

# *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

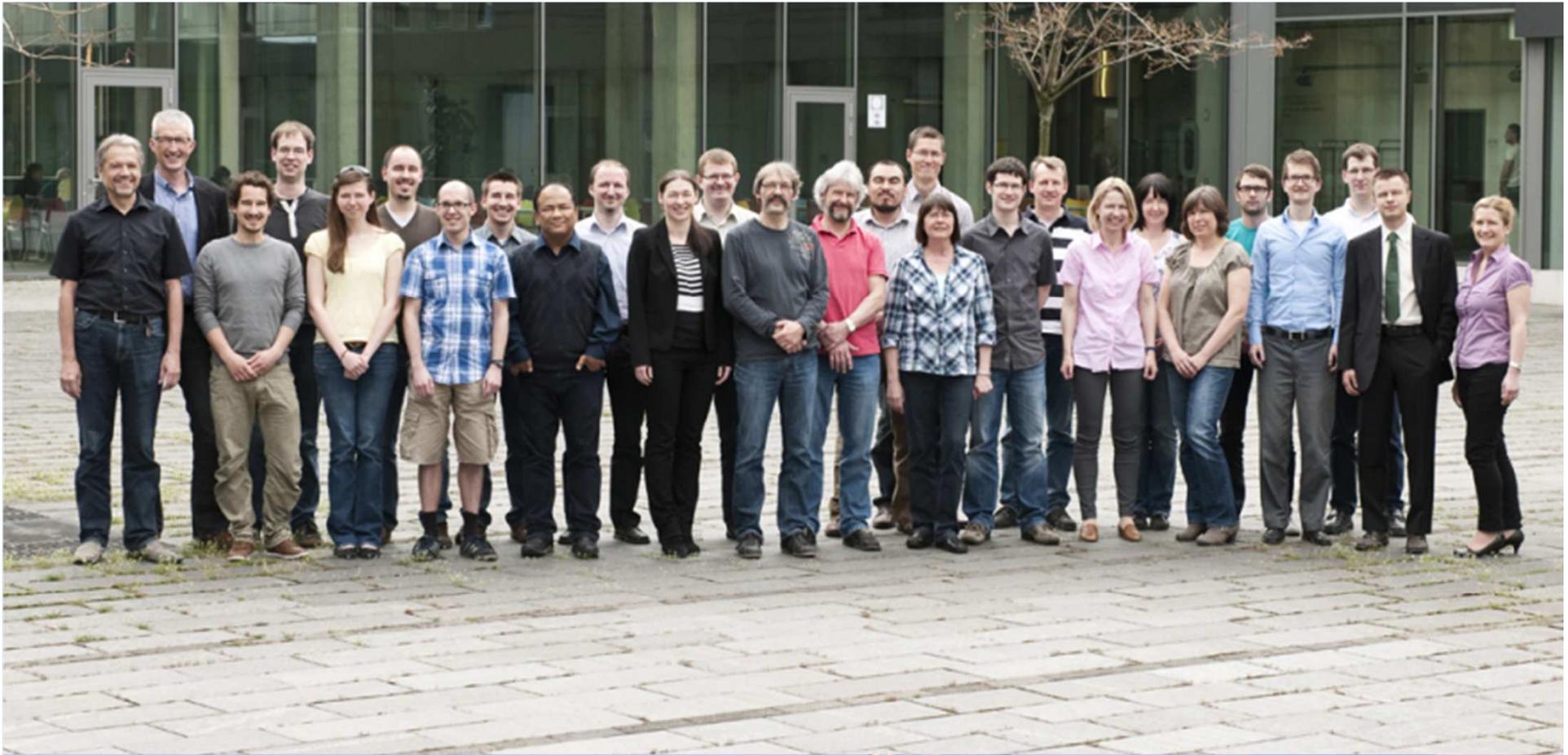
*Technical Session 1A: FIG Commission 3 Technical Session: The Importance of  
Geospatial Information, 19 September 2013, 11.30-13.00*

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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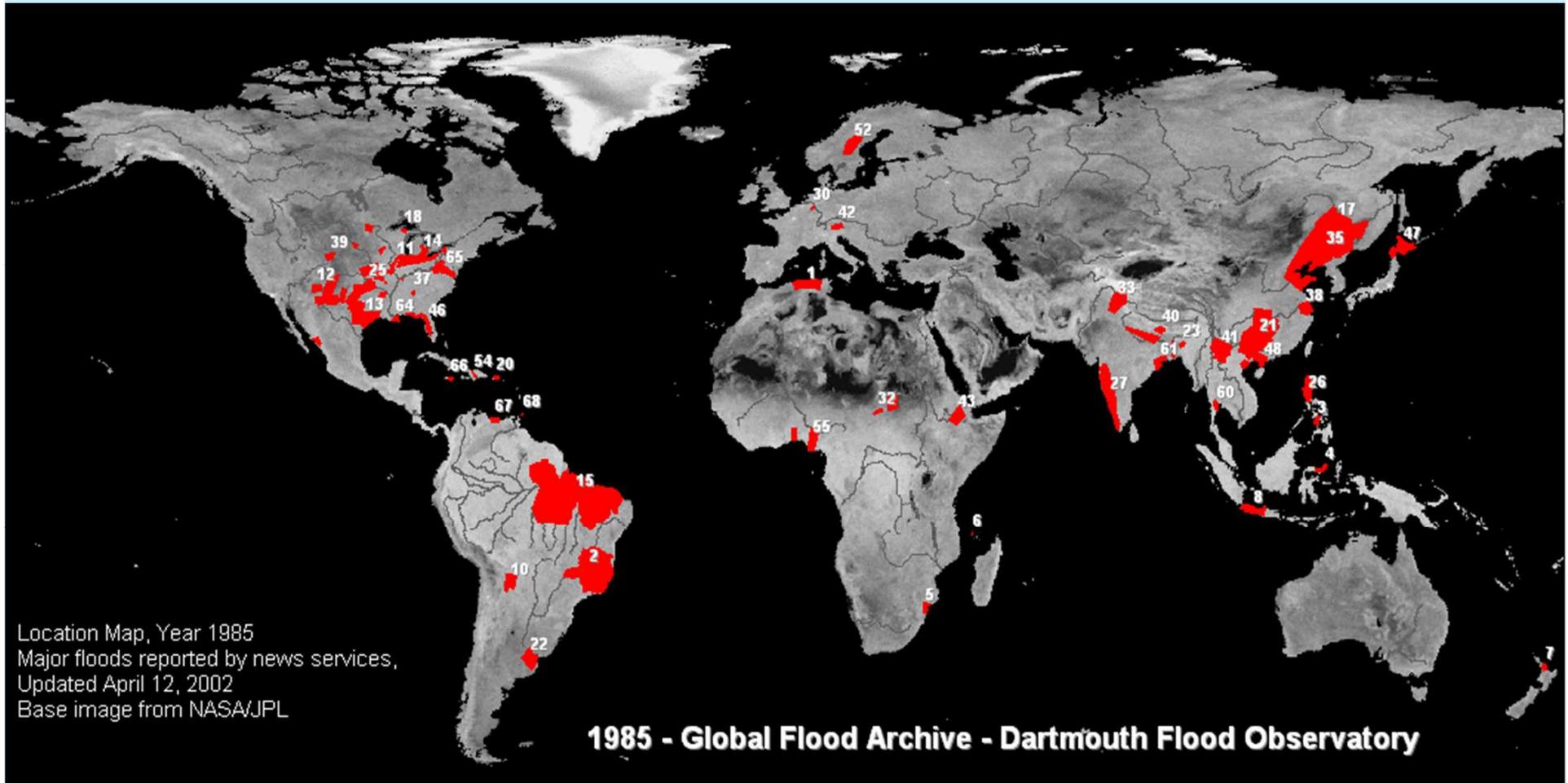


