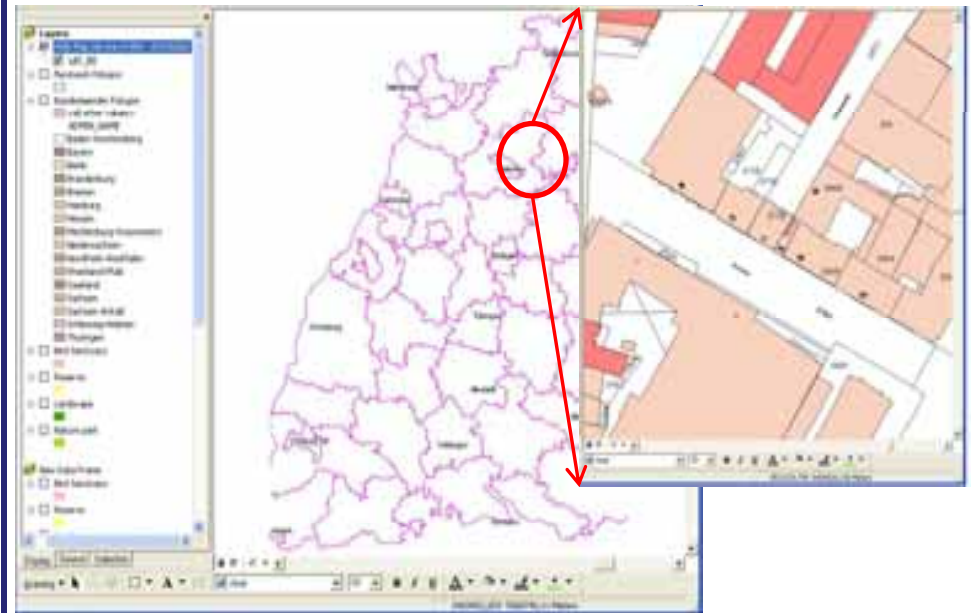


- Service Types

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



- Scale dependant:  
Server offers one layer with scale dependant content (**LGL**).

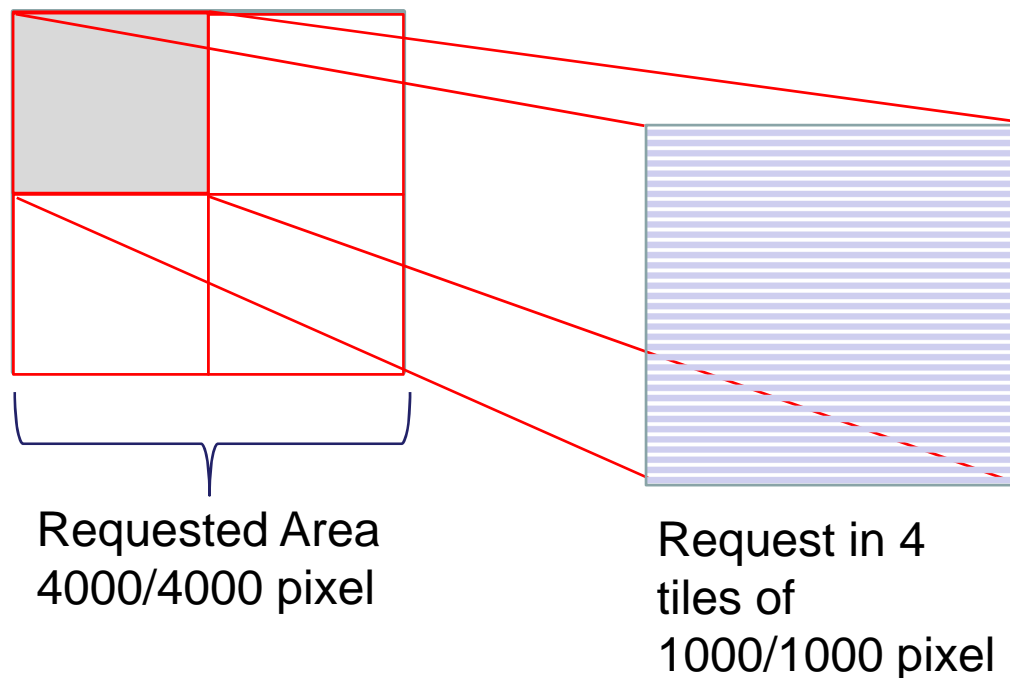


- Printing WMS maps:



- Servers are restricted to a specific number of pixels, without an **ERROR MESSAGE !**

- We can overcome the limitation, if the client divides the requested areas automatically into smaller tiles (currently not realized in ArcGIS).

