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# *Local Spatial Data Infrastructure, a Solid Base for Sustainable Land Management in Germany*

*Ulrike Klein and Hartmut Müller*

FIG Commission 3 Workshop and Commission 3 Annual Meeting  
The Empowerment of Local Authorities: Spatial Information and Spatial Planning Tools  
25-28 October 2011, Paris, France

***Technical Session 8 – Best Peer-Review Papers, 27 October***

# Current Challenges

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- Climate Change
- Rapid Urbanisation
- Population Change



dailygalaxy.com

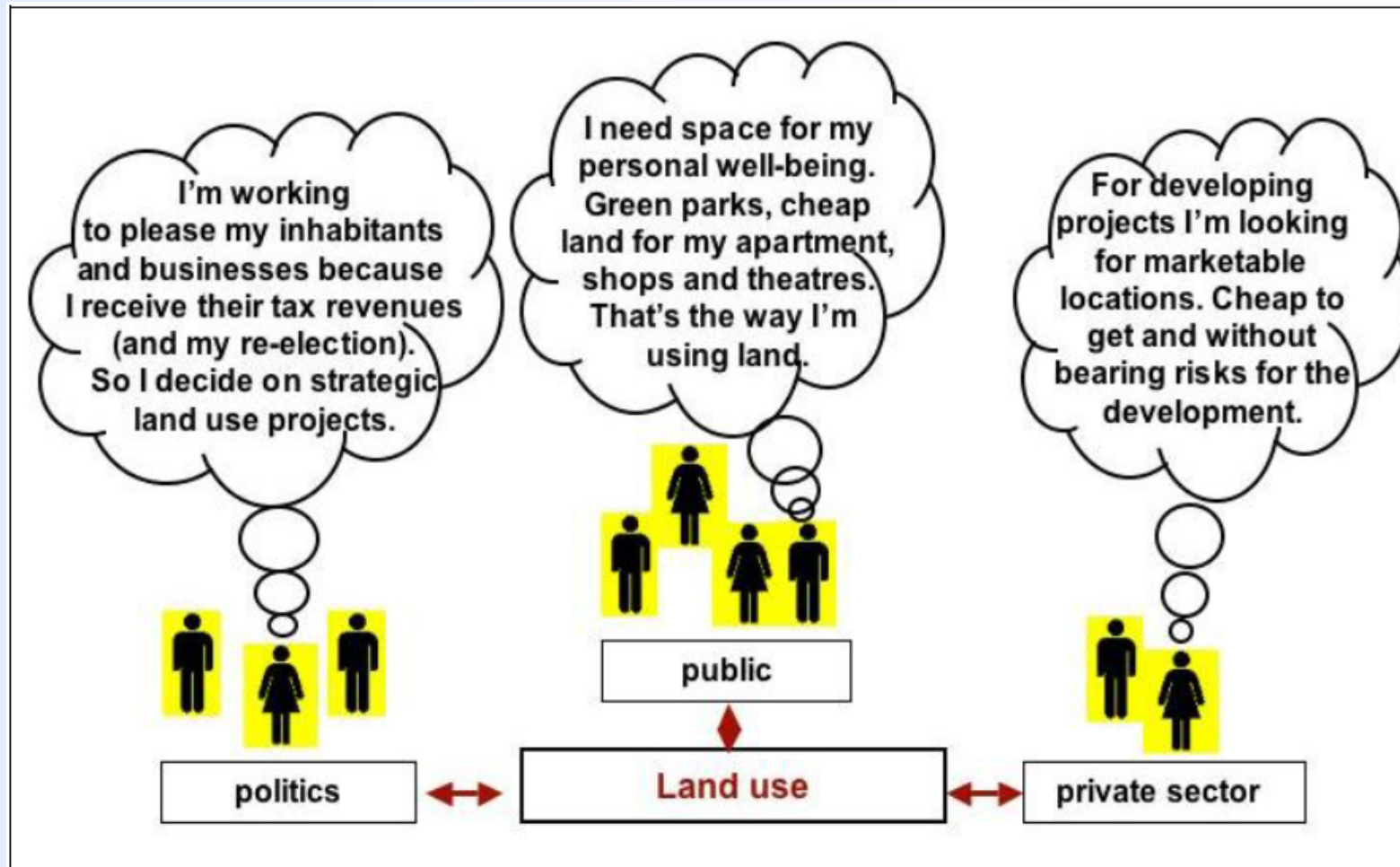
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# SUSTAINABLE LAND MANAGEMENT