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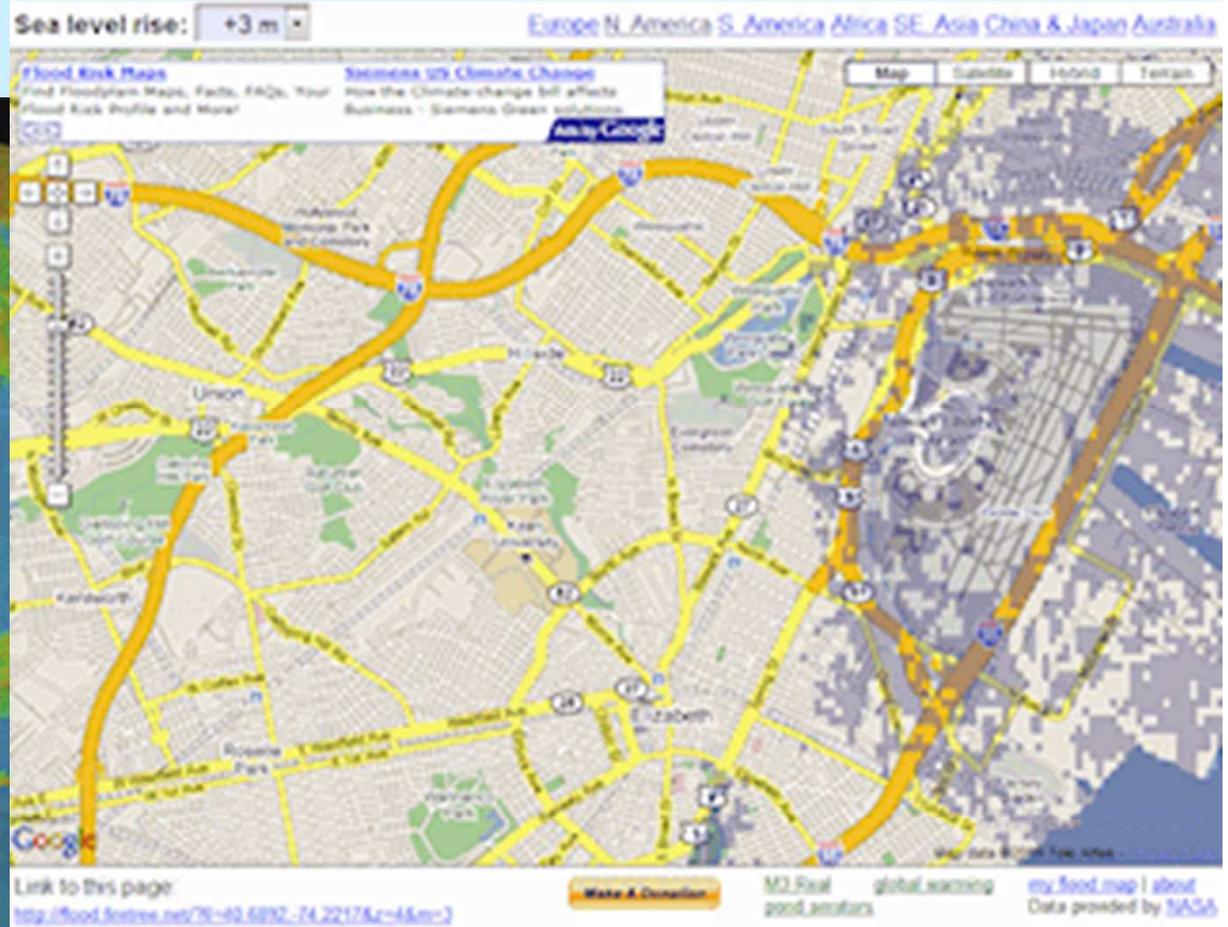
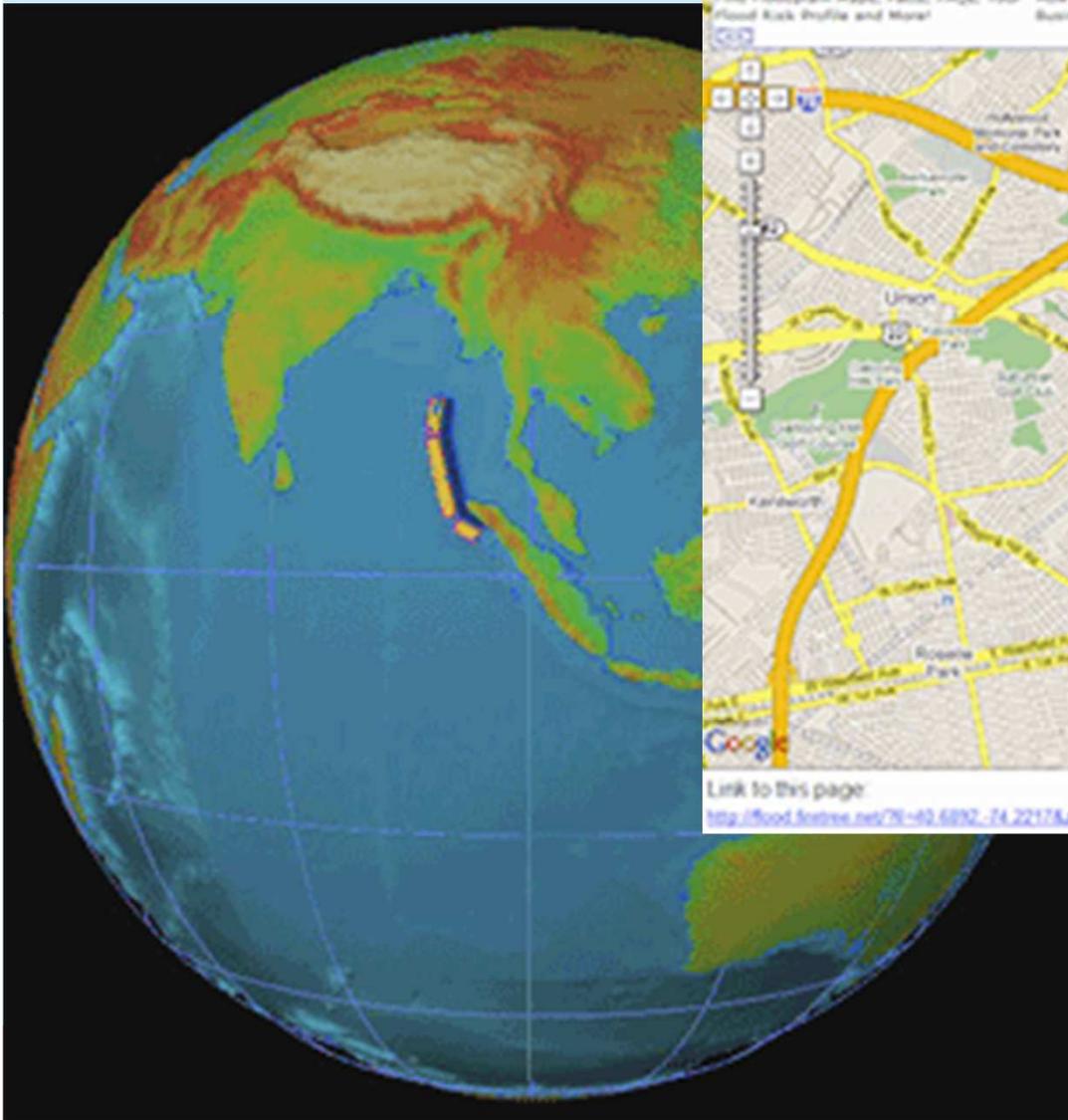
# 1

