Geospatial Information Management, a Feasible Tool for Small Island Developing States?

Hartmut Müller

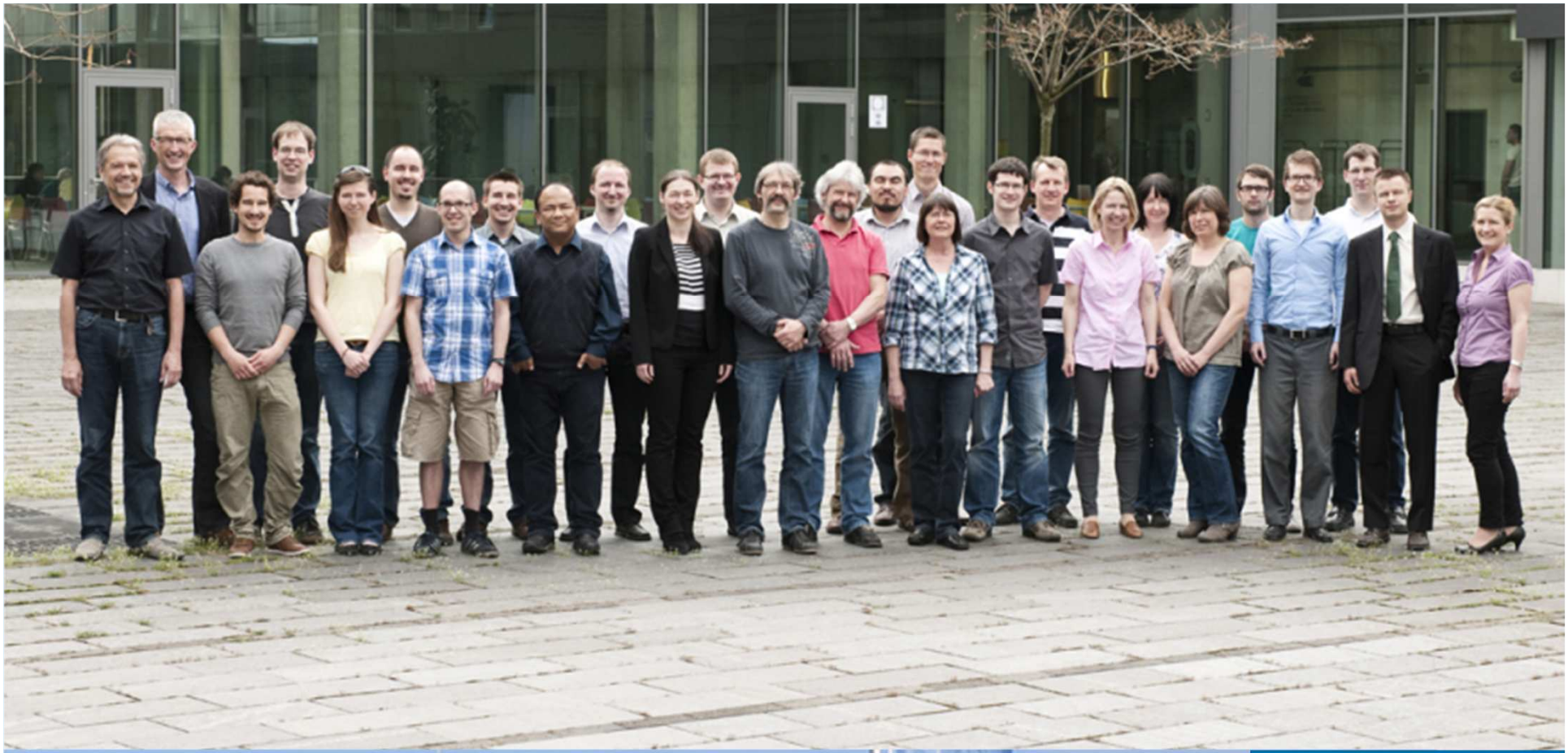
FIG Pacific Small Island Developing States Symposium,
Policies and Practices for Responsible Governance
18-20 September 2013, Suva, Fiji

Technical Session 1A: FIG Commission 3 Technical Session: The Importance of Geospatial Information, 19 September 2013, 11.30-13.00

Distance is 16342 kilometers or 10155 miles or 8824 nautical miles

The distance is the theoretical **air distance** (great circle distance). Flying between the two locations' airports can be a different distance, depending on airport location and actual route chosen.

Map - Shortest path between Frankfurt and Suva



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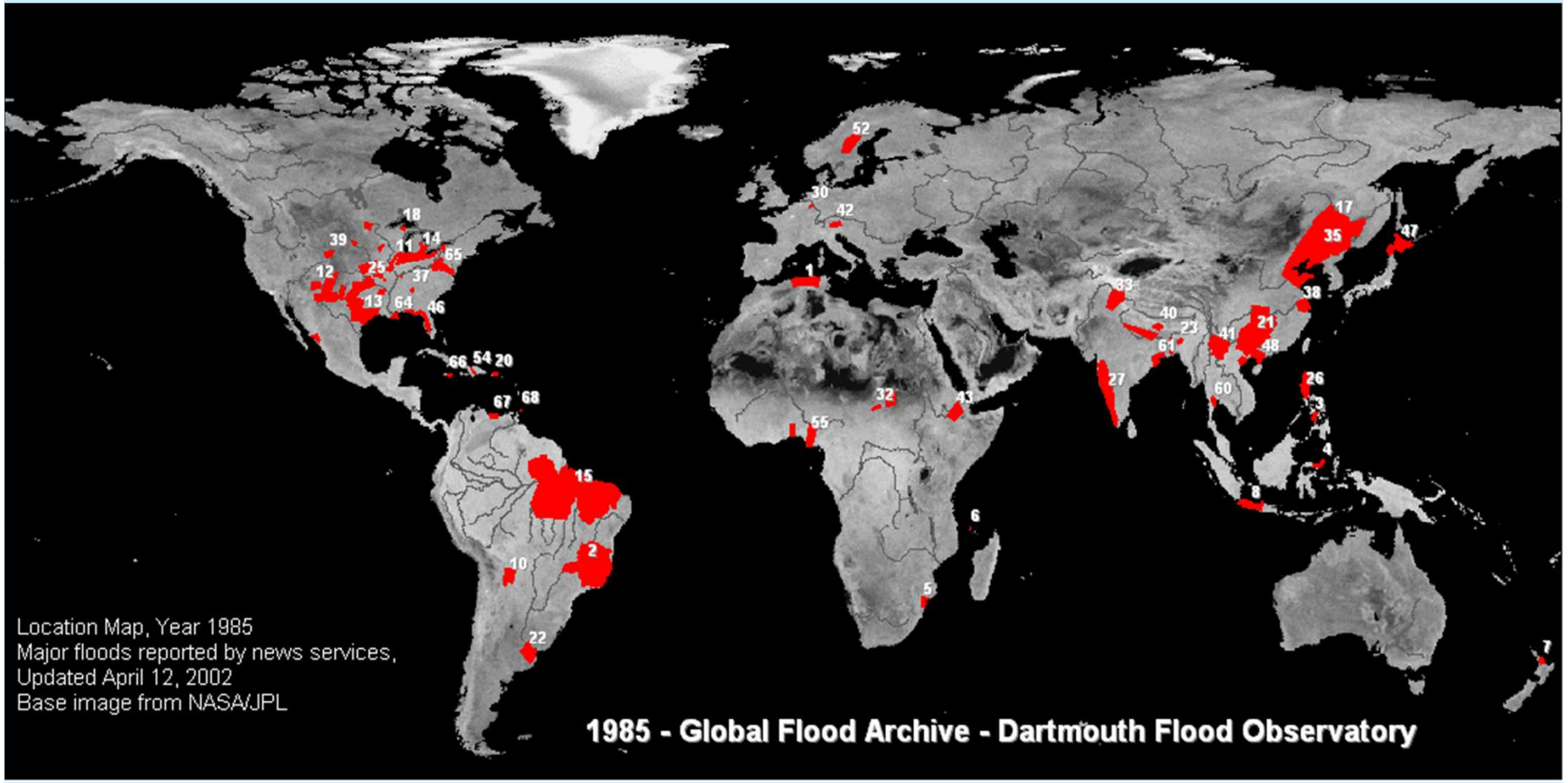
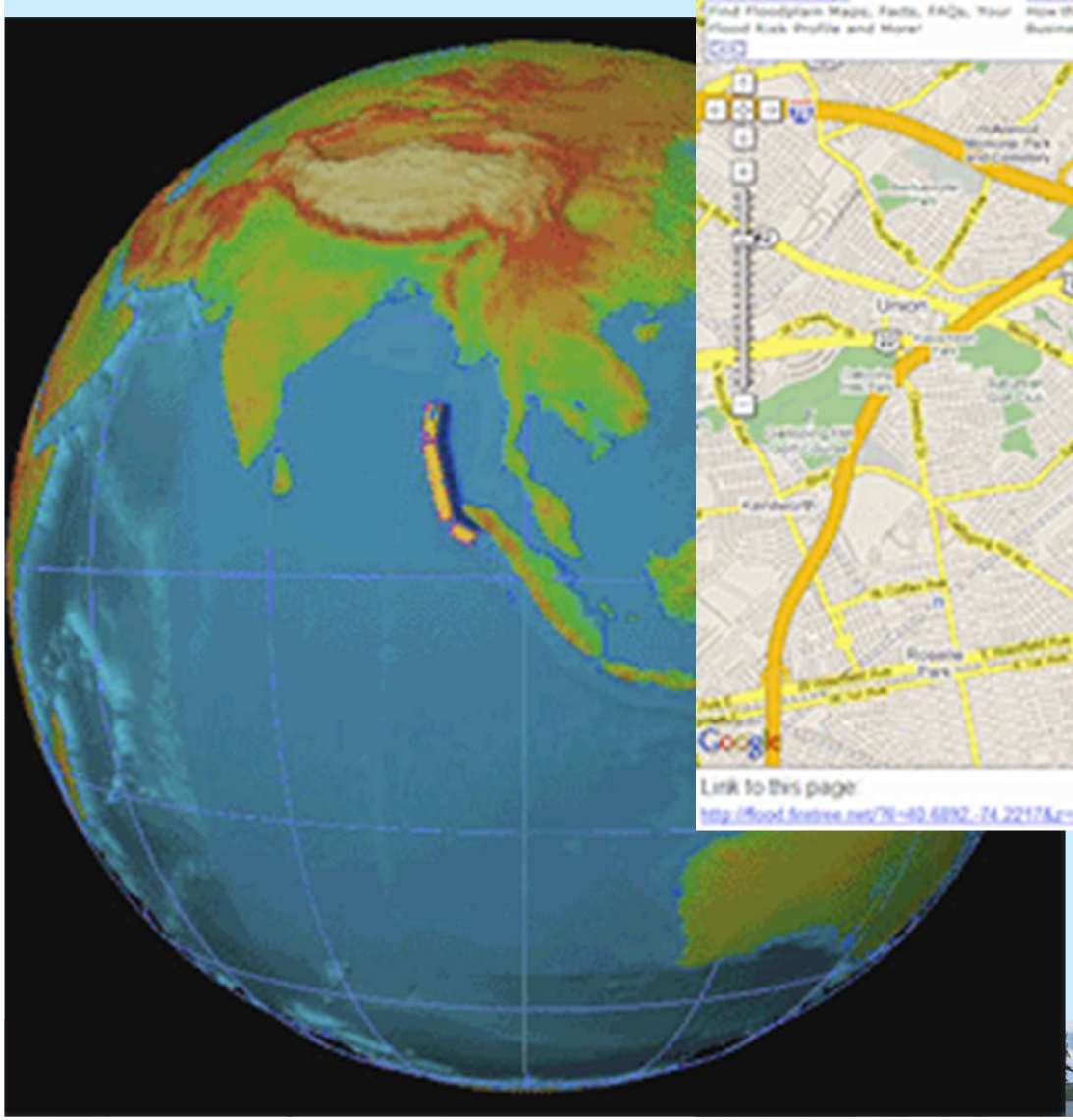
The Need for Geospatial Information Management