# Sustainable Land Management

## Demands on land *Source: Rubitzki and Vancutsem, 2009, p20*

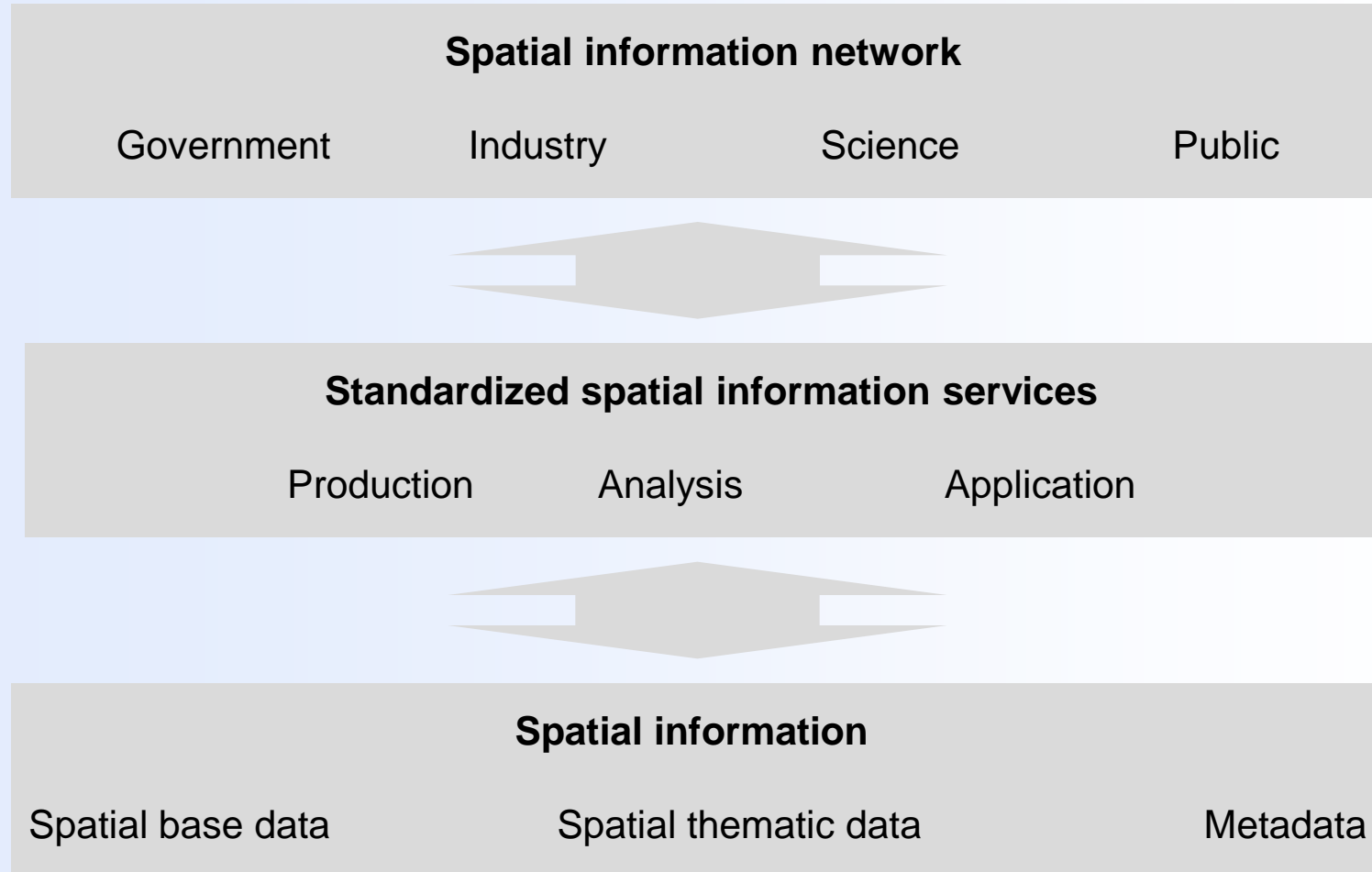


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# SPATIAL DATA INFRASTRUCTURES

# Principles of SDI



# Classification of SDI hierarchy levels

Source: Rajabifard et al (1999)

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- Global Spatial Data Infrastructure (GSDI)
- Regional Spatial Data Infrastructure (RSDI)

Ex. INSPIRE

- National Spatial Data Infrastructure (NSDI)

Ex. SDI Germany

- State or Provincial Spatial Data Infrastructure (SSDI)
- Local Spatial Data Infrastructure (LSDI)

Ex. SDI German State of Rheinland-Pfalz

- Corporate Spatial Data Infrastructure (CSDI)




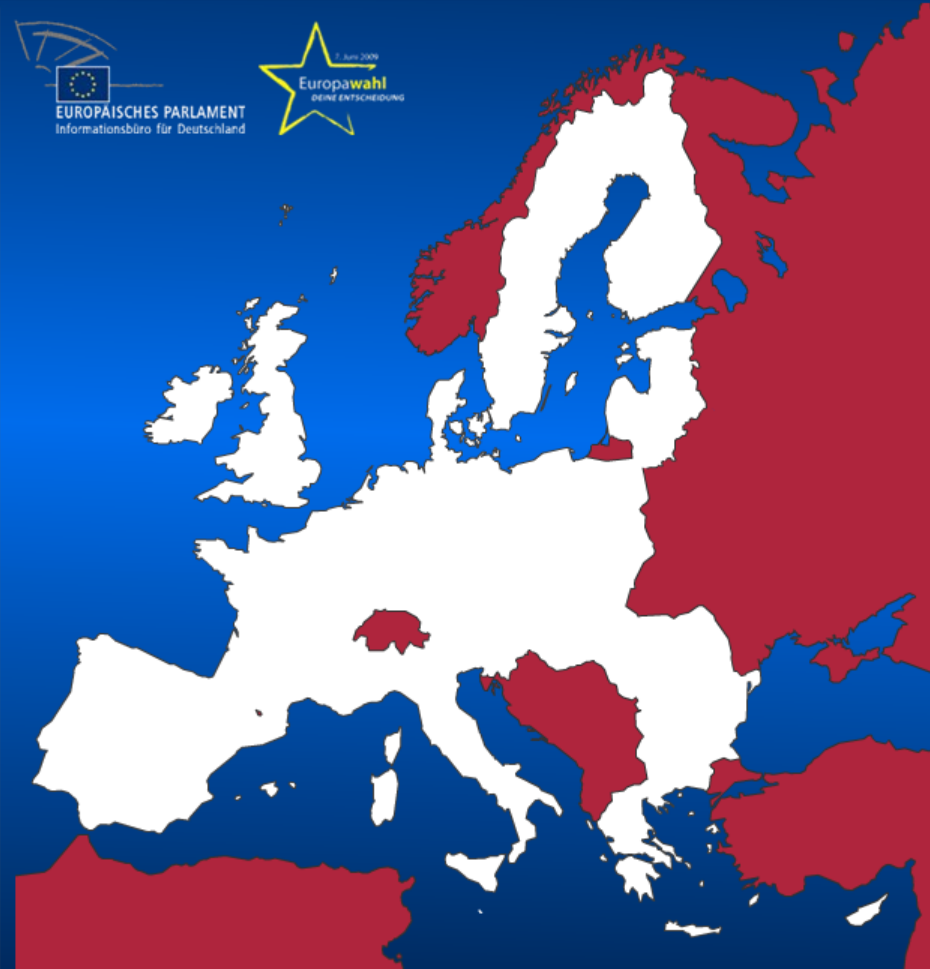
# Distributed Data - like an European puzzle

## Europa-Puzzle

Startseite | Direkt zur Wahlerinnerung

Ziehe mit gedrückter Maustaste eines der unten dargestellten Puzzle-Teile auf die Europakarte. An der jeweils richtigen Stelle angekommen, lass die Maustaste los. Du hast gewonnen, wenn alle EU-Mitgliedstaaten wieder richtig platziert sind.







# INSPIRE ... and Local SDI

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- **Annex I:** Coordinate reference systems, Geographical grid systems, **Geographical names, Administrative units, Addresses, Cadastral parcels, Transport networks, Hydrography, Protected sites**
- **Annex II:** Elevation, **Land cover**, Orthoimagery, Geology
- **Annex III:** **Statistical units, Buildings, Soil, Land use, Human health and safety, Utility and governmental services, Environmental monitoring Facilities, Production and industrial facilities, Agricultural and aquaculture facilities, Population distribution and demography, Area management/ restriction/ regulation zones & reporting units, Natural risk zones, Atmospheric conditions, Meteorological geographical features, Oceanographic geographical features, Sea regions, Bio-geographical regions, Habitats and biotopes, Species distribution, Energy Resources, Mineral Resources.**