## The Need for Geospatial Information Management – an Example –

# Huge floodings in the world between 1985 and 2010



# Tsunami 2004



## 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

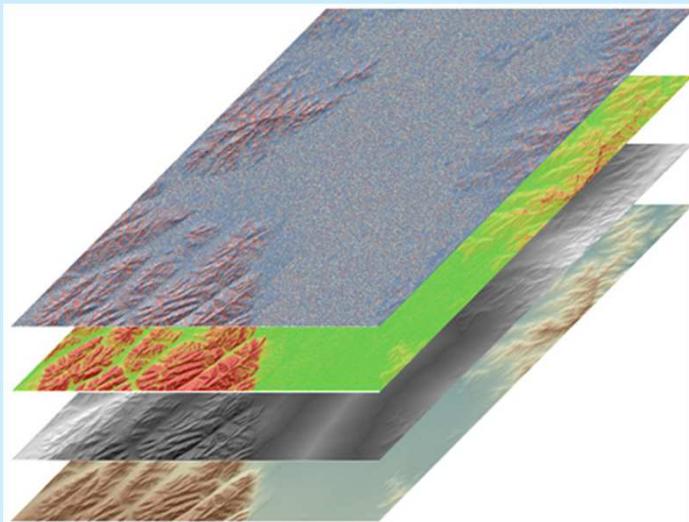
### SDI-Africa: An Implementation Guide

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

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



### 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

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....

