Architectures and Technologies for Spatial Data Networking

Roberto Lucchi
SDI Connects People to Information to Make Better Decisions

• ... Applying Geographic Knowledge To Societies’ Challenges
SDI Elements

- Policy and Data Sharing Agreements

- Education on Policies and Best-practices

- Host and Maintain SDI Components

- Collaboration to Solve Issues
SDI - Addresses National and Global Issues

- Environmental
- Social
- Economic
- Security
SDI Supports Many Policy Initiatives

- Leveraging Government Information
- Job Creation
- Citizen Engagement
- Open Government
- Doing More with Less
- Joint Problem Solving
- Eliminating Redundancies
- Improving Responsiveness

... In a Flexible and Open Framework
Successful SDI Implementation

- Require More Than Technology
  - Vision and Leadership
  - Understanding Business Value
  - Executive Support
  - Governance and Finance Model
  - Planning and Implementation
  - Good People
  - A Spirit of Collaboration
Creating Regional and National GIS Infrastructure
SDI Moving Ahead
GIS Is Changing

• Evolving Technology And Science Are Expanding Our Capabilities

• Helping Us Better Understand Our World
GIS Online is a New SDI Pattern

Enterprise

Pervasive

Desktop

Server

Online

Web / Cloud

Enabling
Intelligent Web Maps Bring Currency to SDI
Constantly updated with live services
SDIs Can Be Used by Everyone Anywhere
Enhancing access and collaboration

One Map — Any Device

Smartphones
Tablets
Desktop
Social media
Websites
Browsers
ArcGIS Online
From Developing to Using SDI
Focus on Building Infrastructure

We have figured out the plumbing aspect of SDI

ISO
INSPIRE
OGC
GEOSS
W3C
CGDI
FGDC
ANSI
NEN
GEMINI
ANZLIC

We have figured out the plumbing aspect of SDI
Focus on Using SDI

- Who ARE the users?
  - GIS Professionals
  - Subject Matter Experts
  - New Media Editors
  - Policy advisors
  - Executives
  - Developers

- What do they NEED?
  - Information Products
  - Maps
  - Data
  - C#, Java, .NET, PHP

- How would they want to consume it?
SDI Users Face Additional Challenges

- No Access to servers
- No Access to GIS tools
- Not a Desktop User
- Need a Quick Map, Not Data
- Answering Questions Quickly
- Outsource Everything
- The economy…
Connecting Science with Policy and Decision Making

The Power of API

GIS Specialists
Intelligent Maps
Data & Services
Groups
Discover Access
Executive Viewer
Request Form
Request Additional Information

The Power of API
SDI is for Everyone

An Intuitive Platform For Sharing, Discovery, Access and Use
Web Maps are a Medium for Information Products

- Integrating Services (Data, Maps, Models…)

  - High quality mapping
  - Pop-ups, charts, and graphs
  - Live links to web services
  - Temporal data (trend data)
  - Spreadsheets and map data
  - User annotation and sketching
  - Spatial analysis
  - Embedding in other applications
Information Products Require Good Design

• Understanding Issues
• Appropriate Data
• Analysis & Manipulation

... And A Compelling Graphic Design
Good Information Products Are Timely
Good Information Products Disseminate Knowledge

Fukushima Radiation Exposure
Good Information Products Communicate Importance

Suitability For Conservation
Good Information Products Support Decision Making

Wind Turbine Suitability

Hydrocarbons
Good Information Products Show Status

- Government Expenditures vs. Need
- Haiti AID Funding
- World Bank Projects
Good Information Products Illustrate Change

Urbanization – Landsat

Temperature

Sedimentation
So What Now?

- From building to using SDIs
  - SDI revisited
  - Focus on information products
  - Built around the concept of a webmap
  - Ubiquitous access to content
  - Hosted Services in the cloud

- Are these solutions from two different technology generations, or are these complementary?