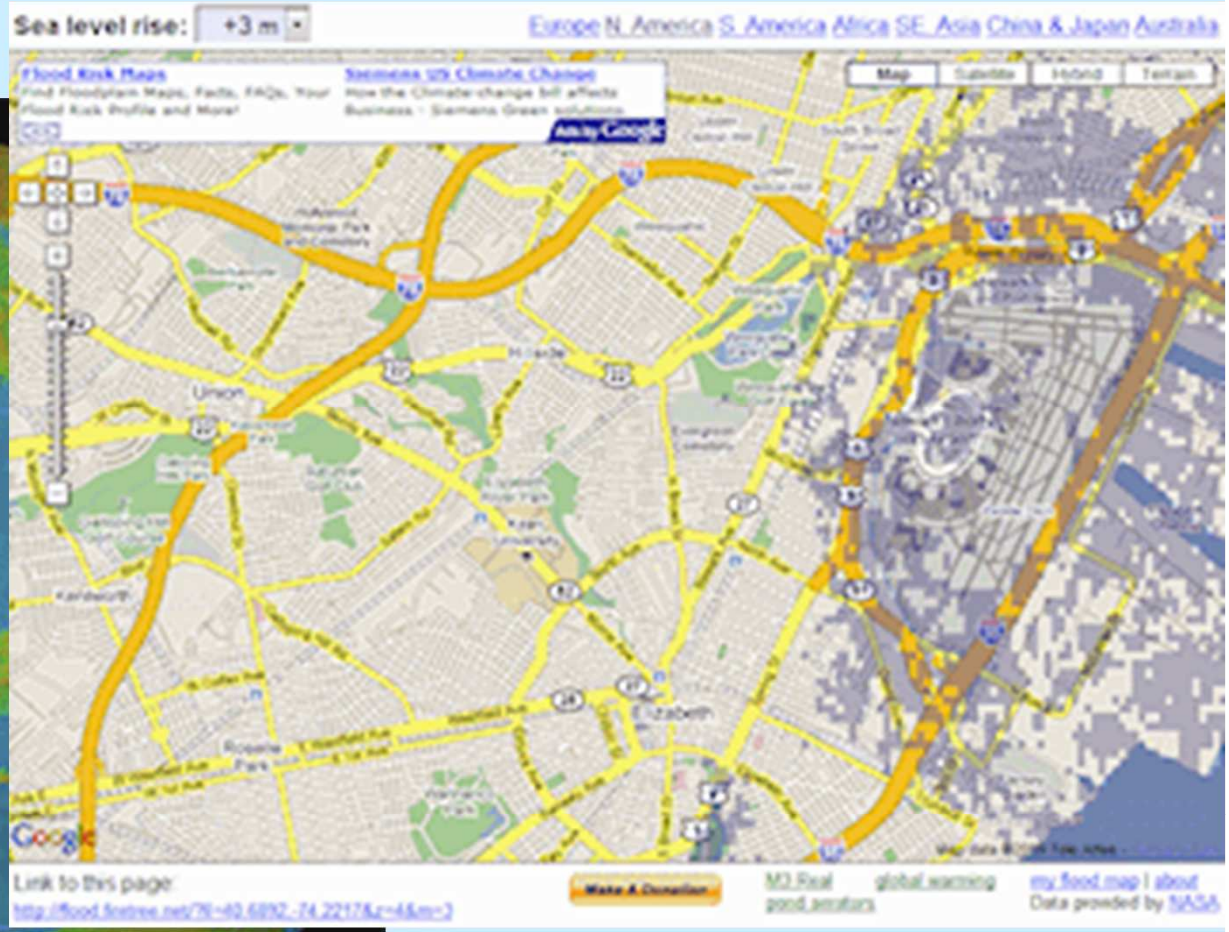
– an Example –

Huge floodings in the world between 1985 and 2010



Tsunami 2004





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Let's have a closer look

SDI-Africa: An Implementation Guide

Heavy rain → Flooding?

Which risk of flooding do we face?

Which people possibly must be evacuated?

Which roads likely will remain accessible?

Where are the river courses?

Which are the heights near the rivers?

Where do people live?

Where are the roads?

Box 3: The need for SDI

There has been significant rain falling for some days, and there is no indication of the rain abating in the near future. Flooding is a distinct possibility to be faced. It would be good to know what the risk of flooding is, and where people are living who should be evacuated, and what routes could be used to reach these people and transport them away from the area of danger. This implies the need for several kinds of information: where the river courses are, the elevation of the area near the rivers, where people live, and where there are roads. Does this data exist, and if so, would the data "owners" be prepared to provide this information to develop a disaster mitigation plan? Unless there is a central point to which one can go to find out what information is available, merely finding this out will take quite some effort and time. Next, assuming that somehow it is discovered that there are relevant datasets available, one needs to obtain the information from disparate sources, then integrate and process the information. In the course of this, one might discover that position of the road network depicted and the river courses clearly do not "fit" the real picture. More investigation, taking more time again, is called for, to discover how the co-ordinate systems used to reference these data differ, so that they can be aligned….

Let's have a closer look

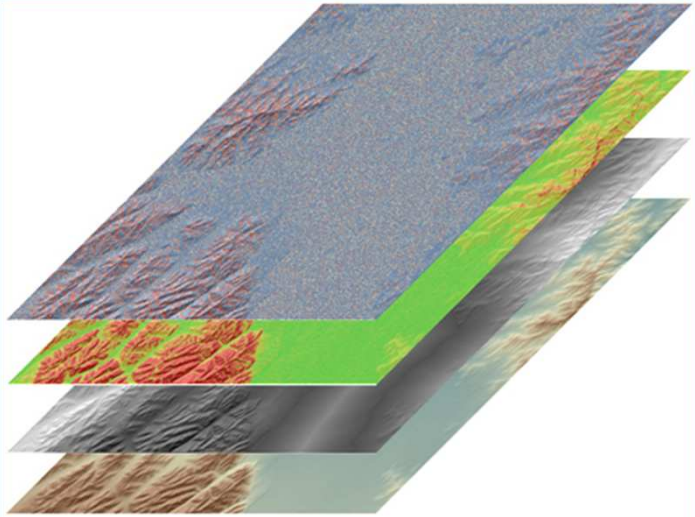
SDI-Africa: An Implementation Guide

Where are the river courses?

Which are the heights near the rivers?

Where do people live?

Where are the roads?



Box 3: The need for SDI

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Let's have a closer look

SDI-Africa: An Implementation Guide

Process steps to be skipped in an operating Geospatial Data Infrastructure

Process the data in GIS

Obtain needed information

→ Make decisions

May be very time consuming!