# 2

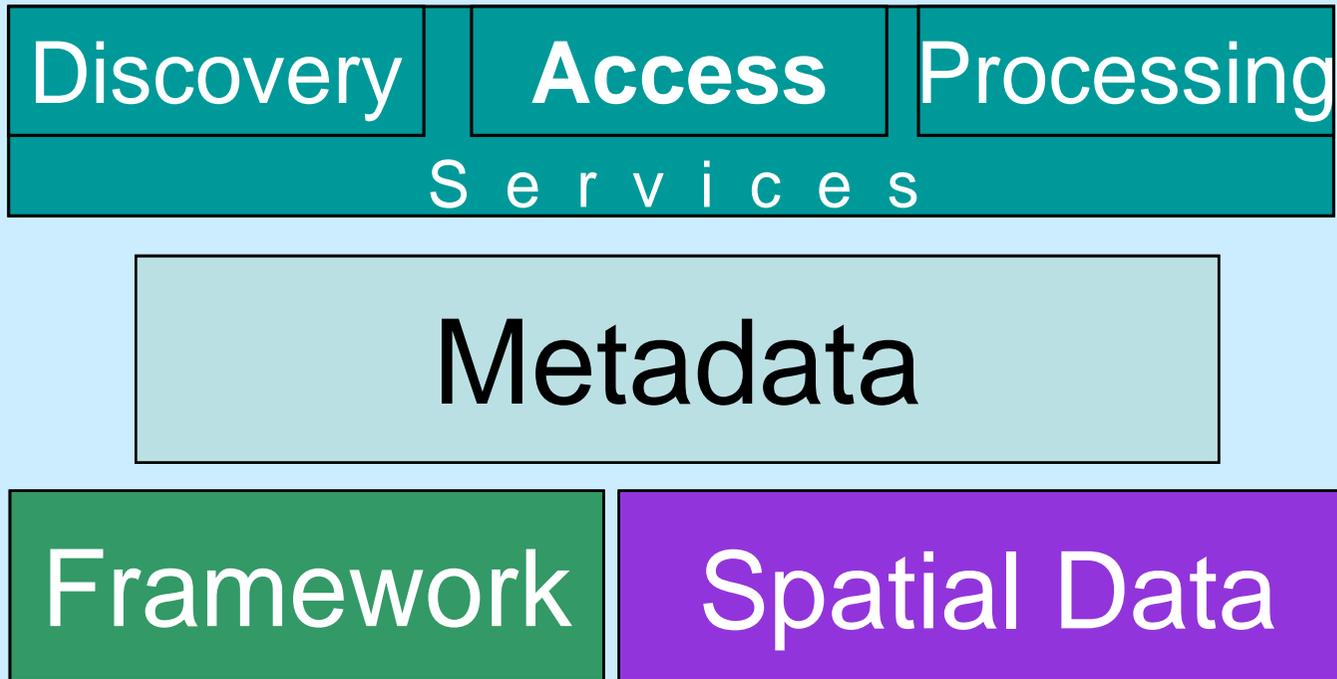
## What is needed?

## ***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



# 3

## What is available?

## Standards



## Wordwide SDI Development

Regional and National Initiatives

in

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

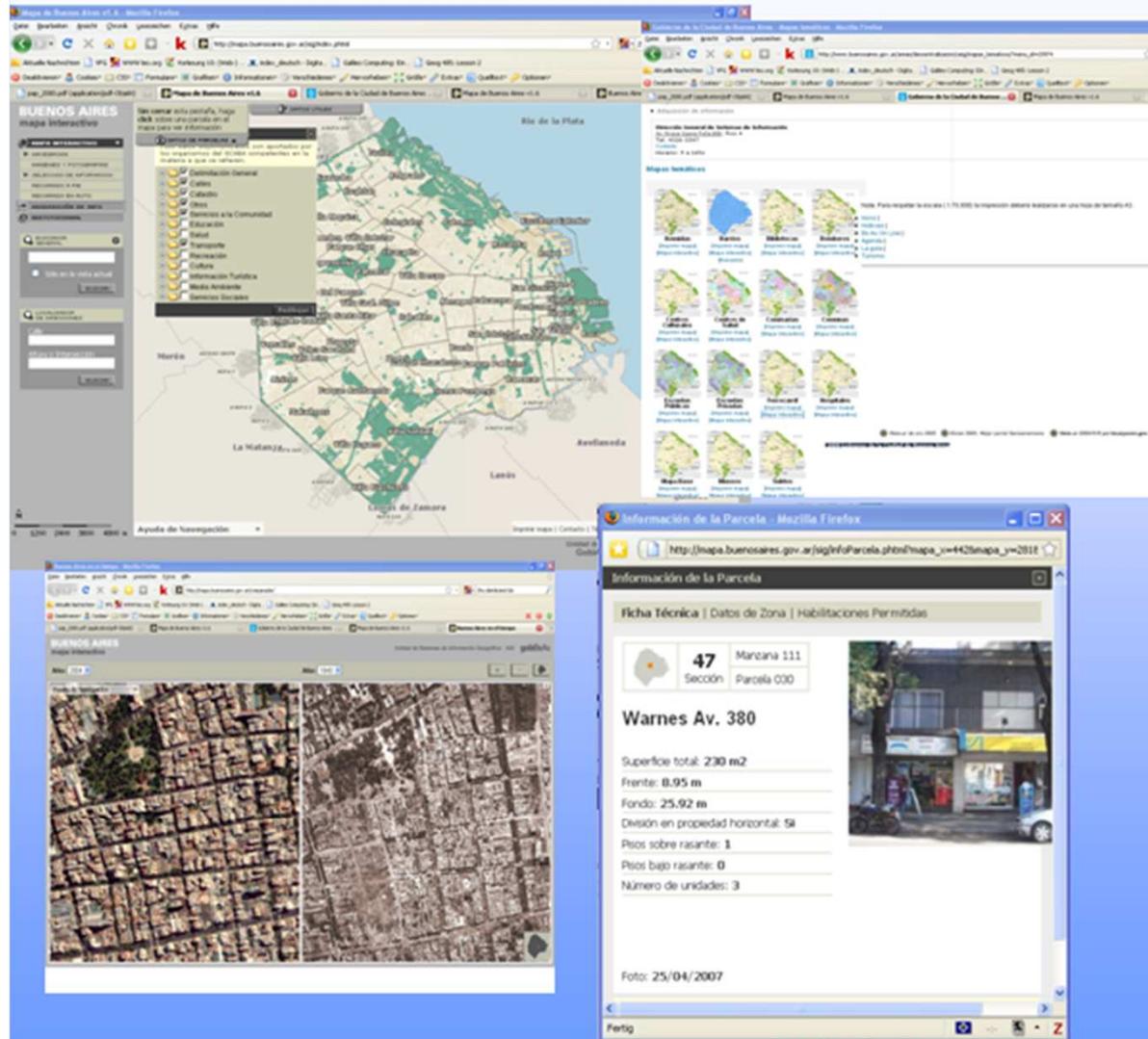
...