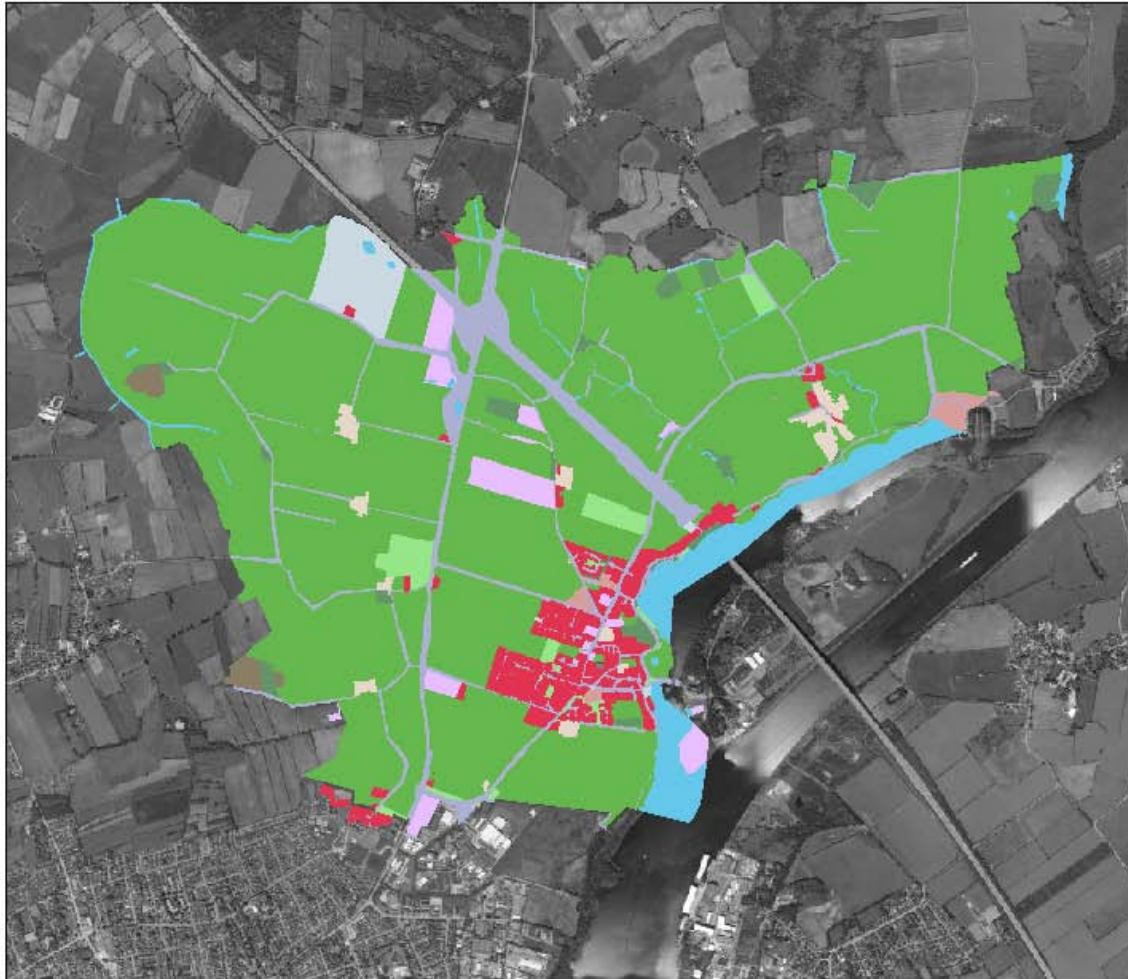
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# SPATIAL DATA INFRASTRUCTURES AND SUSTAINABLE LAND MANAGEMENT

# Overview of land use in a prospective planning area

Source: Own Image















Data source: cadastre  
Re-use of available data

to:

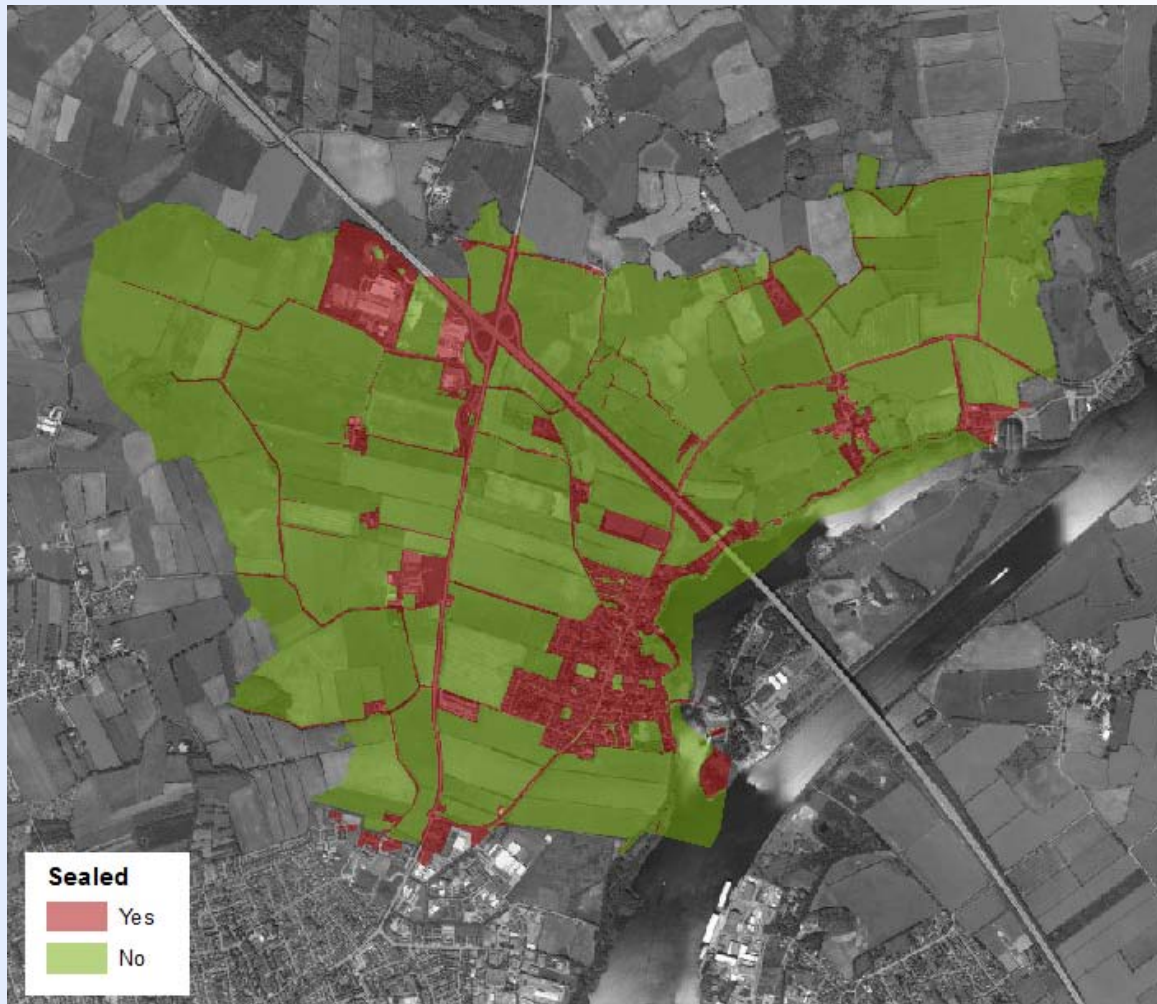
- Identify land use concurrencies
- support decision making