Box 3: The need for SDI

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2

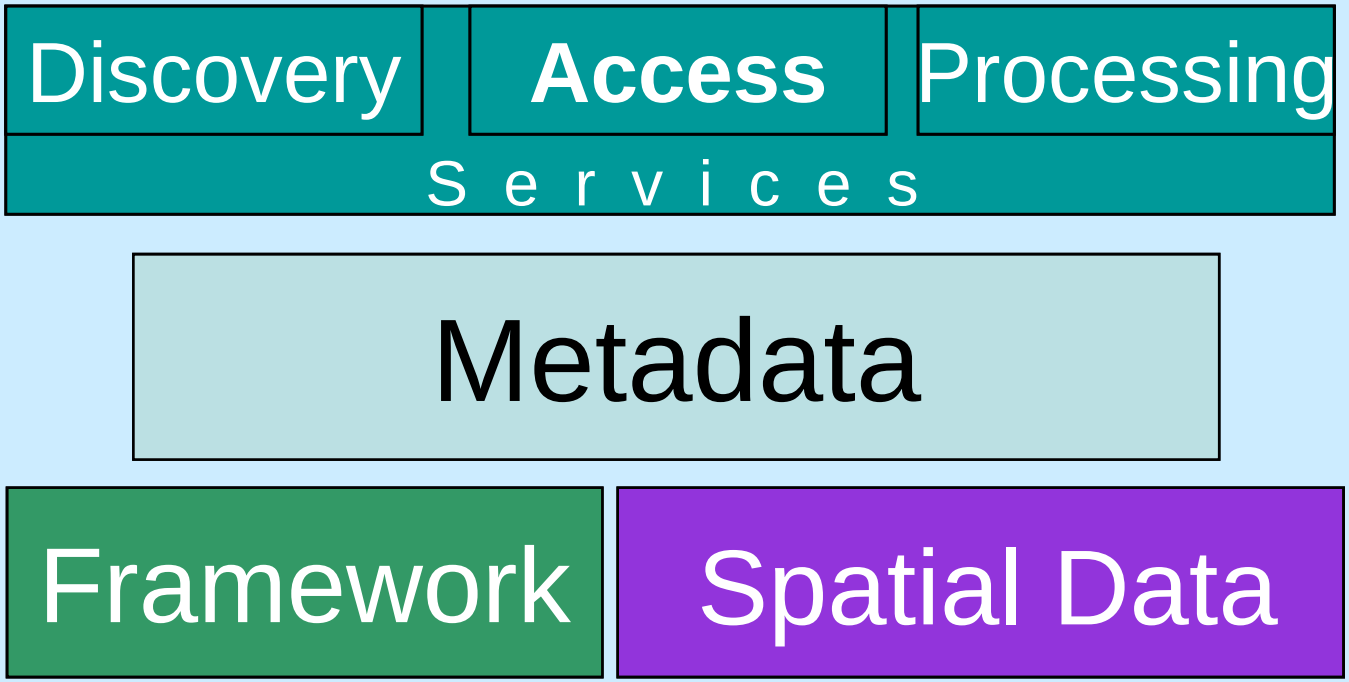
What is needed?

Geospatial Information Management builds on a Spatial Data Infrastructure

'The Spatial Data Infrastructure" (SDI) provides a basis for spatial data discovery, evaluation, and application for users and providers within all levels of government, the commercial sector, the non-profit sector, academia and by citizens in general.'

Source: ***The SDI Cookbook - Global Spatial Data Infrastructure Association***

Components of an SDI



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What is available?