# 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

The screenshot displays the 'BUENOS AIRES mapa interactivo' web application. On the left, there is a navigation menu with options like 'MAPA INTERACTIVO', 'NAVEGACION', 'IMAGENES Y FOTOGRAFIAS', 'SELECCION DE INFORMACION', 'RECORRIDO A PIE', 'RECORRIDO EN AUTO', 'ADQUISICION DE INFO', and 'INSTITUCIONAL'. Below the menu is a search bar and a 'LOCALIZADOR DE DIRECCIONES' section. The main map area shows a street grid with 'Azopardo' and 'San Telmo' labeled. A tooltip above the map reads: 'Sin cerrar esta pestaña, haga click sobre una parcela en el mapa para ver información'. A 'DATOS DE PARCELAS' button is visible. On the right, a browser window titled 'Información de la Parcela - Mozilla Firefox' is open, displaying the following details:

**Información de la Parcela**  
Ficha Técnica | Datos de Zona

	<b>04</b>	Manzana 058
	Sección	Parcela 003

**Azopardo 858**

Superficie total: **708 m2**  
Frente: **13.70 m**  
Fondo: **52.48 m**  
División en propiedad horizontal: **No**  
Pisos sobre rasante: **5**  
Pisos bajo rasante: **0**  
Número de unidades:

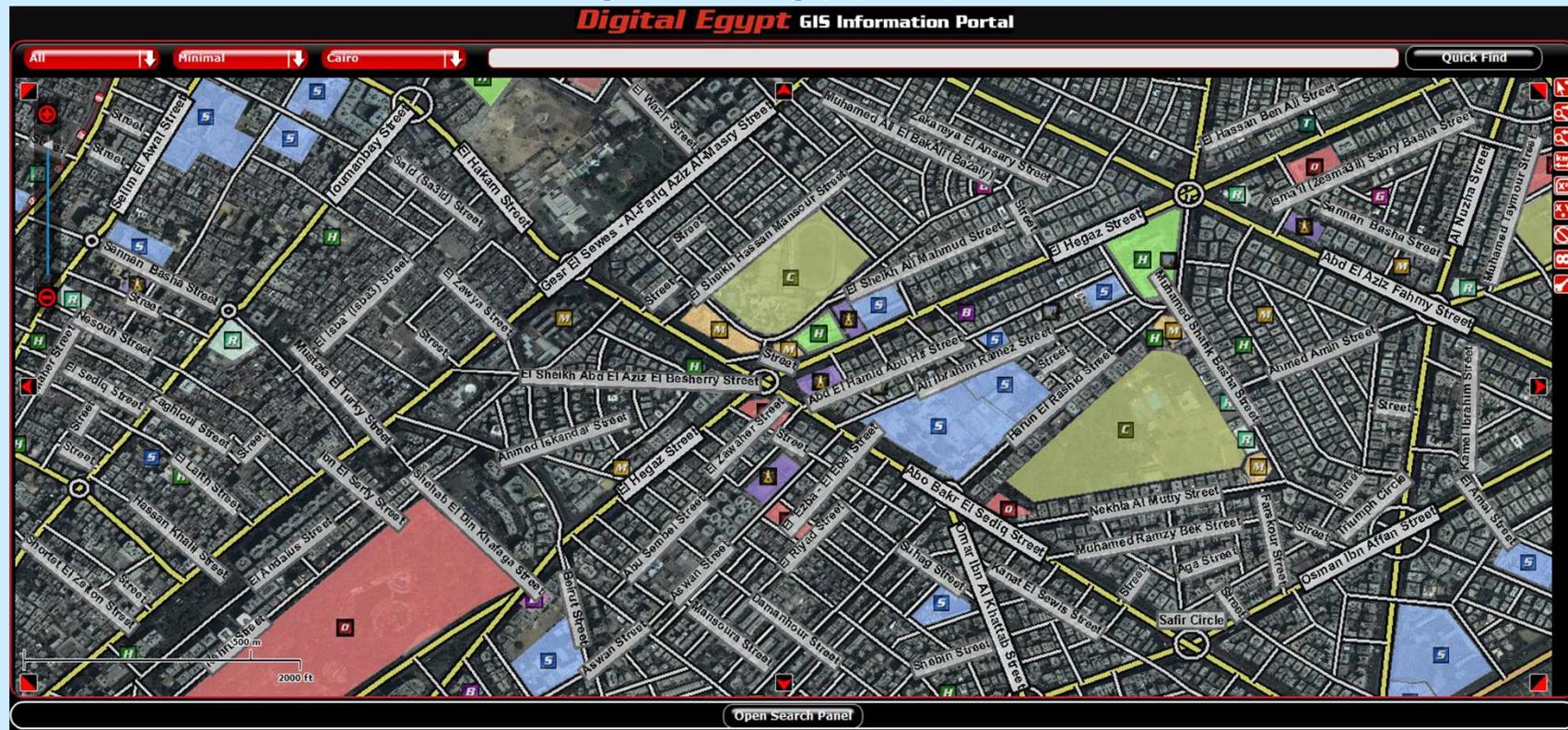
Foto: **01/04/1997**

! Los datos disponibilizados por la USIG en el sitio "http://mapa.buenosaires.gov.ar", son aportados por los organismos del Gobierno de la Ciudad Autónoma de Buenos Aires competentes en la materia a que se refieren.