## Land Use

	Recreation (1,5%)
	Hydrography (4,2%)
	Farmland (75,8%)
	Industry (2,3%)
	Culture (<1%)
	Agriculture (1%)
	Marsh (<1%)
	Utility infrastructure and disposal (1,9%)
	Traffic (6,4%)
	Governance (<1%)
	Forrest (1,6%)
	Living (4,2%)

# Soil Sealing in the planning area

Source: Own Image



Data source: cadastre



# Useful Data for Land Management from INSPIRE

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- Annex I: Coordinate reference systems, Geographical grid systems, **Geographical names, Administrative units, Addresses, Cadastral parcels, Transport networks, Hydrography, Protected sites**
- Annex II: Elevation, **Land cover**, Orthoimagery, Geology
- Annex III: **Statistical units, Buildings, Soil, Land use, Human health and safety, Utility and governmental services, Environmental monitoring Facilities, Production and industrial facilities, Agricultural and aquaculture facilities, Population distribution and demography, Area management/ restriction/ regulation zones & reporting units, Natural risk zones**, Atmospheric conditions, Meteorological geographical features, Oceanographic geographical features, Sea regions, Bio-geographical regions, **Habitats and biotopes, Species distribution**, Energy Resources, Mineral Resources.



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# A GERMAN CASE STUDY



## Case Study, study area in Germany

Source: <http://geoportal.bkg.bund.de>



# Impressions

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Schleswig-Holstein



Rheinland-Pfalz

# Spatial Data Infrastructures

## SDI Hierarchy in Germany *Source: GDI-DE 2010, p9*

### SDI- Germany

#### SDI of the federal states

#### Local SDI

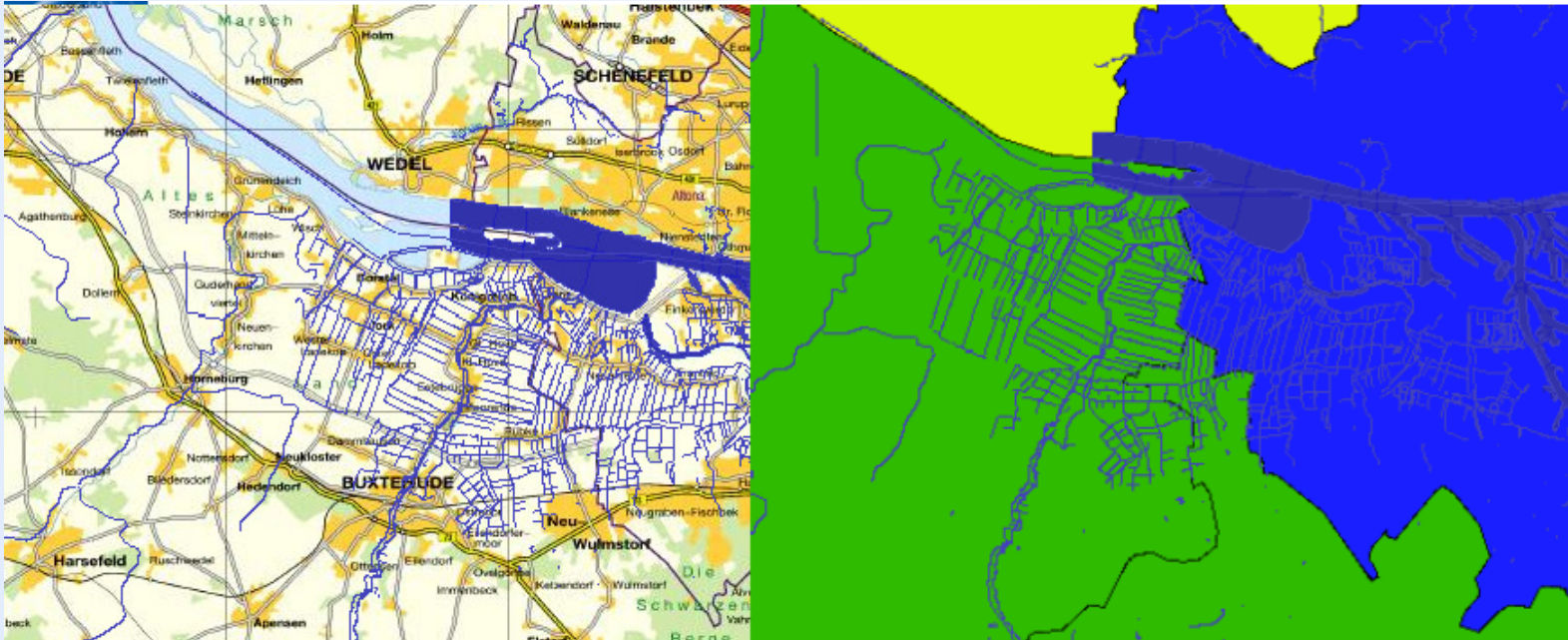
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# CHALLENGES IN SDI-DEVELOPMENT AT A SECOND GLANCE



# Problem: Data quality and access



- ☹ countrywide availability
- ☹ harmonized symbols
- ☹ reliable content
- ☹ homogeneous quality
- ☹ available metadata
- ☹ costs

# Problem: Sustainable data management and integration in e-government



# Problem: Lack of Spatial Media Literacy

- Geographical Literacy  
= Orientation in spatial media
- Geographical Media Literacy  
= Retrieving information from spatial media
- Geographical Information Literacy  
= Search and find geographical information
- Geographical Communication Literacy  
= Present and communicate geographical information



Spatial Media Literacy



# Problem: Unknown or ignorated laws and directives

## Bis 2010

1. Koordinatenreferenzsysteme
2. Geografische Gittersysteme
3. Geografische Bezeichnungen
4. Verwaltungseinheiten
5. Adressen
6. Flurstücke/Grundstücke
7. Verkehrsnetze
8. Gewässernetz
9. Höhe
10. Bodenbedeckung
11. Orthofotografie
12. Geologie



## Bis 2013

1. Statistische Einheiten
2. Gebäude
3. Boden
4. Bodennutzung
5. Gesundheit und Sicherheit
6. Versorgungswirtschaft und staatliche Dienste
7. Umweltüberwachung
8. Industrieanlagen
9. Wirtschaftliche Anlagen und Aquakulturanlagen
10. Migration der Bevölkerung – Demographie
11. Umweltschutzgebiete/ Schutzgebiete/ geregelte Gebiete
12. Berichterstattungseinheiten
13. Katastrophengebiet mit naturbedingten Risiken
14. Klimatische Bedingungen
15. Biologisch-geografische Kennwerte
16. Ozeanografisch-geografische Kennwerte
17. Meeresregionen
18. Biogeografische Regionen
19. Lebensräume und Biotope
20. Verteilung der Arten
21. Energiequellen
22. Mineralische Bodenschätze