Standards

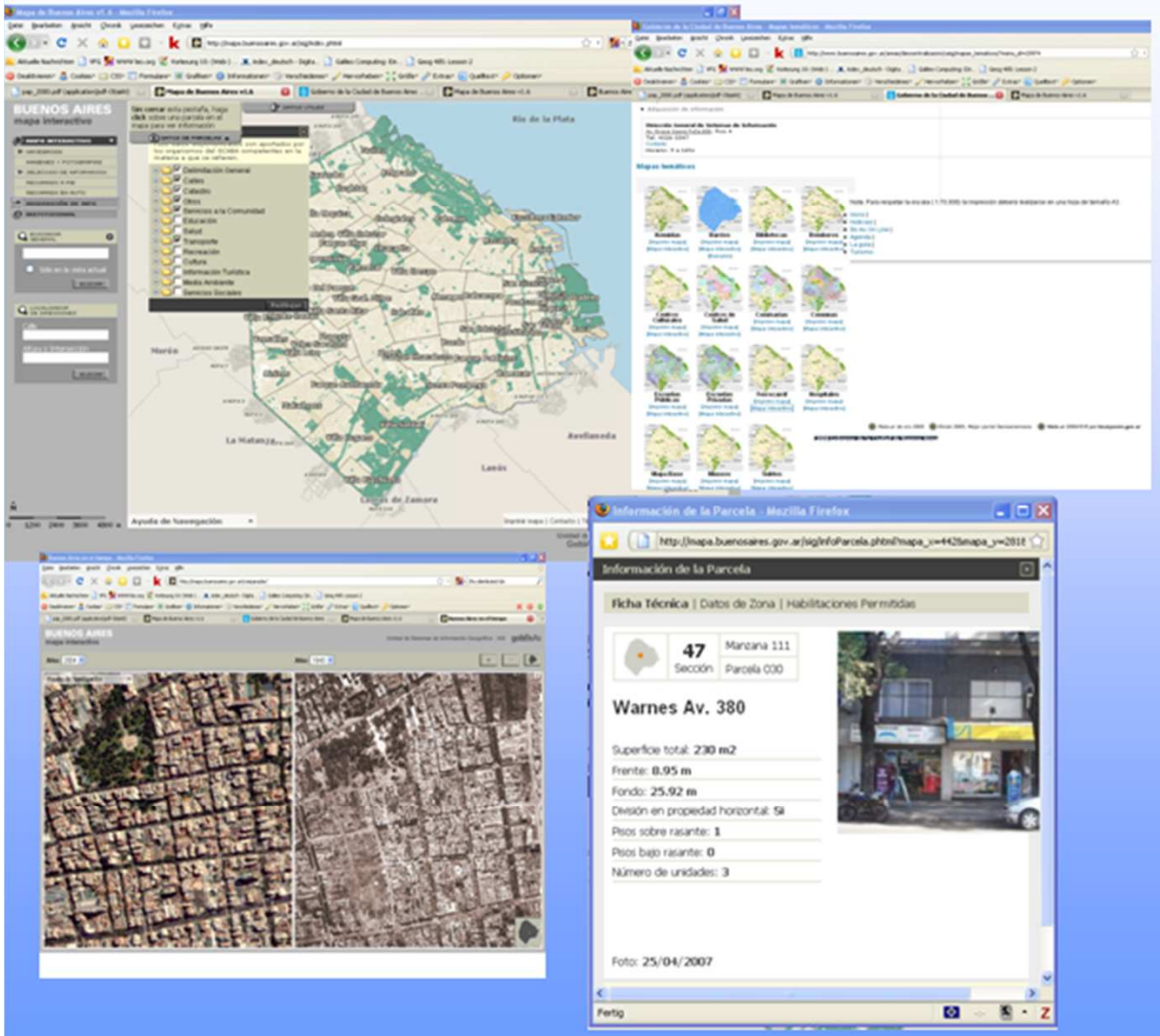
Wordwide SDI Development

Regional and National Initiatives

in

Europe, Australasia, the Americas, Africa, Middle East, …

Example: SDI application in Buenos Aires

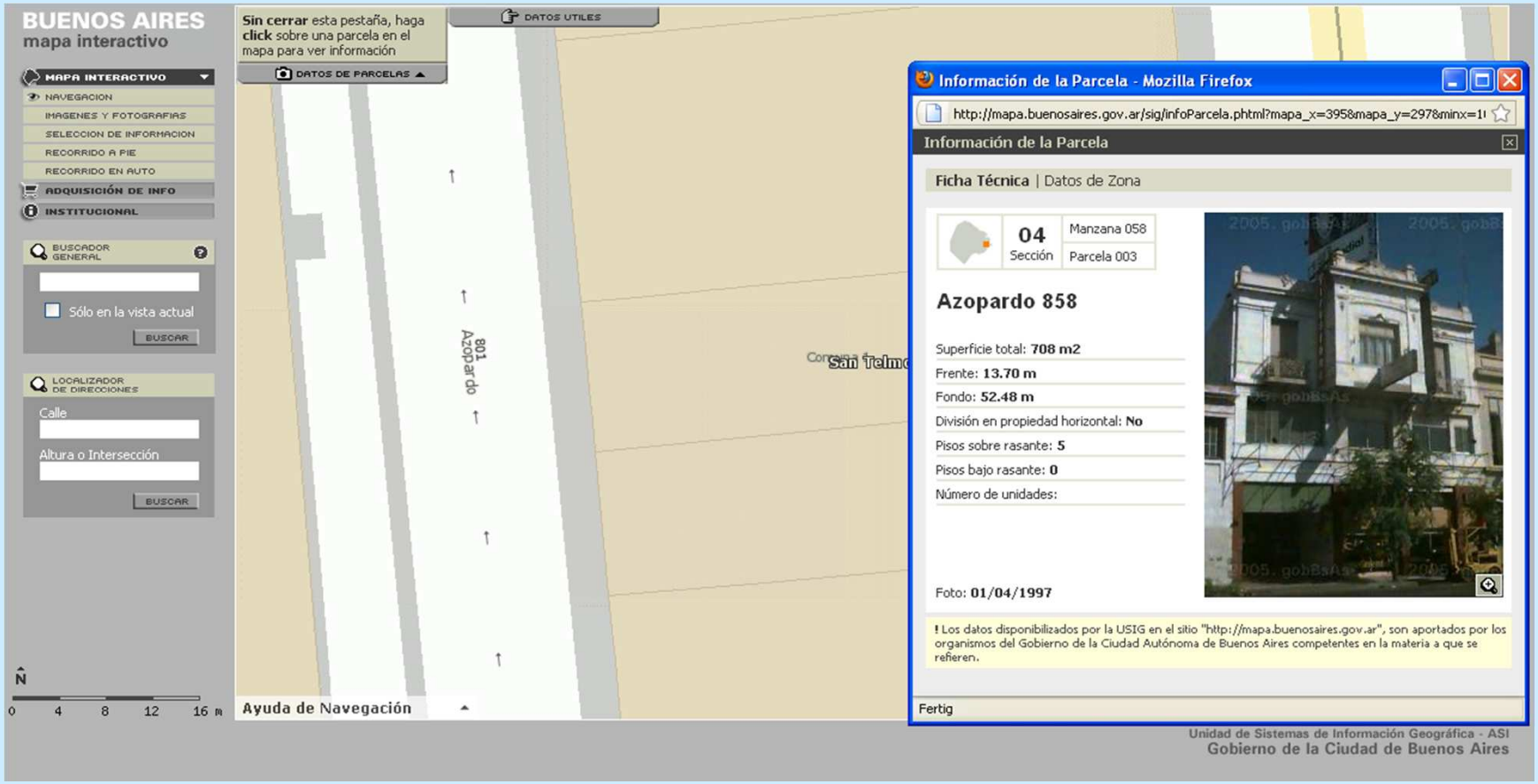


Mapa Buenos Aires

- Open Source WebGIS development, which covers a range of applications like health, education, tourism, sports, culture, social services etc.
- Access to information down to parcel units
- Access on thematic maps in digital and analogue format
- Access on historical maps (a viewer enables comparison of historical orthofotos with current orthofotos

http://mapa.buenosaires.gov.ar/sig/index.phtml

Public access to parcel information of the City of Buenos Aires

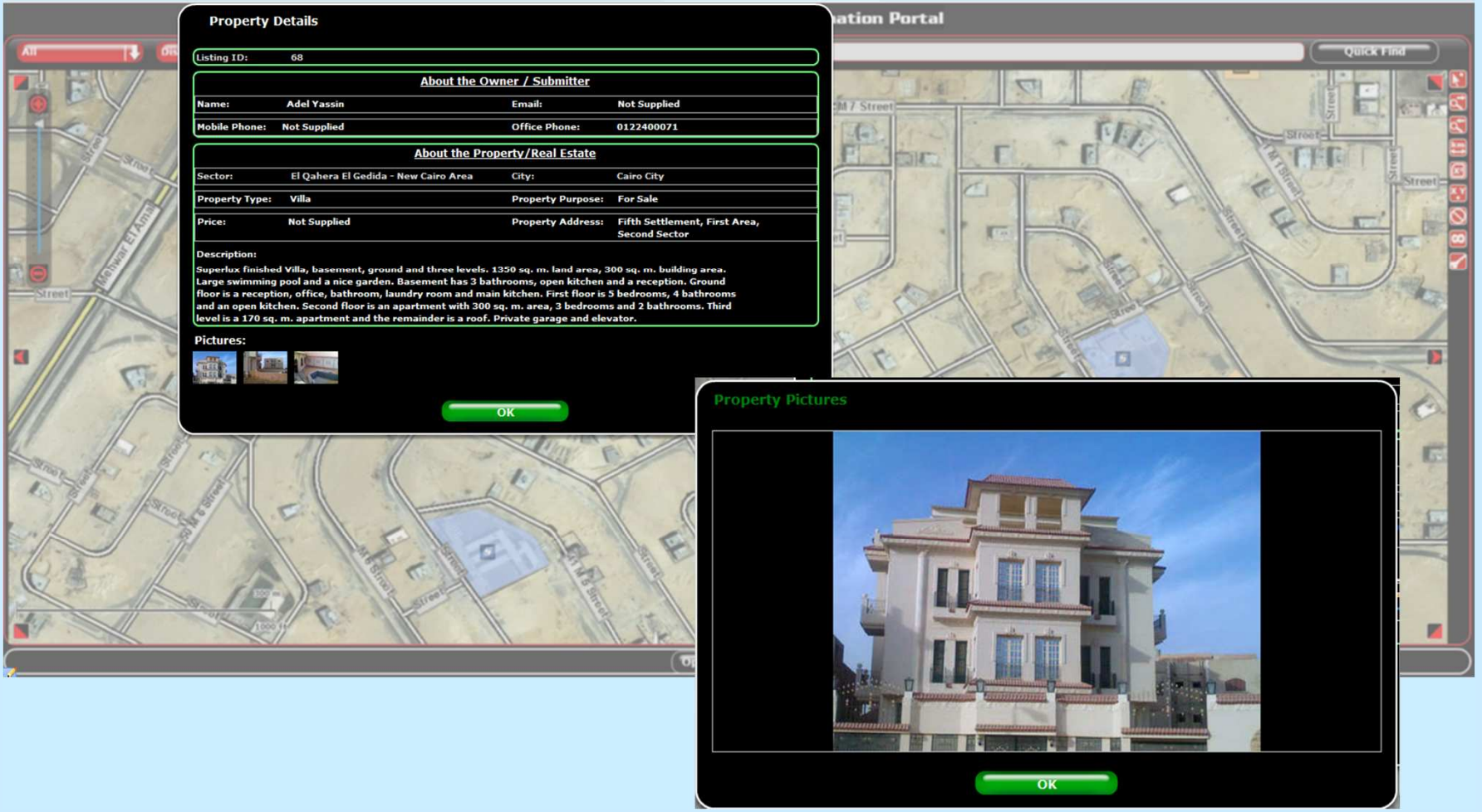


Digital Egypt (2009)

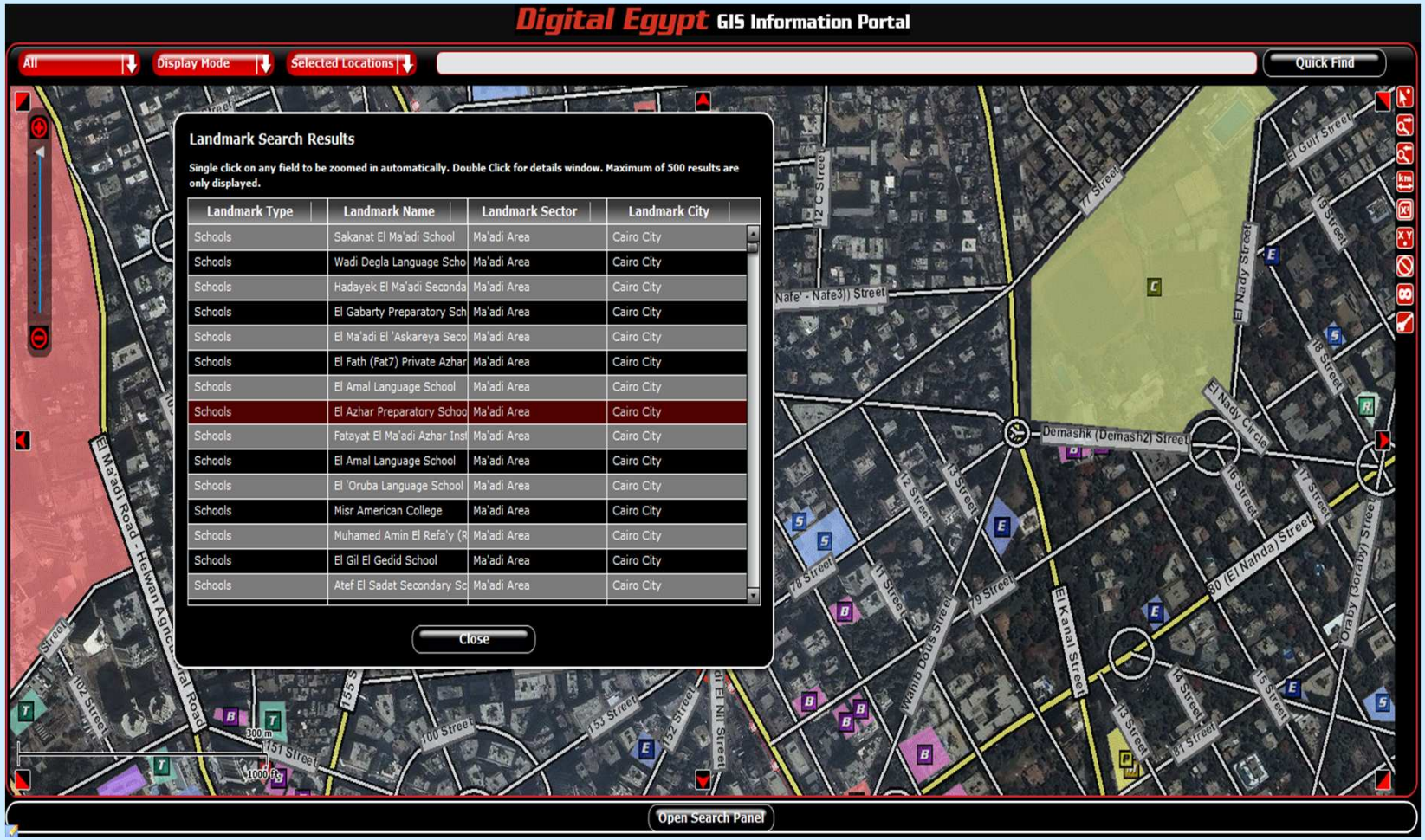
- WebGIS- Application launched in April 2009
- Development of a private Egyptian company
- Covers Governorate of Cairo, cities of Sharm El Sheilh, Hurghada, the Northern Coast and 122 cities as point objects