The power of AND
Extending SDIs to Everyone

- Applications
- Communities
- Mashups
- Sharing
- Discovery
- Maps and Data

Traditional SDI
Examples
A Platform Model based on ArcGIS Online

Discovery, Access and Use of Information Products

Subject Matter Experts
Executives
Policy Makers
New Media Editors
GIS Professionals
UNEP-Live

Background

- UNEP produces global and regional documents & maps
- UNEP Member States produce local UNEP documents & maps

Content
- State of the environment
- Environmental issues and programs
UNEP-Live

Business Objectives

• Access to UNEP, Member State, and Cloud resources
• Enable UNEP, Member State and Public tracking
  - environmental change, document updates
• Access to environmental warnings, alerts, and collaborative discussion
Documents, maps and UNEP indicator statistics featured
Federated search capability extends to ArcGIS Online resources (Eye on Earth)
Country Gateway
Real time on-the-fly charting/mapping of data from UNEP statistics service
Eye on Earth
Citizen centric portal

- Partnership with Microsoft and European Environment Agency
- Technology: Microsoft SharePoint + ArcGIS Online
- Data providers use: ArcGIS Online, or ArcGIS on premises
ArcGIS Online as a platform

http://www.arcgis.com/apidocs/rest/

Sharepoint

ArcGIS Online

ArcGIS Portal API

http://www.arcgis.com/apidocs/rest/
Geo.data.gov and geoplatform.gov
Private Sector Examples
INSPIRE Addresses Pan-European Issues

INSPIRE is a legal framework facilitating the access at spatial data

- Environmental
- Climate change
- Conservation
- Health
- Safety
- Transportation
- Urban planning
- ...and many more

Using Standardized Data Models, Services, and Metadata
### INSPIRE thematic scope

<table>
<thead>
<tr>
<th>Annex I</th>
<th>Annex II</th>
<th>Annex III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate Reference System</td>
<td>Elevation</td>
<td>Statistical Units</td>
</tr>
<tr>
<td>Geographical Grid System</td>
<td>Land Cover</td>
<td>Buildings</td>
</tr>
<tr>
<td>Geographical Names</td>
<td>Ortoimagery</td>
<td>Soil</td>
</tr>
<tr>
<td>Administrative Units</td>
<td>Geology</td>
<td>Land Use</td>
</tr>
<tr>
<td>Addresses</td>
<td></td>
<td>Human Health and Safety</td>
</tr>
<tr>
<td>Cadastral Parcels</td>
<td></td>
<td>Utility and Governmental Services</td>
</tr>
<tr>
<td>Transport Networks</td>
<td></td>
<td>Environmental Monitoring Facilities</td>
</tr>
<tr>
<td>Hydrography</td>
<td></td>
<td>Production and Industrial Facilities</td>
</tr>
<tr>
<td>Protected Sites</td>
<td></td>
<td>Agricultural and Aquacultural Facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Population Distribution – Demography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Area Managements/Restriction/Regulation Zones and Reporting Units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Natural Risk Zones</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atmospheric Conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meteorological Geographical Features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oceanographic Geographical Features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sea Regions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bio-geographical Regions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Habitats and Biotopes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Species Distribution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy Resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mineral Resources</td>
</tr>
</tbody>
</table>
ArcGIS for INSPIRE
Extends ArcGIS to Support INSPIRE Directive

- Allows to comply with INSPIRE by extending their existing ArcGIS infrastructure
- Meet compliance in a timely manner
ArcGIS for INSPIRE
Extends ArcGIS to Support INSPIRE Directive

• ArcGIS for INSPIRE provides
  - Compliant services
  - Data models
  - Integrated tools
• Desktop and server extensions
• Reduces complexity of implementing compliant nodes
Extending the reach of INSPIRE

INSPIRE Services and Apps for GIS professionals, Citizens, Developers …

Data View and Download services

INSPIRE

INSPIRE

INSPIRE
Validating the result

Top 10 user questions

Information/Data model

Delivery and Share

Geodatabase implementation
Other use cases
Our Challenge: The Power of AND

• Minimalistic user experience AND rich functionality
• Simple descriptions AND complete metadata
• Work with our content AND everyone else’s
• Great taste AND 0 calories
• Outsource everything AND do it myself
• Publish once AND share everywhere
I want to share metadata in standard format

- ISO, FGDC, Dublin Core, GEMINI, …
Expose a CSW
Expose a CSW ISO catalog
Integration with other modules

FGDC Service Status Checker
Steps to evaluate UC sessions

- My UC Homepage > “Evaluate Sessions”
- Choose session from planner
  OR
- Search for session

www.esri.com/ucsurveysessions
• Thank you for attending
• Have fun at UC2012
• Open for Questions

• Please fill out the evaluation:

  www.esri.com/ucsessionssurveys

  *First Offering ID: 985*