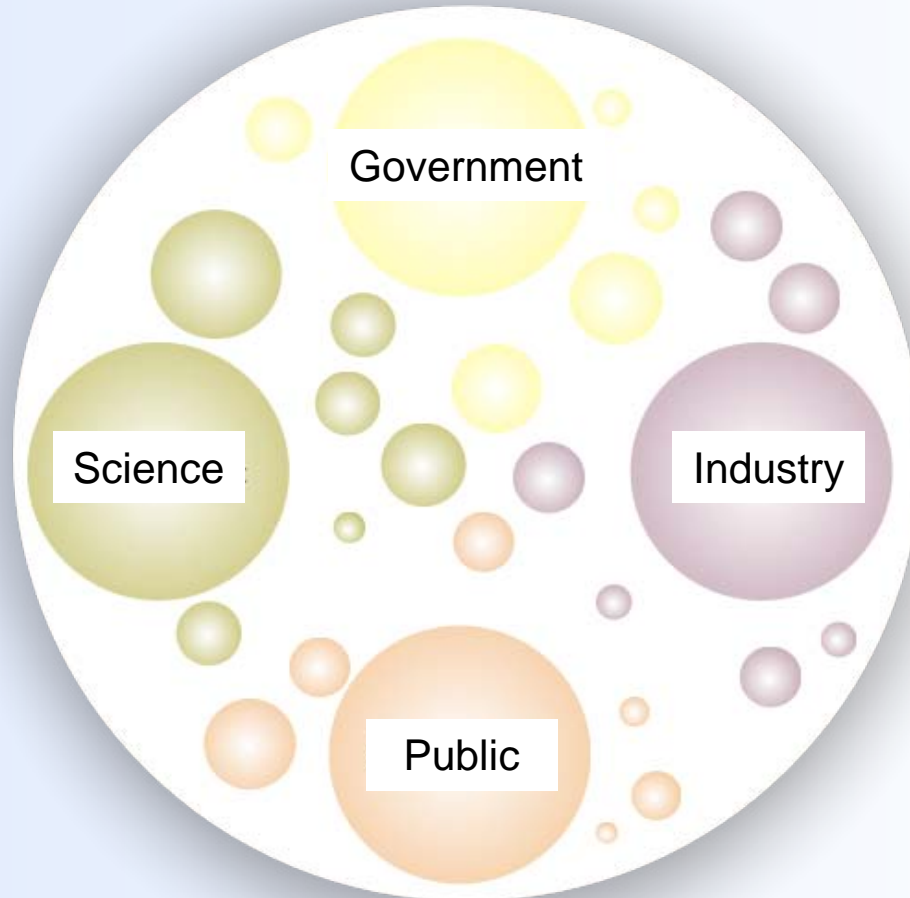
# Problem: Unknown responsibilities between departments



# Problem: Lack of communication



# Problem: Not enough Network



# Problem: Missing Vision



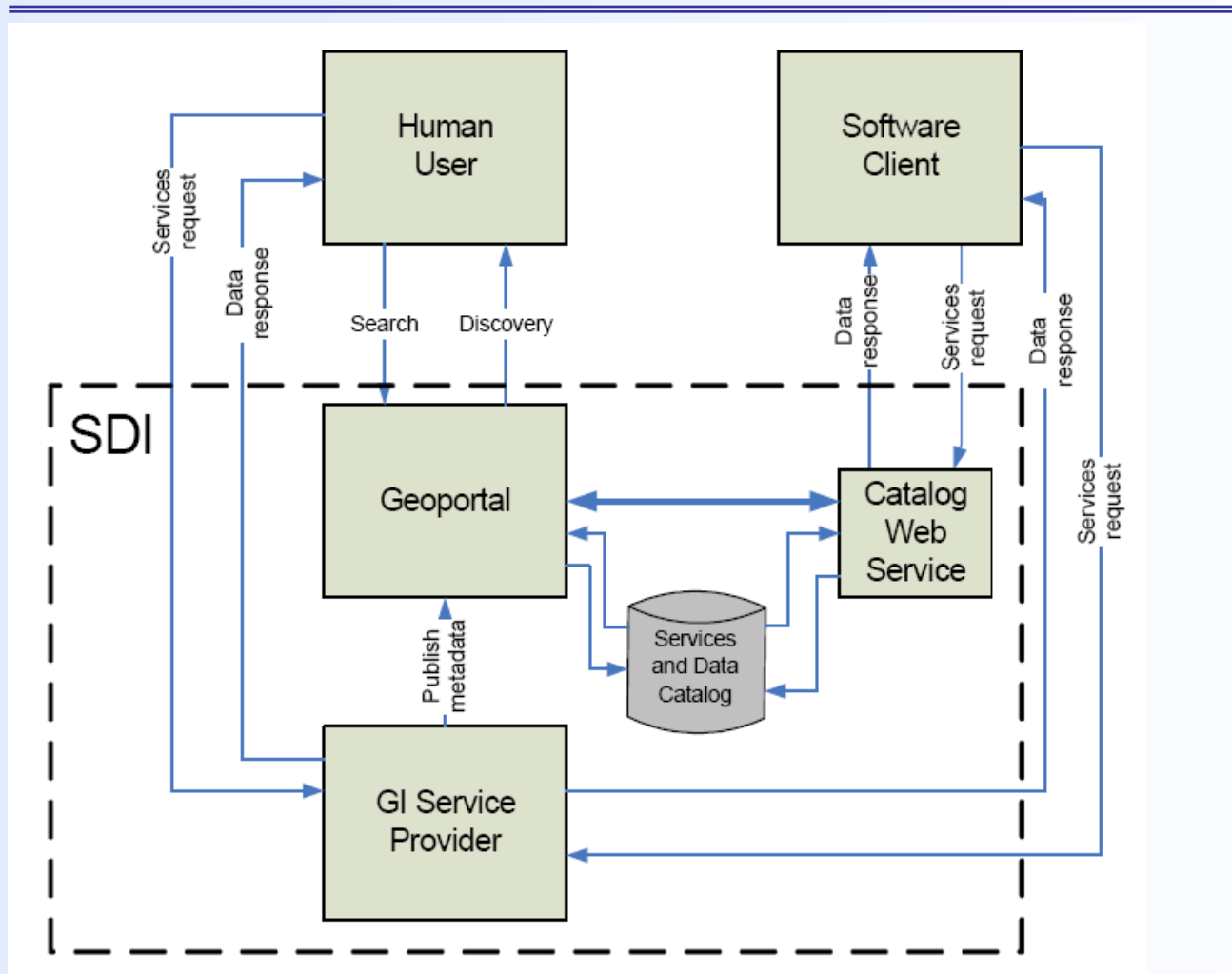
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# SDI RP