- Search for real estate and properties
- Find businesses
- Locate streets and landmarks
- Measure distances and areas
- Obtain point coordinates

Digital Egypt (2009) Search for properties

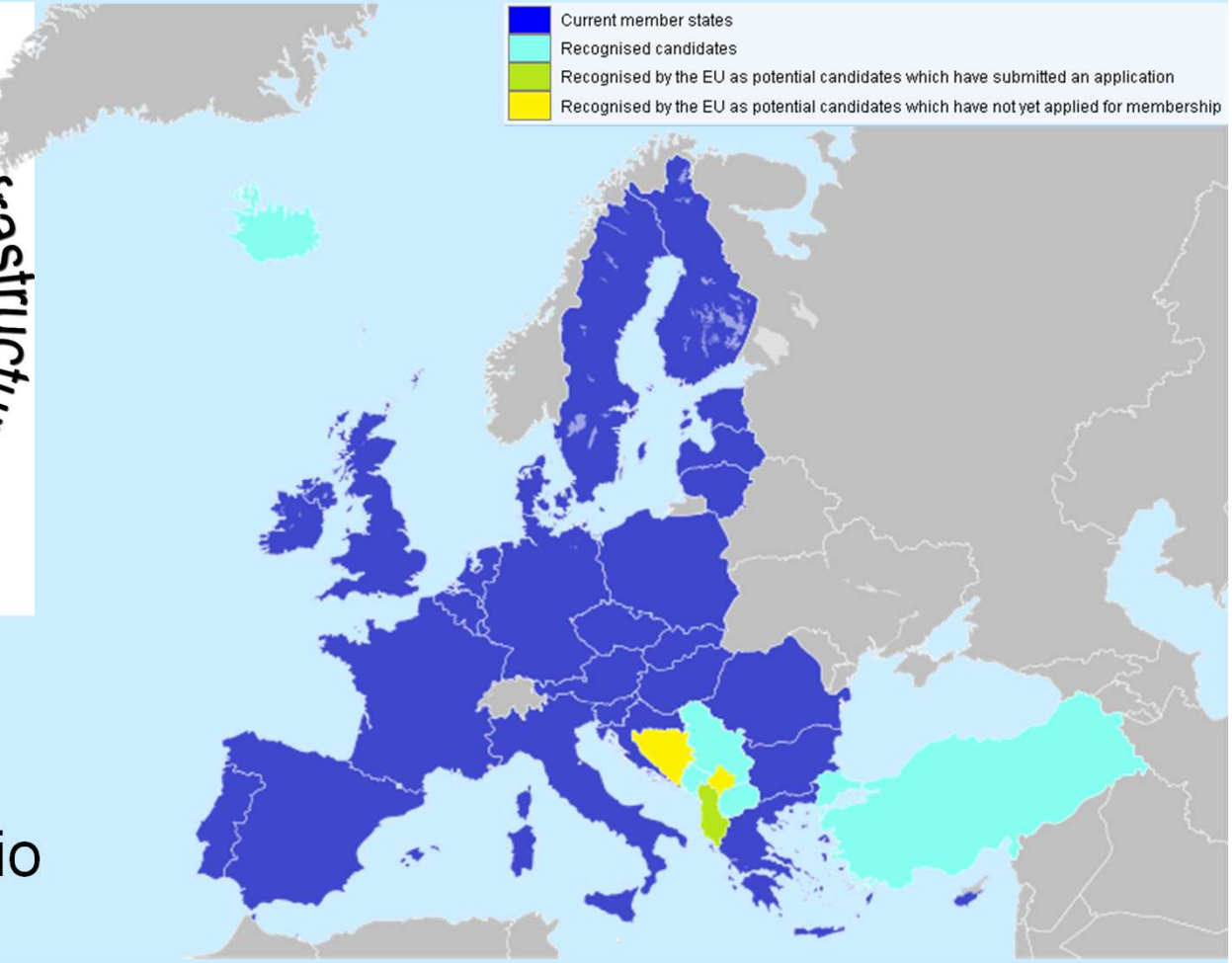


Digital Egypt (2009) Search for landmarks



The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)



Area 4,4 Mio km²

Population > 500 Mio

The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)

Purpose of INSPIRE

- **to support environmental policy**
- **to overcome major barriers**

affecting the availability and accessibility of relevant data

Barriers include

- Inconsistencies in spatial data collection (spatial data often missing or incomplete, same data collected twice or more by different organizations;
- Lack or incomplete documentation of available spatial data;
- Lack of compatibility among spatial datasets (datasets cannot be combined or used with other spatial datasets;
- Incompatible SDI initiatives within Member States that often function in isolation;
- Cultural, institutional, financial, and legal barriers preventing or delaying the sharing of existing spatial data.

World Bank SDI Report, http://lgosmgb2.nottingham.ac.uk/elogeowiki/index.php/World_Bank_SDI_Report, accessed 26 July 2013

INSPIRE Themes

Annex I

1. Coordinate reference systems
2. Geographical grid systems
3. Geographical names
4. Administrative units
5. Addresses
6. Cadastral parcels
7. Transport networks
8. Hydrography
9. Protected sites

Annex II

1. Elevation
2. Land cover
3. Ortho-imagery
4. Geology

Annex III

1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utility and governmental services
7. Environmental monitoring facilities
8. Production and industrial facilities
9. Agricultural and aquaculture facilities
10. Population distribution – demography
11. Area management/ restriction/regulation zones & reporting units
12. Natural risk zones
13. Atmospheric conditions
14. Meteorological geographical features
15. Oceanographic geographical features
16. Sea regions
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution
20. Energy Resources
21. Mineral resources

Cascading Services linking EU Regional level, National level and Local level SDI's

one stop

citizen

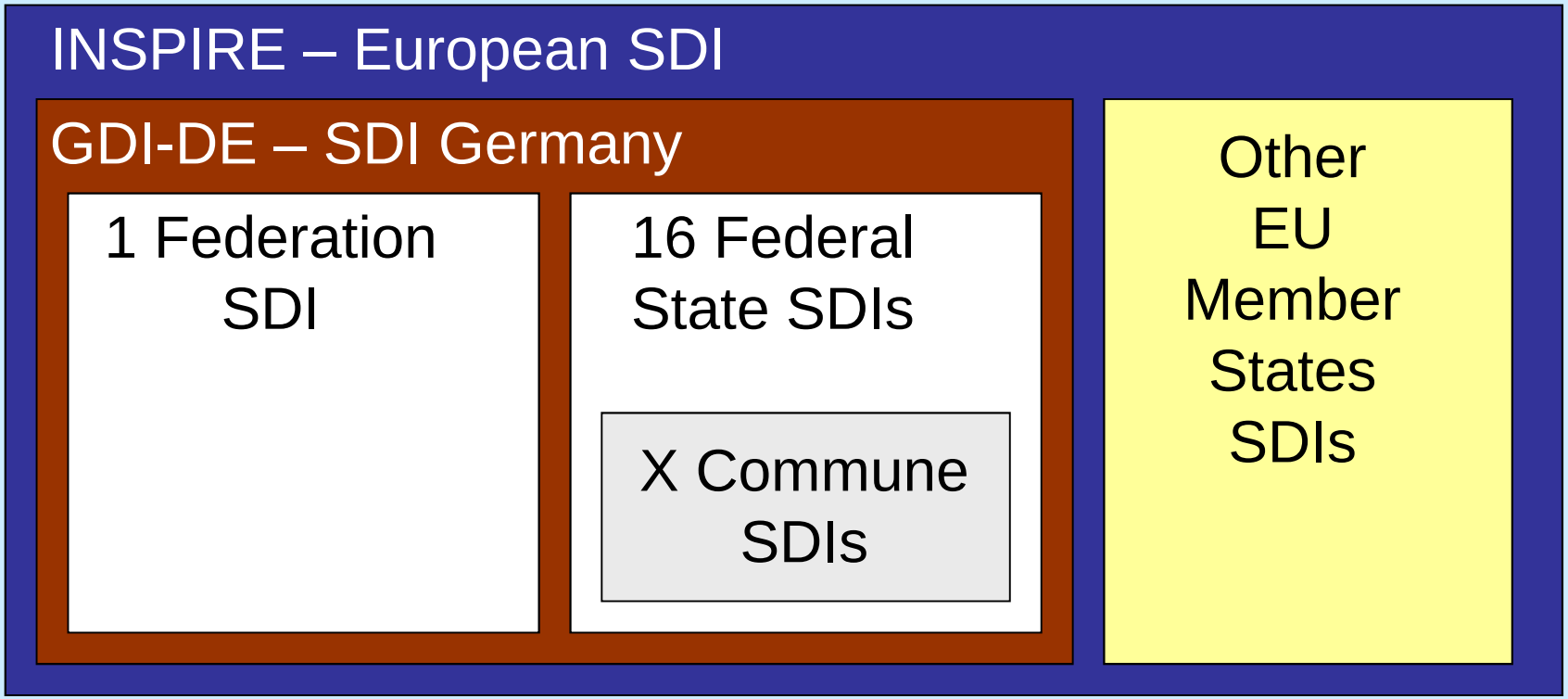
interfaces

Cascading Services linking EU Regional level, National level and Local level SDI's