Fertig

Unidad de Sistemas de Información Geográfica - ASI  
Gobierno de la Ciudad de 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

**Property Details**

Listing ID: 68

**About the Owner / Submitter**

Name: Adel Yassin	Email: Not Supplied
Mobile Phone: Not Supplied	Office Phone: 0122400071

**About the Property/Real Estate**

Sector: El Qahera El Gedida - New Cairo Area	City: Cairo City
Property Type: Villa	Property Purpose: For Sale
Price: Not Supplied	Property Address: Fifth Settlement, First Area, Second Sector

**Description:**  
 Superlux finished Villa, basement, ground and three levels. 1350 sq. m. land area, 300 sq. m. building area. Large swimming pool and a nice garden. Basement has 3 bathrooms, open kitchen and a reception. Ground floor is a reception, office, bathroom, laundry room and main kitchen. First floor is 5 bedrooms, 4 bathrooms and an open kitchen. Second floor is an apartment with 300 sq. m. area, 3 bedrooms and 2 bathrooms. Third level is a 170 sq. m. apartment and the remainder is a roof. Private garage and elevator.

**Pictures:**

**Property Pictures**

# Digital Egypt (2009) Search for landmarks

**Digital Egypt GIS Information Portal**

All | Display Mode | Selected Locations | Quick Find

**Landmark Search Results**

Single click on any field to be zoomed in automatically. Double Click for details window. Maximum of 500 results are only displayed.

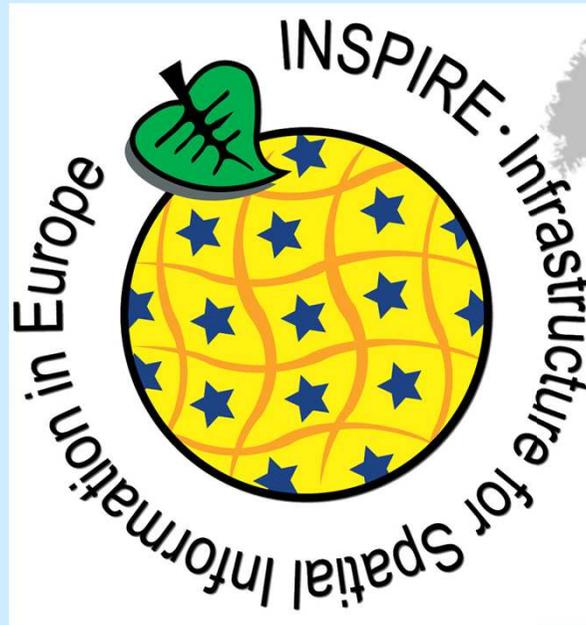
Landmark Type	Landmark Name	Landmark Sector	Landmark City
Schools	Sakanat El Ma'adi School	Ma'adi Area	Cairo City
Schools	Wadi Degla Language Scho	Ma'adi Area	Cairo City
Schools	Hadayek El Ma'adi Seconda	Ma'adi Area	Cairo City
Schools	El Gabarty Preparatory Sch	Ma'adi Area	Cairo City
Schools	El Ma'adi El 'Askareya Seco	Ma'adi Area	Cairo City
Schools	El Fath (Fat7) Private Azhar	Ma'adi Area	Cairo City
Schools	El Amal Language School	Ma'adi Area	Cairo City
Schools	El Azhar Preparatory Schoo	Ma'adi Area	Cairo City
Schools	Fatayat El Ma'adi Azhar Ins	Ma'adi Area	Cairo City
Schools	El Amal Language School	Ma'adi Area	Cairo City
Schools	El 'Oruba Language School	Ma'adi Area	Cairo City
Schools	Misr American College	Ma'adi Area	Cairo City
Schools	Muhamed Amin El Refa'y (R	Ma'adi Area	Cairo City
Schools	El Gil El Gedid School	Ma'adi Area	Cairo City
Schools	Atef El Sadat Secondary Sc	Ma'adi Area	Cairo City