# Technical implementation - Geoportals and SDI

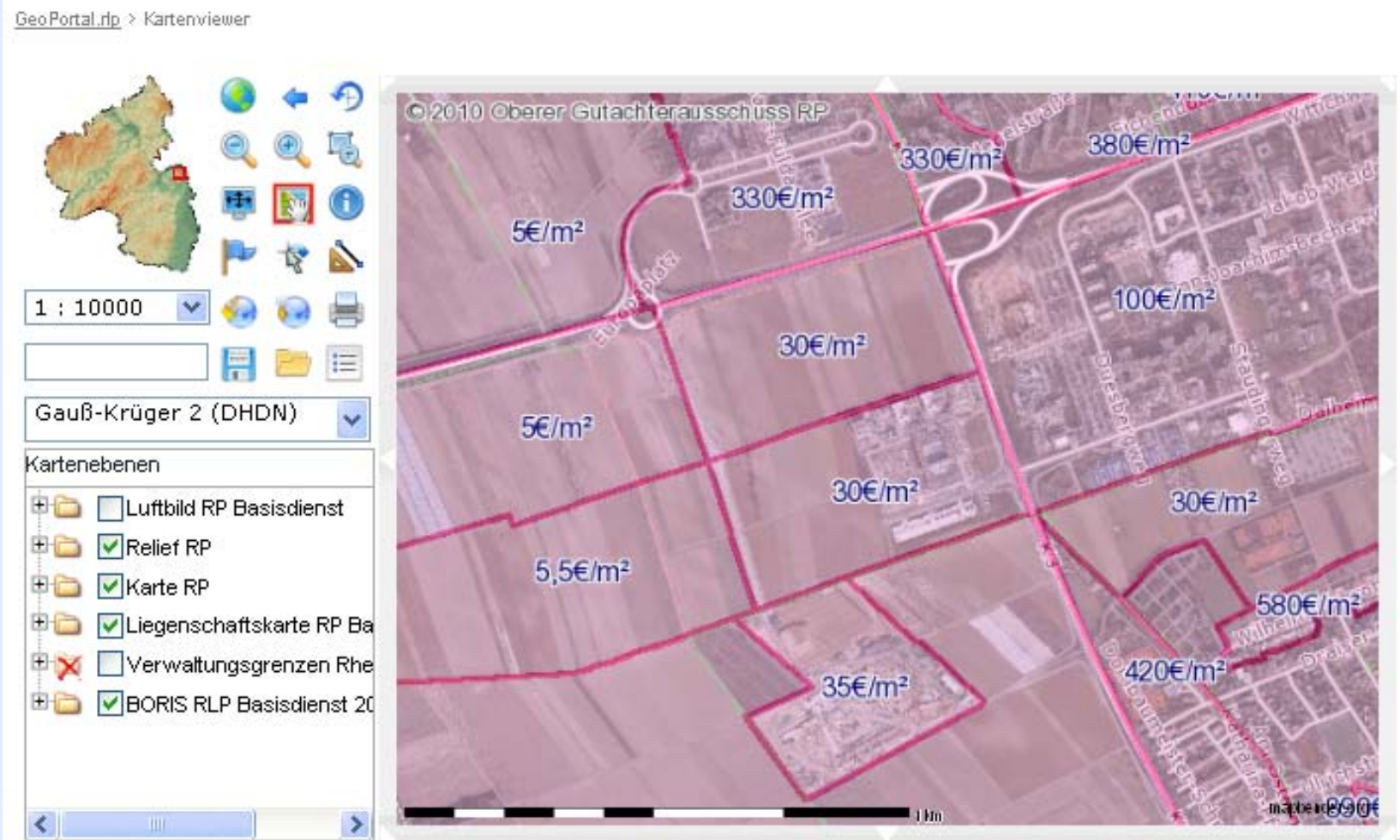
Source: Geoinfo, 2005





# Technical implementation - Public access to land values within GDI-RP federal state SDI

Source: <http://www.geoportal.rlp.de/>



# Functional implementation

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- Establishment of workingsgroups at different governmental levels
- Development of literacy concepts for vertical and horizontal inter- and transdisciplinary cooperation
- Development of implementation concepts at county level
- Implementation Support

# Example: SDI assessment at Rheinland-Pfalz county level

## List of SDI assessment indicators

*Source: SDI assessment at the county level, State of Rheinland-Pfalz*

1. Degree of availability of digital geospatial basic data
2. Availability of qualified personnel (employee with a high level GIS qualification)
3. Degree of availability of digital geospatial thematic data and of metadata
4. Information retrieval of digital geospatial basic data as a part of daily routine of service personnel
5. Information retrieval of digital geospatial thematic data as a part of daily routine of service personnel
6. Powerful computer hardware available
7. Powerful computer network available
8. Broad use of Desktop GIS in different departments interacting with each other
9. Broad use of external web services in different departments
10. Provision of web services for external users
11. Availability of a WebGIS intranet
12. Availability of WebGIS internet access for general public use
13. Availability of WebGIS internet access for professional use

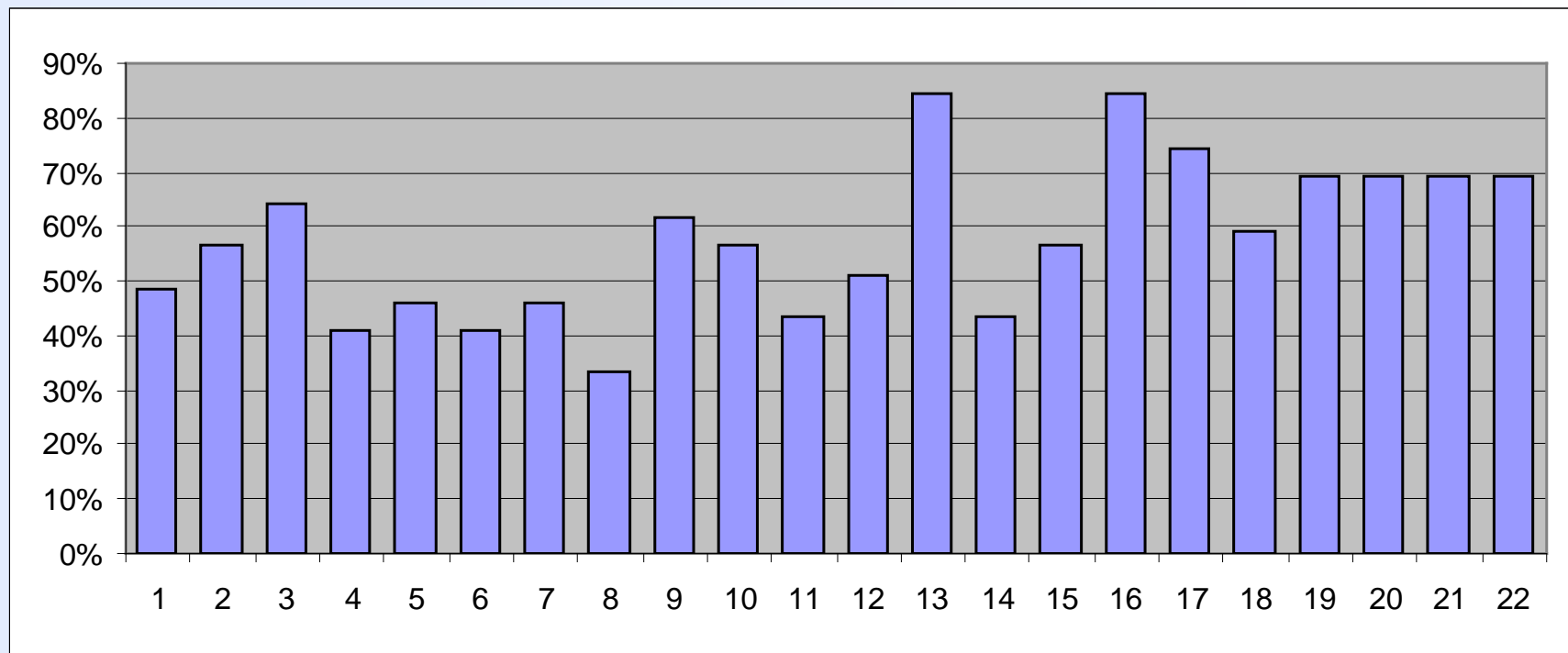
0 not available  
1 implementation scheduled  
2 partly implemented  
3 fully implemented