EU Level
DE Level
DE_RLP Level
DE_RLP_communal Level

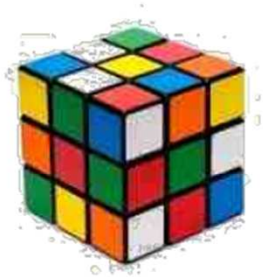
SDI Germany within the European SDI framework

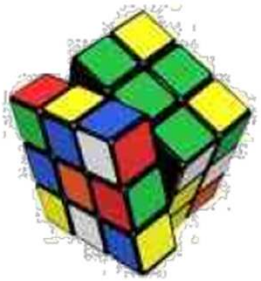
Source: adapted from Schilcher et al. (2009)



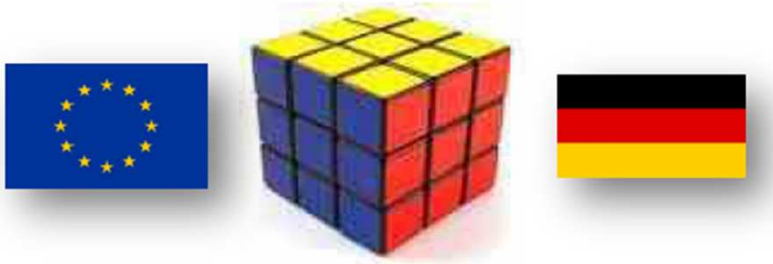
Source: Daniela Hogrebe, Andres von Dömming, Coordination Office SDI Germany

3 Administrative Levels: 13.000 Municipalities, 16 States and 1 Federation





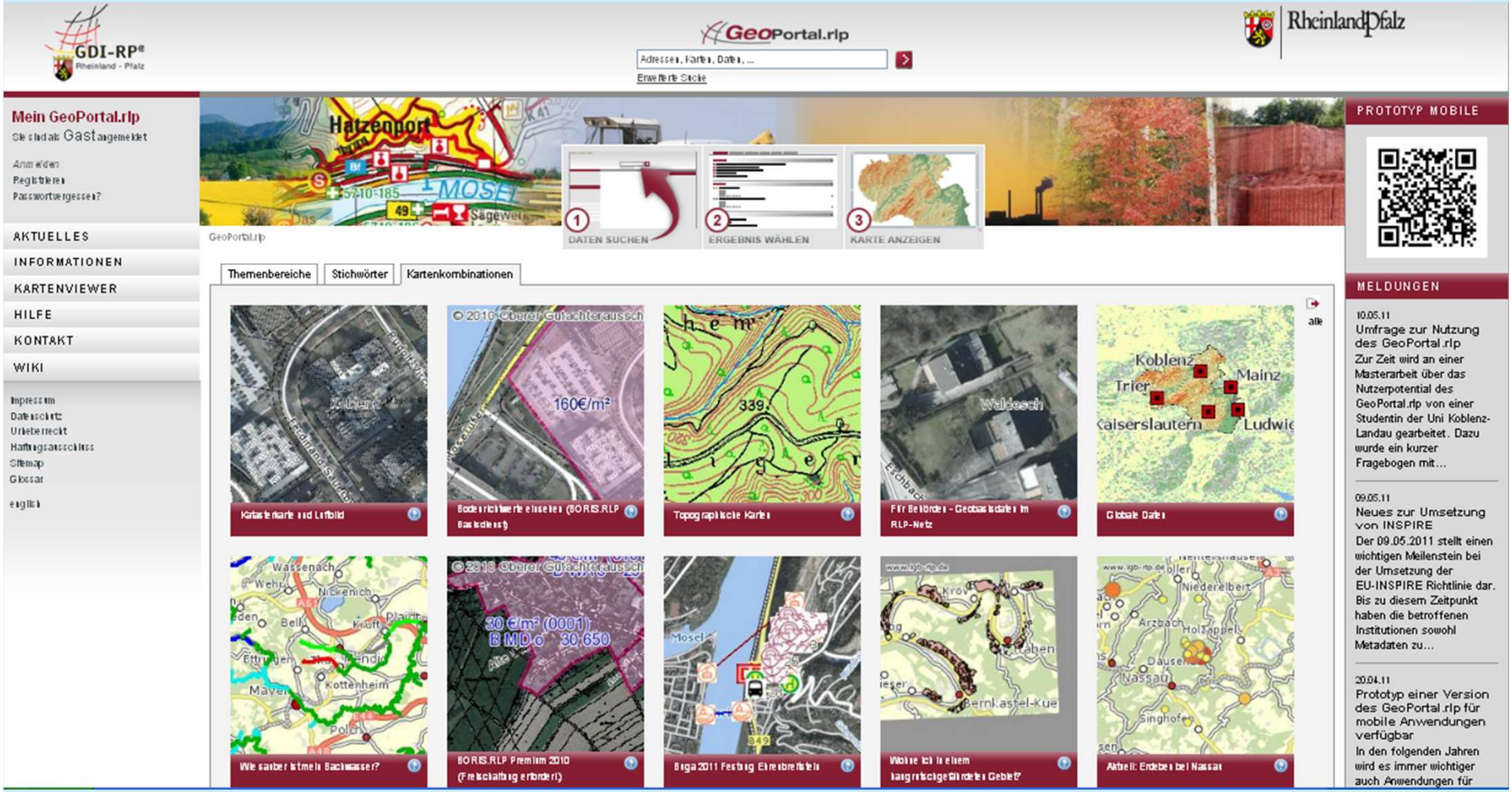
GDI-DE



Cascading Services linking EU Regional level, National level and Local level SDI's

EU Level
DE Level
DE_RLP Level
DE_RLP_communal Level

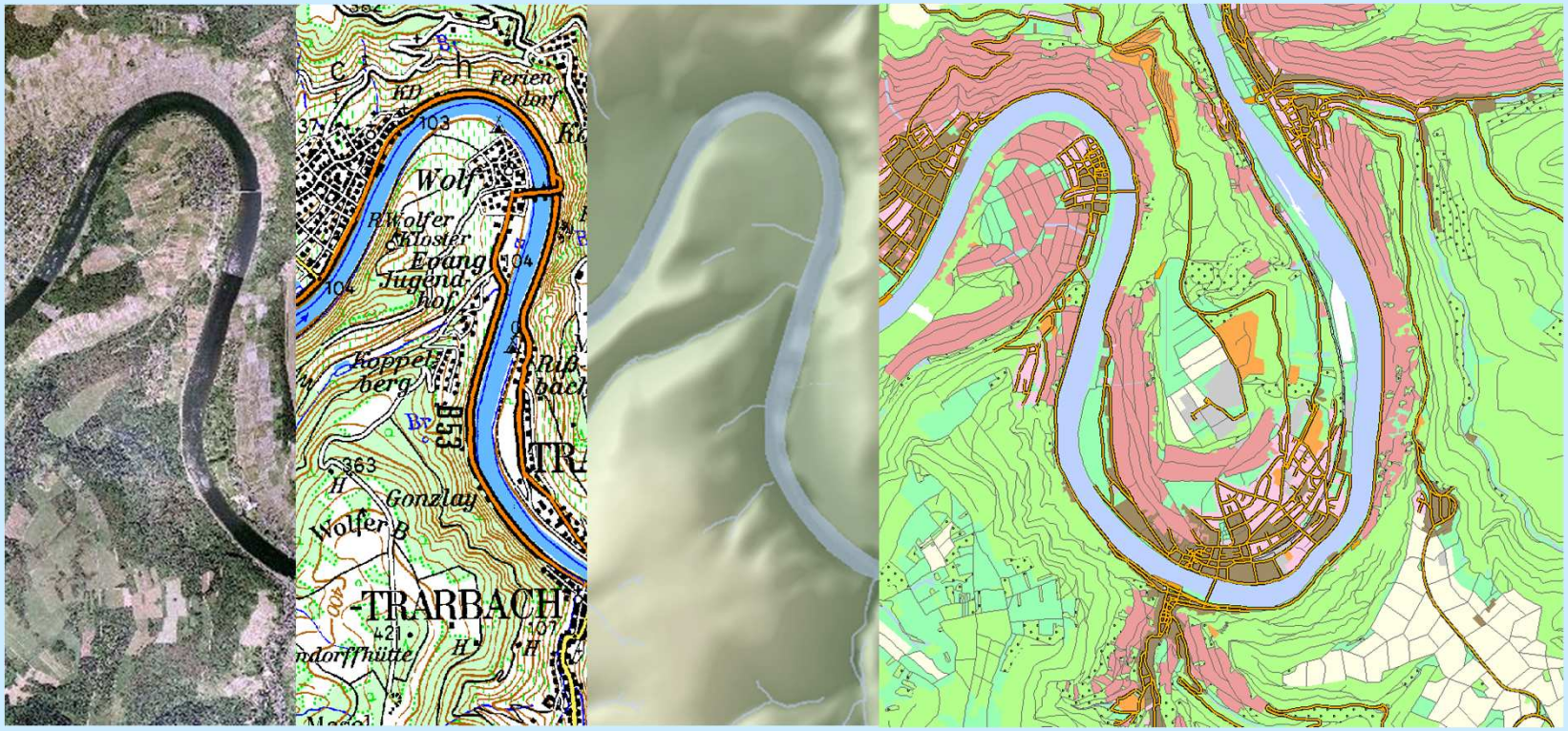
Cascading Services linking EU Regional level, National level and Local level SDI's