Close

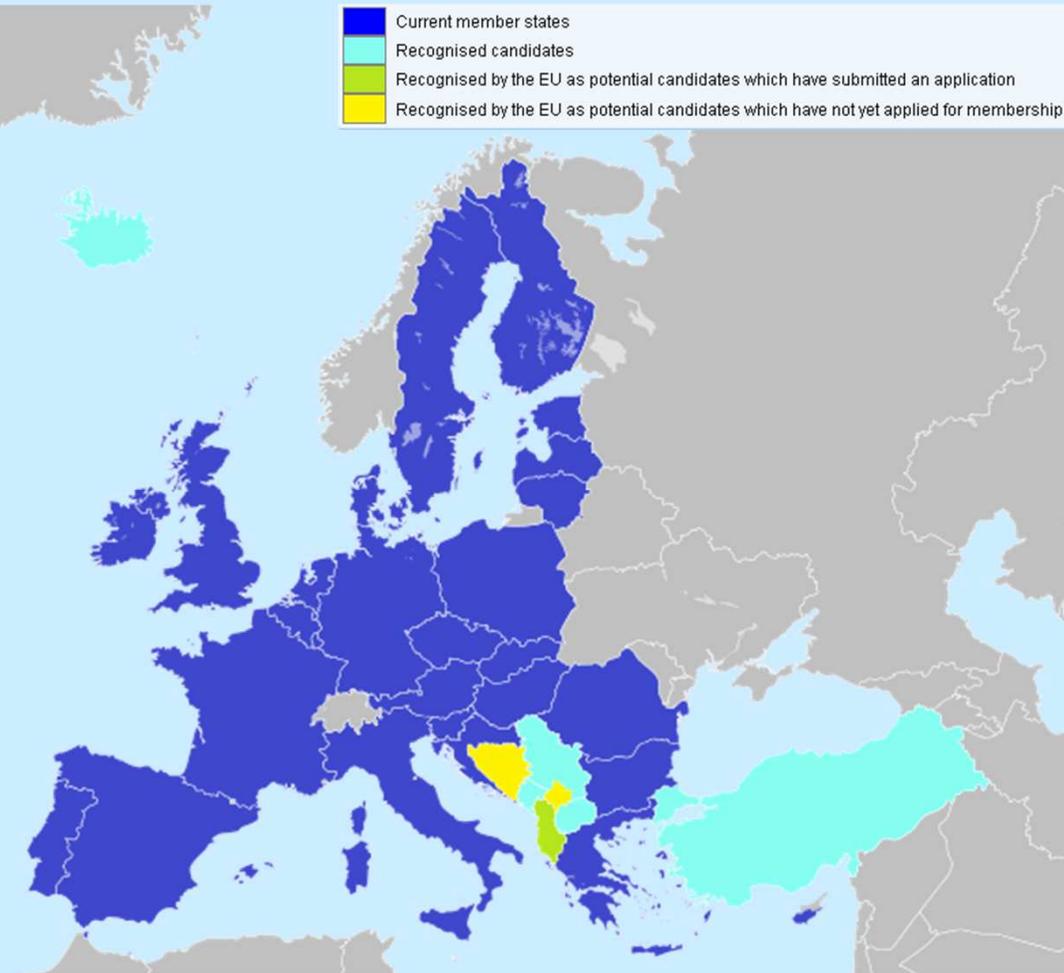
Open Search Panel

# The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)



- Current member states
- Recognised candidates
- Recognised by the EU as potential candidates which have submitted an application
- Recognised by the EU as potential candidates which have not yet applied for membership



Area 4,4 Mio km<sup>2</sup>

Population > 500 Mio

# The European SDI Initiative INSPIRE

Regional Spatial Data Infrastructure (RSDI)



## *Purpose of INSPIRE*

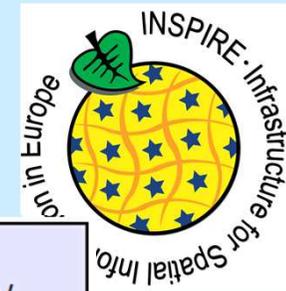
- to support environmental policy
- to overcome major barriers affecting the availability and accessibility of relevant data

## *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](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

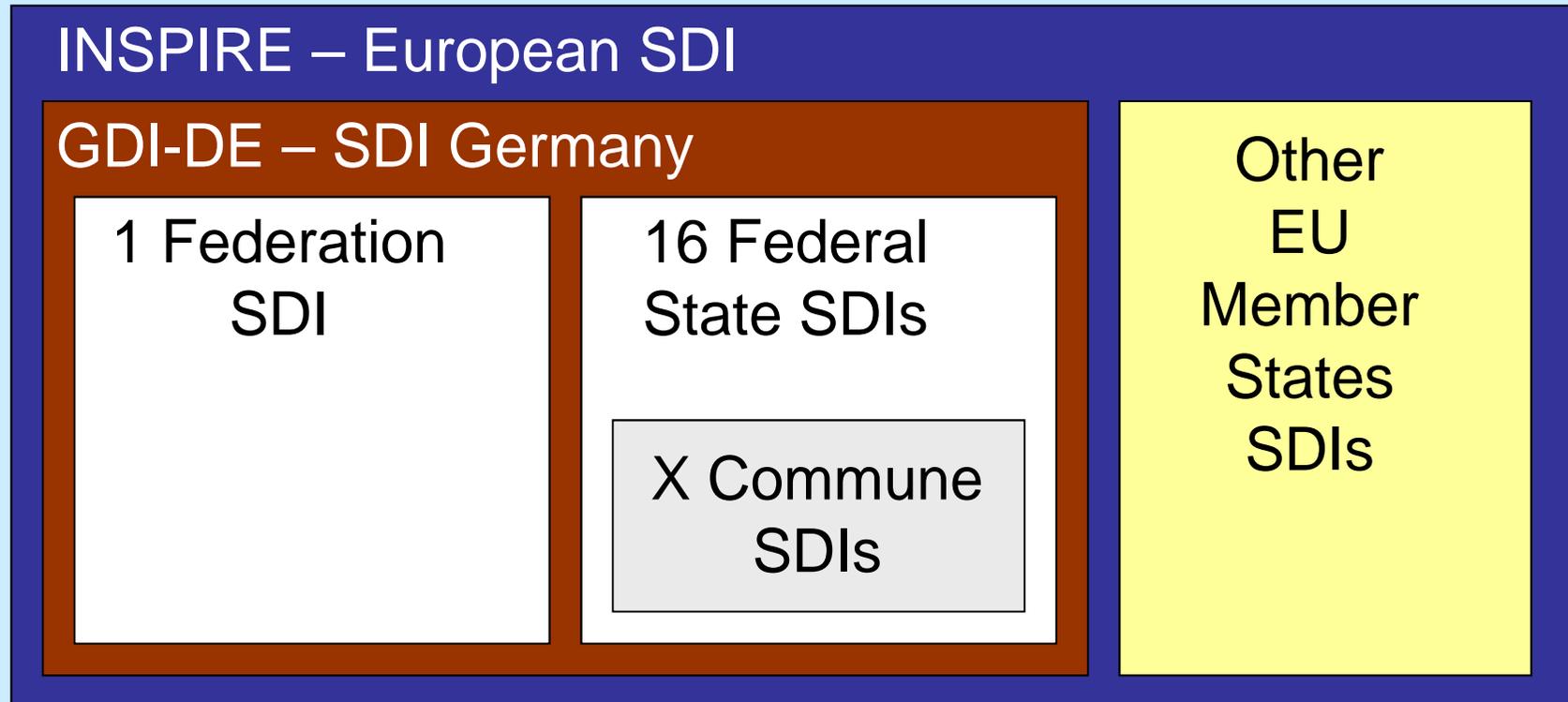


# Cascading Services linking EU Regional level, National level and Local level SDI's



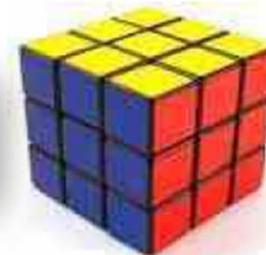
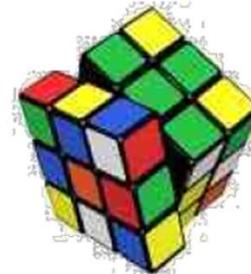
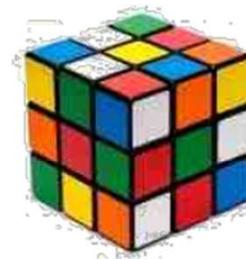
# SDI Germany within the European SDI framework