# Result: Local SDI implementation at county level

State of Rheinland-Pfalz 2009/2010

Source: *SDI assessment at the county level, State of Rheinland-Pfalz*

## Implementation status



County No.

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# SDI SH

# Technical Implementation: Publish-Find-Bind in Schleswig-Holstein



Metadata information system „SH-MIS“

„Publish“

„Find“

e.g. WMS- oder WFS-Dienst

e.g. [www.sh-mis.schleswig-holstein.de](http://www.sh-mis.schleswig-holstein.de)



„Geoserver“

„Bind“



„Digital Atlas North“

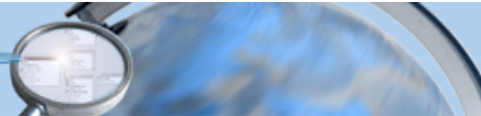


# Metadata information System SH-MIS

Source: [www.sh-mis.schleswig-holstein.de](http://www.sh-mis.schleswig-holstein.de)

Das schleswig-holsteinische Metainformationssystem





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**Suche**

- ▶ Einfache Suche
- ▶ Erweiterte Suche
- ▶ Kategorien
- ▶ GEMET Browser
- ▶ Einstellungen

**Maps**

**Ergebnisliste** Ergebnisse: 3

← 1 →

[← Zurück zur Suche](#)

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**Dienst**

[WebAtlasDE Schleswig-Holstein \(WMS-Darstellungsdienst\) - GK4](#) DA Nord

Dieser WMS beinhaltet fünf Maßstabsstufen, sowie unterschiedliche Ebenendarstellung im Themenbereich Verkehr, um Überführungen und Tunnelbauwerke besser visualisieren zu können, nach dem Vorbild der WebAtlasDE-Darstellung für Schleswig-Holstein. Die ...

WMS (1.1.1)

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**Dienst**

[WebAtlasDE Schleswig-Holstein \(WMS - Darstellungsdienst\)](#) DA Nord

Der Maßstabsbereich dieses WMS umfasst 1:1 bis 1:12Mio und basiert auf das Basis DLM. Der Dienst beinhaltet fünf Maßstabsstufen, sowie unterschiedliche Ebenendarstellung im Themenbereich Verkehr, um Überführungen und Tunnelbauwerke besser visualisieren zu ...

WMS (1.1.1)



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**Dienst**

[WebAtlasDE Schleswig-Holstein \(WMS - Kreise-SH\)](#)

Dieser WMS steht ausschliesslich für die Kreise in Schleswig-Holstein, im Rahmen des Geodateninfrastrukturgesetzes SH (GDIG-SH) bereitgestellt. Er enthält fünf Maßstabsstufen, sowie

Hilfe | [Kontakt/Impressum](#) | [Neustart](#) | [GeoNEWS](#)

**Geografische Namen**

Geben Sie einen Begriff ein

[Optionen >>](#)



**i 3 mainz**  
Institute for Spatial Information and Surveying Technology



**FIG COMMISSION 3**  
Spatial Information Management

International Federation of Surveyors  
Fédération Internationale des Géomètres  
Internationale Vereinigung der Vermessungsingenieure



# Digital Atlas North

Source: [www.digitaleratlasnord.de](http://www.digitaleratlasnord.de)

## DigitalerAtlasNord

Neustart | AGB | Hilfe

Navigation Messen Zeichnen Extras

Karteninhalt Legende



Werkzeug: Vergrößern ?

- Hintergrundkarte ?
- Internetkarte
- Topographische Karten
- Luftbildkarte (ab 1:35000)

Karte aktualisieren

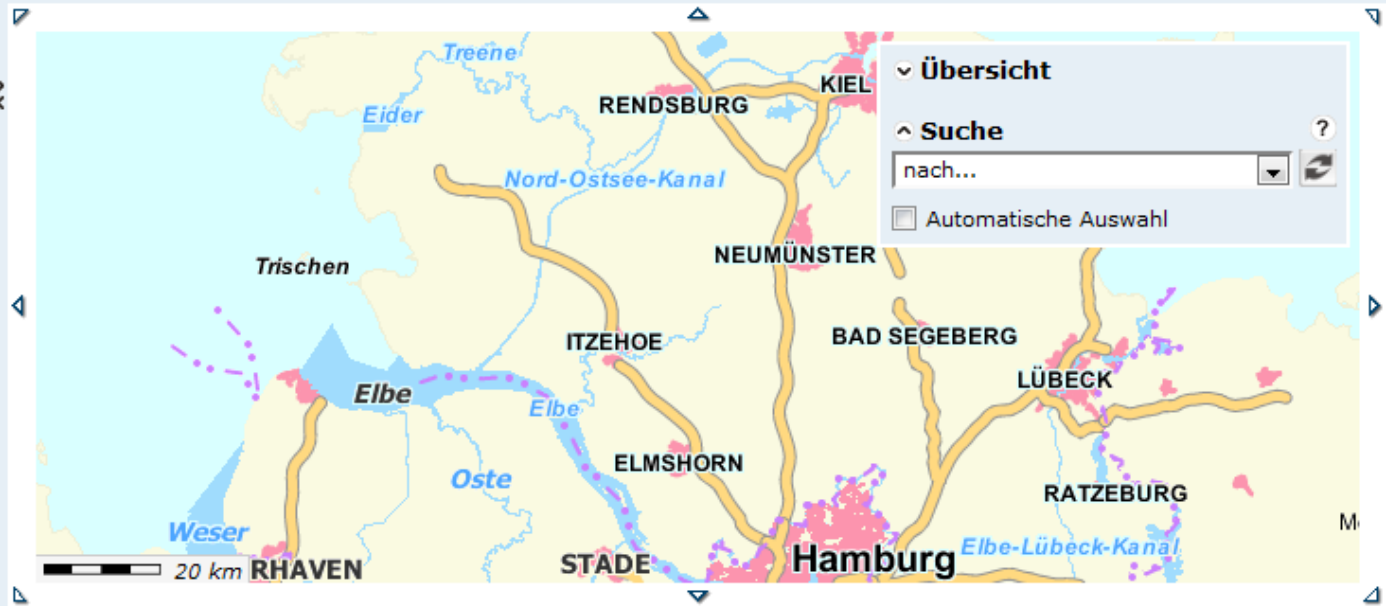
Themengebiete: ?