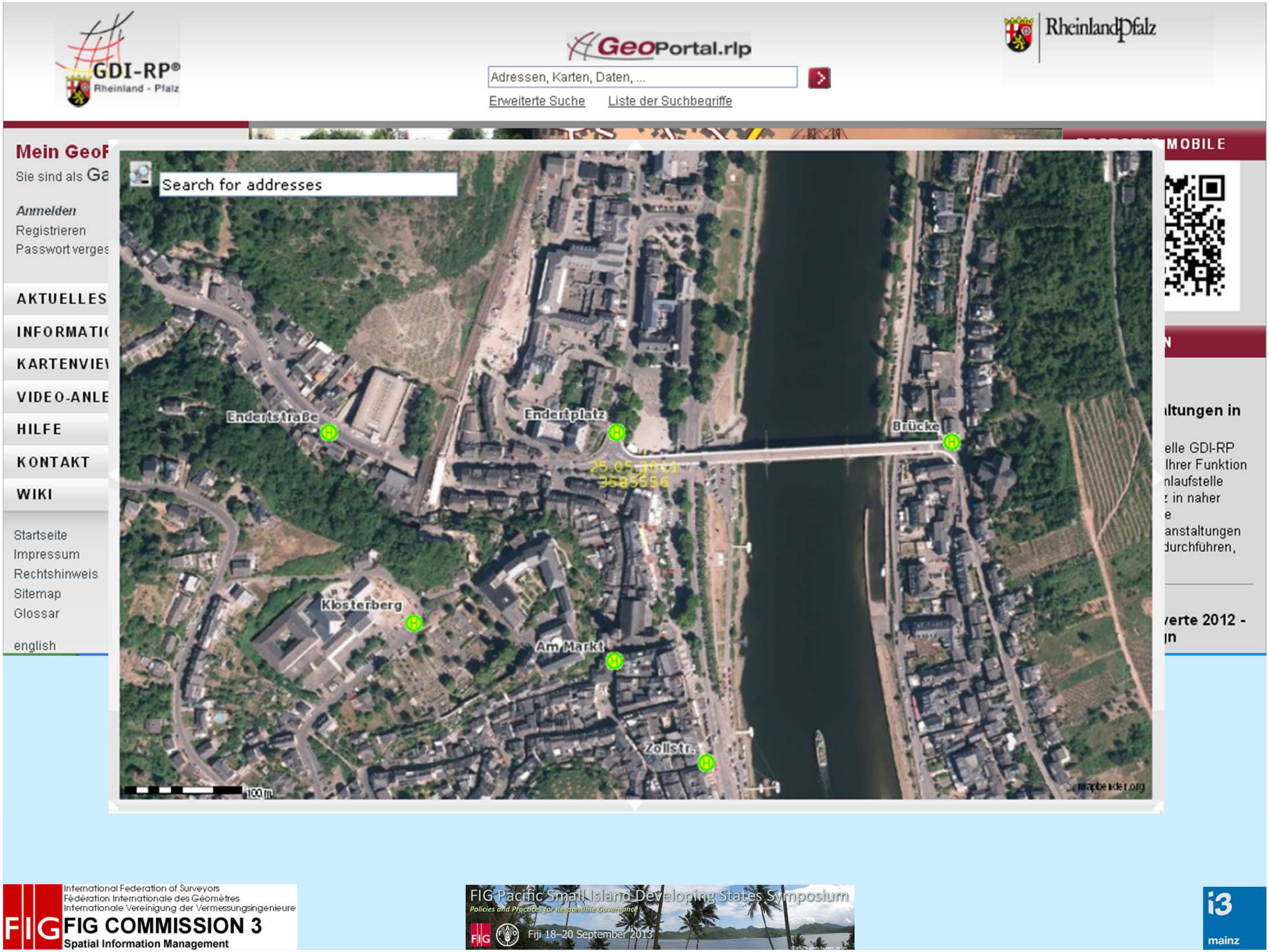


Geospatial basic data countrywide available in Germany

Digital orthophoto (left), topographic map (half left), digital height model (half right), digital landscape model (right)

Source: Landesamt für Vermessung und Geobasisinformation Rheinland-Pfalz

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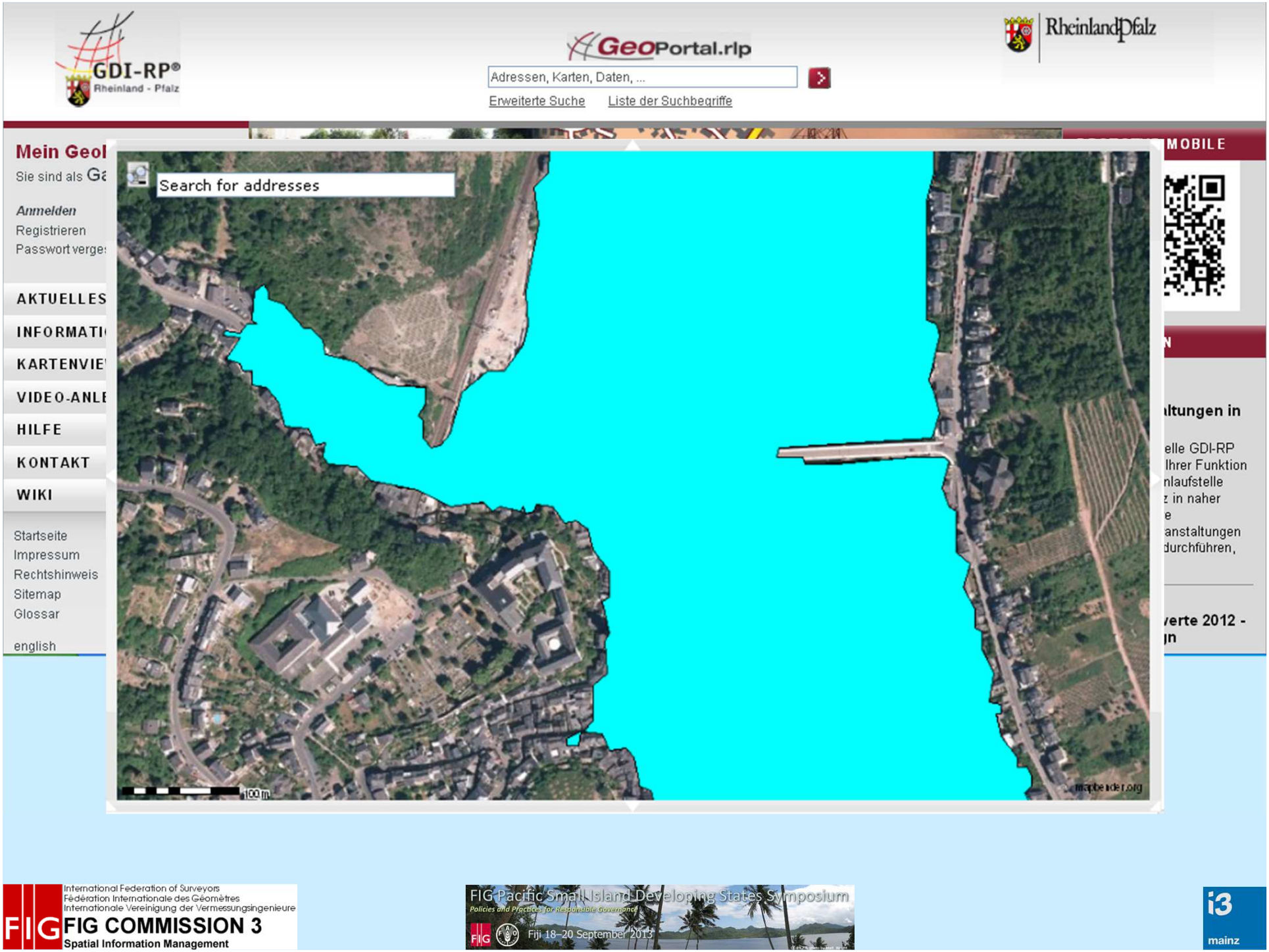