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



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



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

The screenshot displays the GeoPortal.rlp website interface. At the top, there is a search bar with the text "Adresse, Karte, Daten, ..." and a search button. Below the search bar, there are three numbered steps: 1. DATEN SUCHEN, 2. ERGEBNIS WÄHLEN, and 3. KARTE ANZEIGEN. The main content area features a grid of map thumbnails with titles such as "Karte der Stadt Koblenz", "Bodenrichtwerte Koblenz (BORIS.RLP)", "Topographische Karte", "Flurkataster - Geobasekarte im RLP-Netz", "Globale Daten", "Wie sauber ist mein Bachwasser?", "BORIS.RLP Premium 2010", "Biga 2011 Festzug Elberfeld", "Woher ist in einem langfristige Gebiete?", and "Karte II: Erdbeben bei Nassau". On the right side, there is a "PROTOTYP MOBILE" section with a QR code and a "MELDUNGEN" section with news items dated 10.05.11, 09.05.11, and 20.04.11. The left sidebar contains navigation links like "Mein GeoPortal.rlp", "AKTUELLES", "INFORMATIONEN", "KARTENVIEWER", "HILFE", "KONTAKT", and "WIKI".

# 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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### KARTENVIEW

### VIDEO-ANLE

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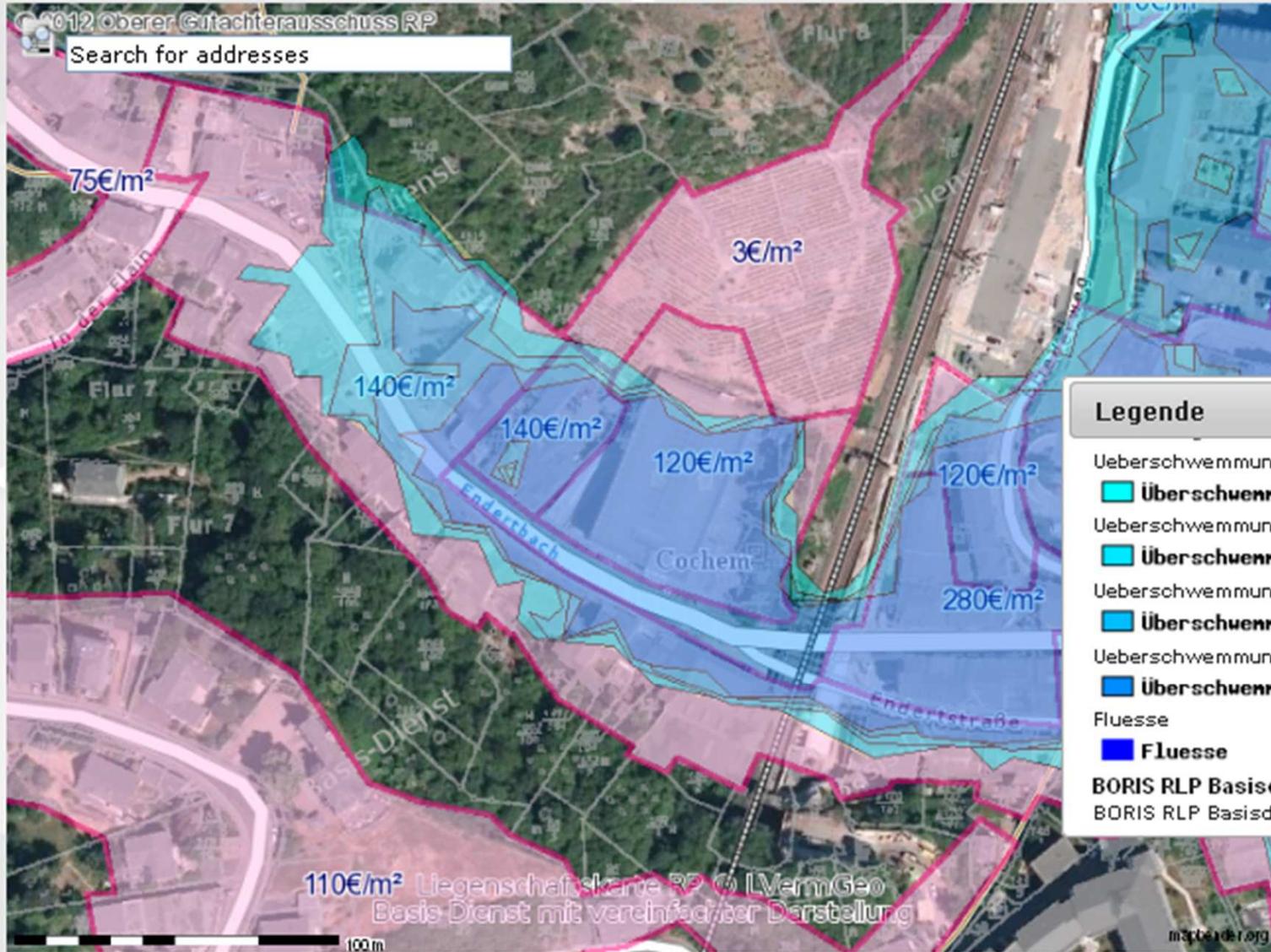
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- Überschwemmung 100-jährlich**
- Ueberschwemmung\_50a
- Überschwemmung 50-jährlich**
- Fluesse
- Fluesse**

BORIS RLP Basisdienst 2012  
BORIS RLP Basisdienst 2012, bebaut

# 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 develops 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](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](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!

hartmut.mueller@fh-mainz.de