Planung

Planung

- Schleswig-Holstein
- Raumordnungsplanung
- Flächeninformationen -
- Kreis Dithmarschen

Automatisches Aktualisieren



Übersicht

Suche ?

nach... ?

Automatische Auswahl

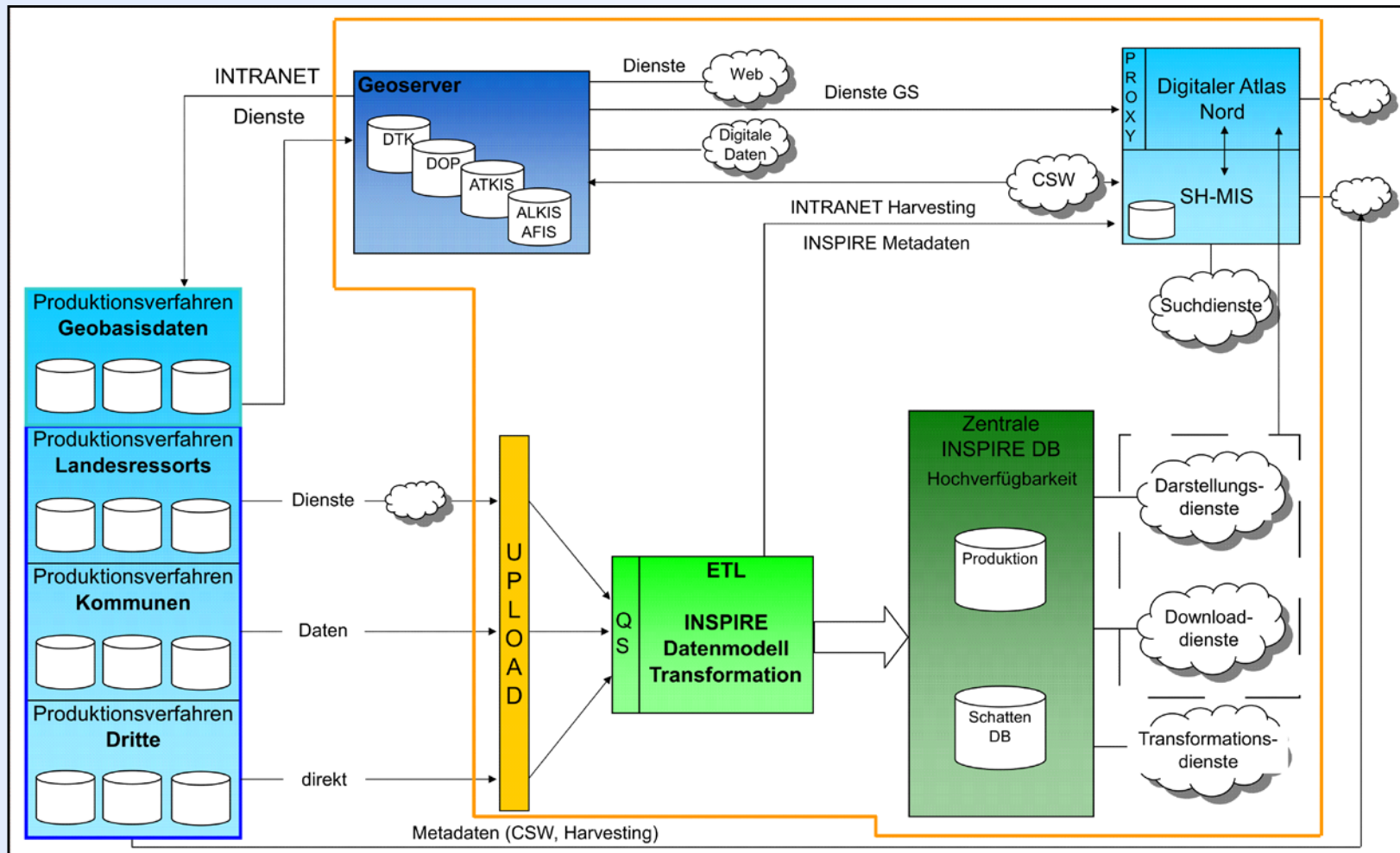
© Amtliche Geobasisdaten

1:1.221.621

Gauß-Krüger, 3. Streifen

3657676.06 - 5943222.45  
Breite 225 km - Höhe 94 km

# Technical implementation - Dataflow



# Functional implementation

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- Establishing the network of sdi-stakeholders from government, science, industrie and public by building up the „Centre of Geoinformation“ at the University of Kiel funded by the „European Fond of Regional Development“
- Knowledge- and technologytransfer in e.g. best practice projects, surveys, research, innovation development, consulting and further education

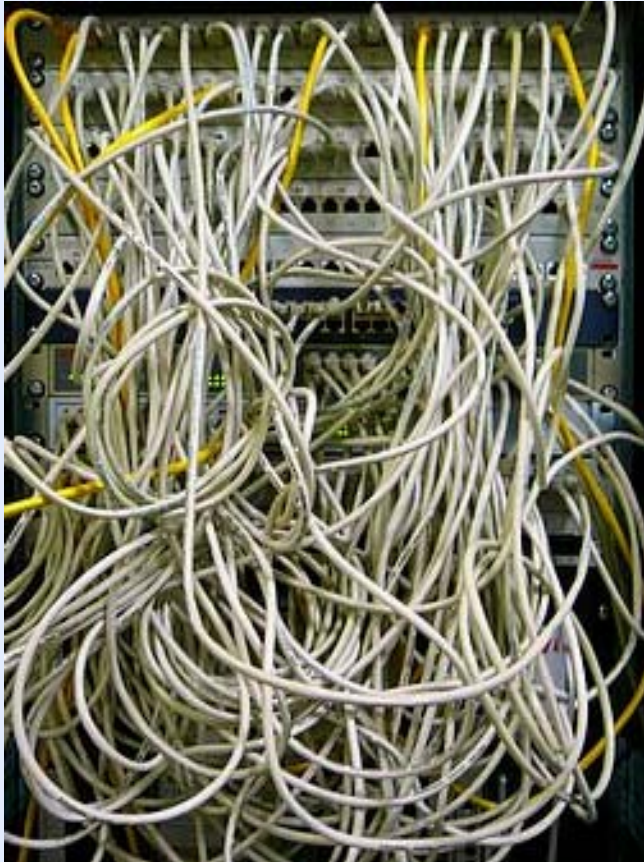
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# CONCLUSIONS

# Hardcore facts

✓ Evaluate and organize technical infrastructure at all levels





# „Soft“ skills



- ✓ Do (further) education in Spatial Media Literacy
- ✓ Clear up communication structures
- ✓ Build up networks of people
- ✓ Discuss and create a vision
- ✓ Communicate





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Thank you for listening