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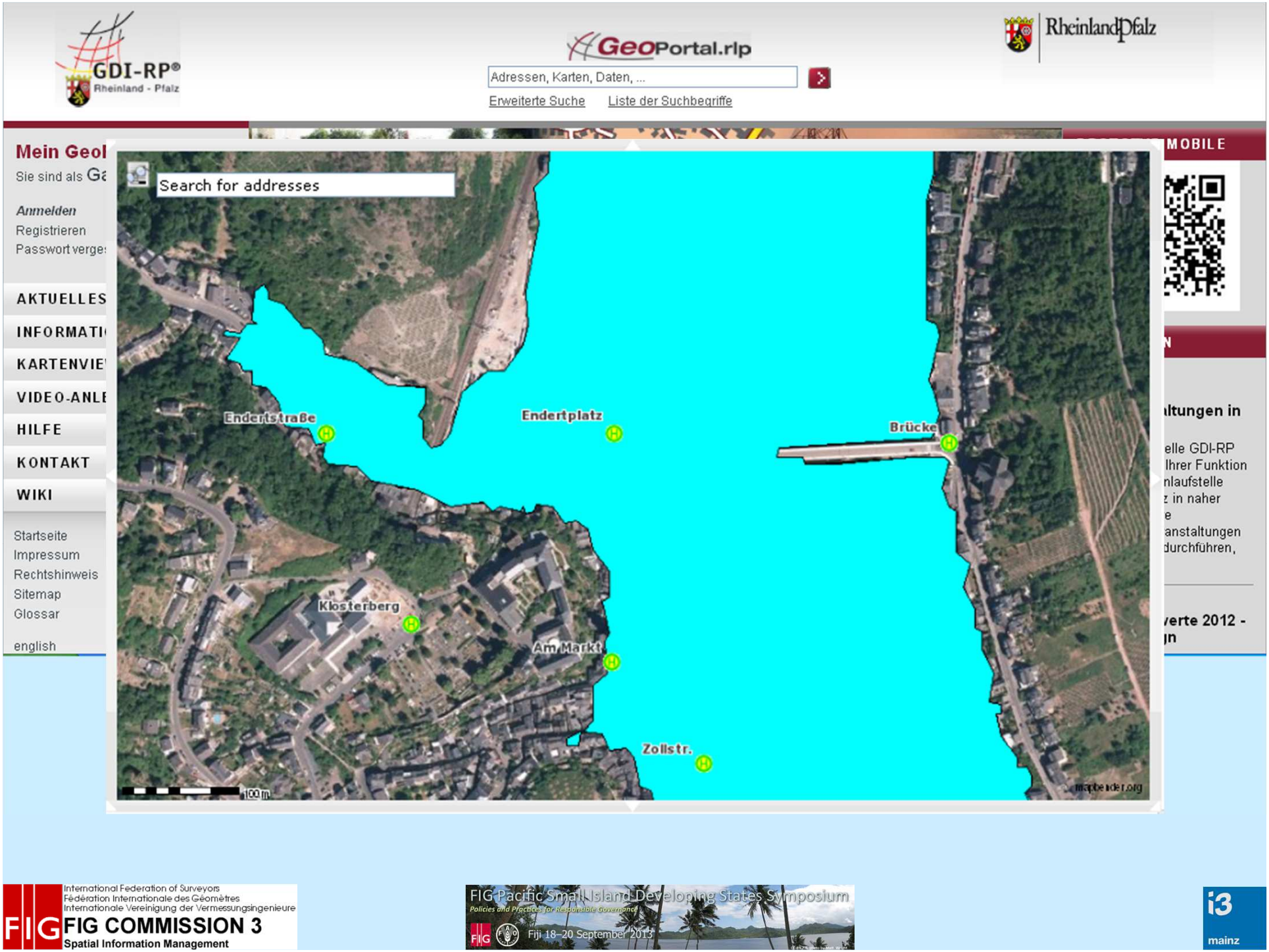
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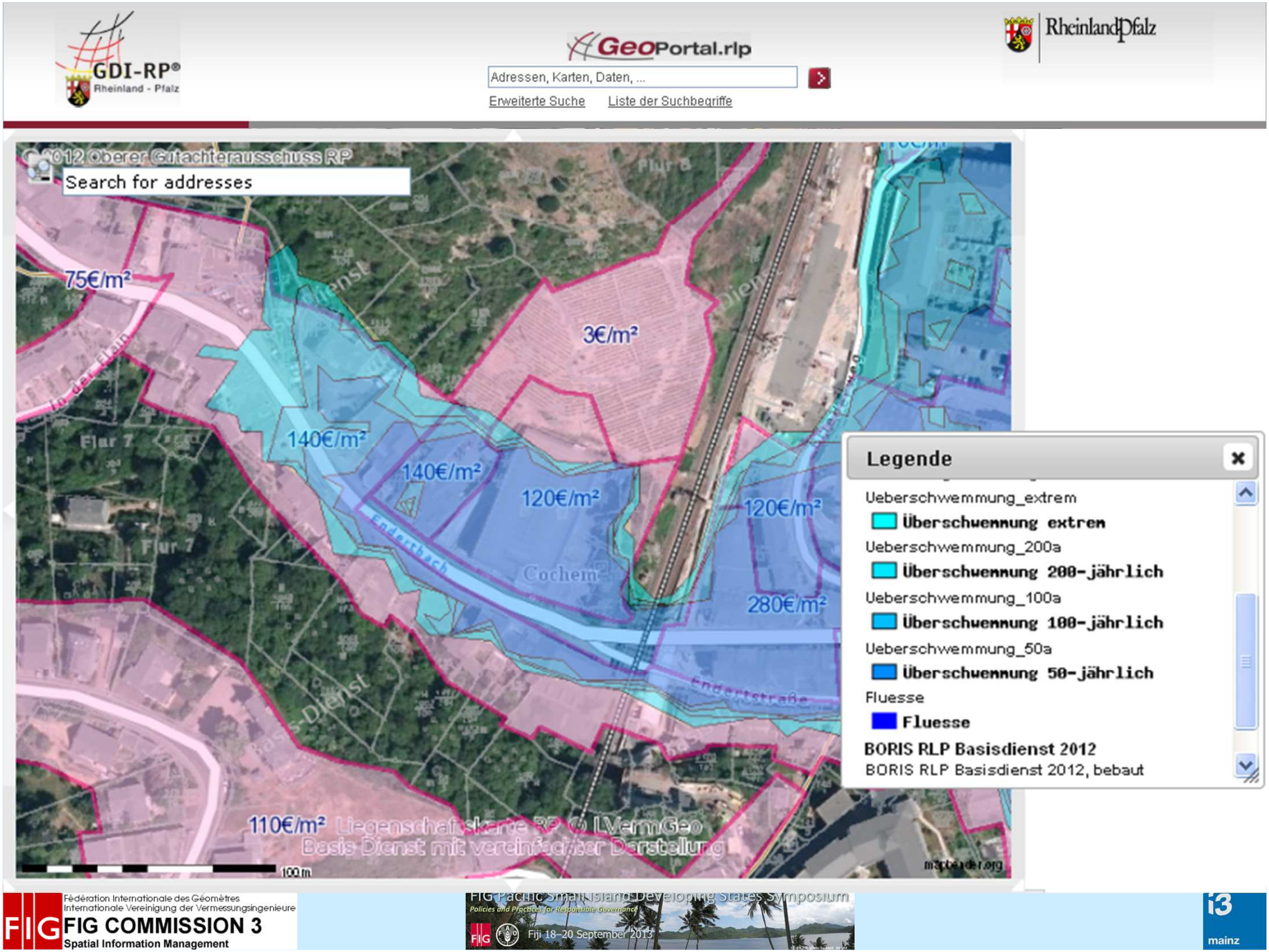
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3€/m²
140€/m²
140€/m²
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Legende
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Überschwemmung extrem
Ueberschwemmung_200a
Überschwemmung 200-jährlich
Ueberschwemmung_100a
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Fluesse
Fluesse
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BORIS RLP Basisdienst 2012, bebaut
Liegenschaftskarte RP © LVermGeo
Basis Dienst mit vereinfachter Darstellung
100 m
mapbender.org

The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)

Lessons for SDI development in other countries

- Development of INSPIRE requires all member states to
  - pass legislation and rules to match the EU Inspire SDI directive;
  - build institutional and human capacity to undertake SDI;
  - build 'metadata' information systems;
  - support education and training of staff and citizens in SDI skills and awareness

- INSPIRE developes and uses many international technical standards
  → potential benefit for SDI in developing countries;
- INSPIRE makes available verification and test services
  → potential use by SDI in developing countries;
- Steps involved in building a SDI presented in the INSPIRE directive
  → comprehensive check list for SDI development

World Bank SDI Report, http://lgosmgb2.nottingham.ac.uk/elogeowiki/index.php/World_Bank_SDI_Report, accessed 26 July 2013

The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)

Lessons for SDI development in other countries

INSPIRE has stimulated a large amount of academic research, pilot studies, test-beds, on-line training materials

→ technical relevance for other national and regional SDI's

INSPIRE is a large, complex and costly initiative (co-ordination of 34 data themes, 28 sovereign countries, population > 500mio, multiple languages and legal systems)

→ political, legal and administrative aspects likely to be different for other SDI's

World Bank SDI Report, http://lgosmgb2.nottingham.ac.uk/elogeowiki/index.php/World_Bank_SDI_Report, accessed 26 July 2013

Conclusion

Geospatial Information Management,
a feasible tool for Small Island Developing States?

Everything happens somewhere

↓

Decision making has a spatial component

↓

Geospatial Information Management, a feasible tool for all states!

Thank you for your attention!

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