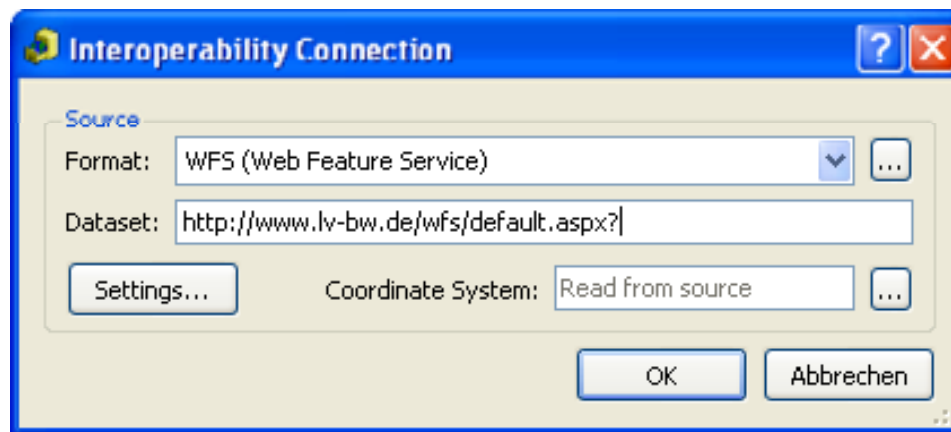


- Provided services for the border areas of Germany states are not unique.
- Can be solved by harmonizing geometry along boundaries of different responsibility .



- 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.

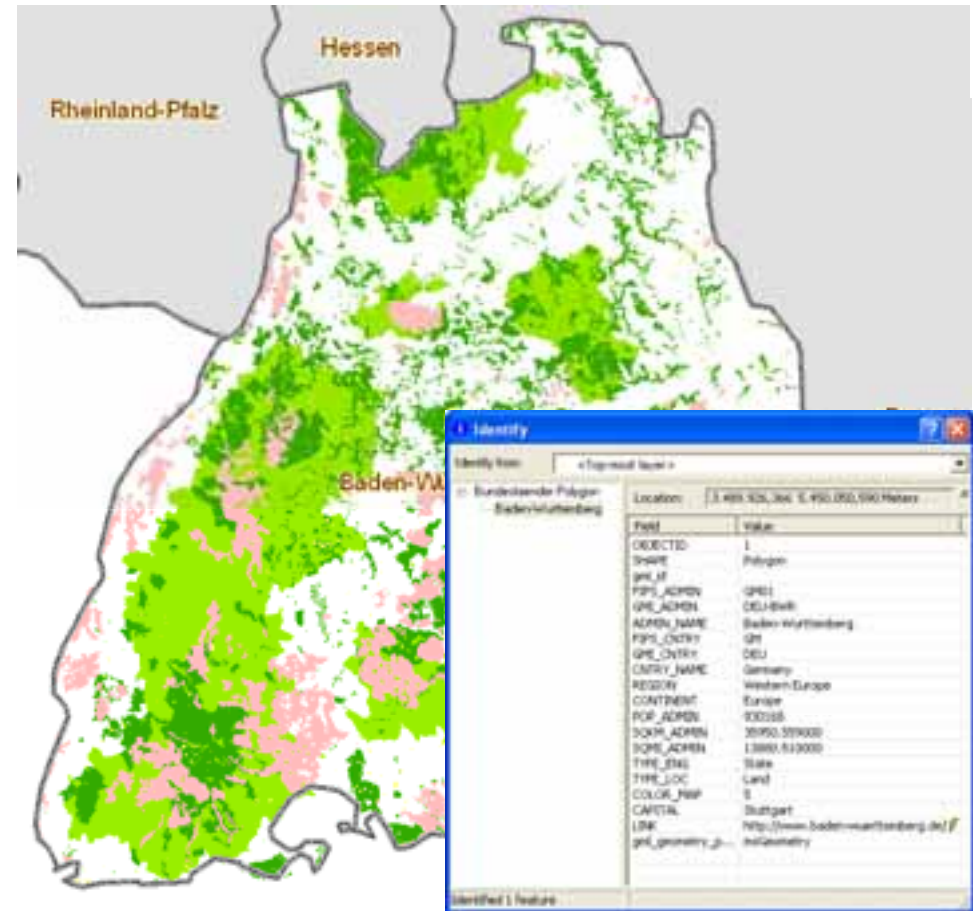
- Returns feature classes (as vector).
- Still under research and development.
- Only few WFS services are available in Germany.
- ESRI Uses **FME** Data Interoperability Interface.



- 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.

➤ WFS Supports all GIS functionalities:

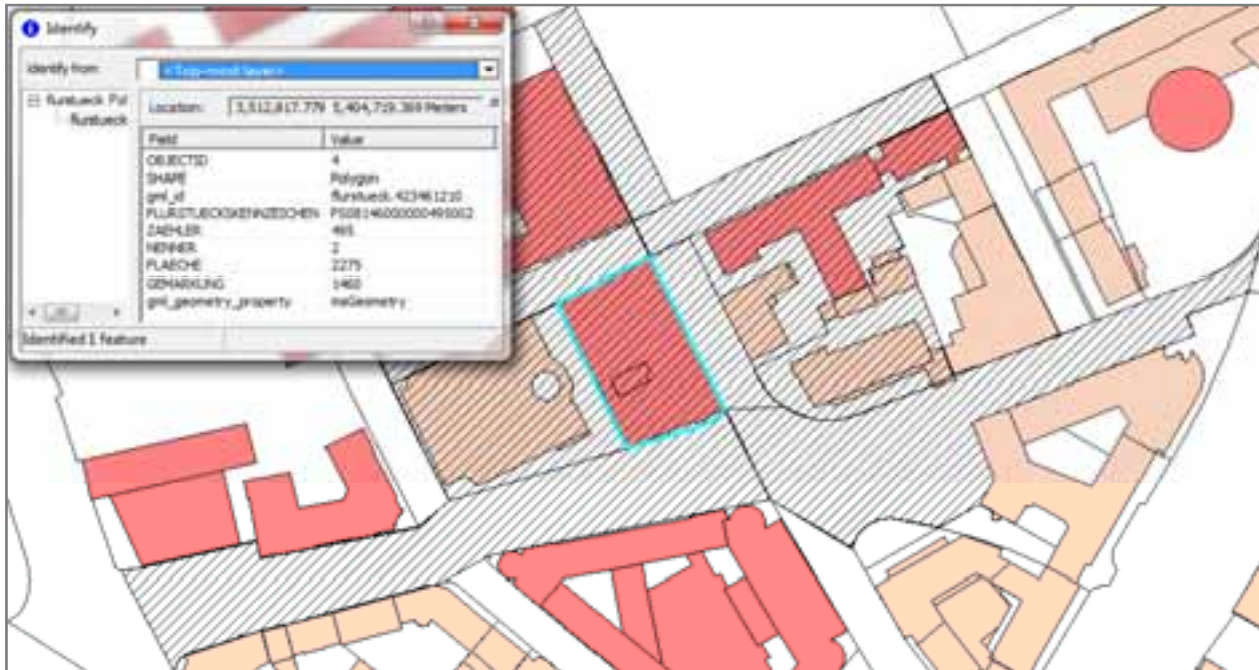
- Overlay Analysis.
- Spatial Analysis.
- Thematic Mapping.
- Identify.







- 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.

Local  
Data

FID	Shape	FLSTKZ	GMK	FLR	FLSTHRZ	FLSTHRN	ALBFLAEC	RECHTS	HOCH	DATUM
0	Polygon	080680-002-02094/002	680	2	2094	2	0	3514814.9	5455187.3	11/20/1997
1	Polygon	080680-002-00116/001	680	2	116	1	0	3514871.9	5454920.6	10/1/1997
2	Polygon	080680-002-00116/000	680	2	116	0	0	3514836.6	5454956.4	10/1/1997
3	Polygon	080680-002-02438/000	680	2	2438	0	0	3514324	5455284.3	7/28/1994
4	Polygon	080680-002-02439/000	680	2	2439	0	0	3514345.3	5455284.6	7/28/1994
5	Polygon	080680-002-02433/000	680	2	2433	0	0	3514349	5455316.3	7/28/1994

WFS

OBJECTID	SHAPE *	gml_id	FLURSTUECKSKENNZEICHE	ZAEHLER	HEINER	FLAECHE	GEMARKUNG	gml_geometry_property
1	Polygon	flurstueck.423461175	FS08146000000495000	495	0	6103	1460	msGeometry
2	Polygon	flurstueck.423461231	FS08146000000409000	409	0	5379	1460	msGeometry
3	Polygon	flurstueck.423461180	FS08146000000495001	495	1	3460	1460	msGeometry
4	Polygon	flurstueck.423461210	FS08146000000495002	495	2	2275	1460	msGeometry
5	Polygon	flurstueck.423461207	FS08146000000491002	491	2	2302	1460	msGeometry
6	Polygon	flurstueck.423461206	FS08146000000490002	490	2	1026	1460	msGeometry
7	Polygon	flurstueck.423461200	FS08146000000475003	475	3	1484	1460	msGeometry
8	Polygon	flurstueck.423461208	FS08146000000491000	491	0	3855	1460	msGeometry
9	Polygon	flurstueck.423461201	FS08146000000502000	502	0	6461	1460	msGeometry
10	Polygon	flurstueck.423463164	FS08146000000490009	490	9	1255	1460	msGeometry

- 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 Bounding 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 !**

- 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 !**

