Community GIS over the Web: A Categorization and Analysis

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Our goal: To better understand the dimensions in Web-based community GIS.

Four dimensions

- Spatial data sources
- Web technologies
- People and community
- Sustainability
Application, technical, and user issues in GIS:

<table>
<thead>
<tr>
<th>GIS APP Issues</th>
<th>Technical Issues</th>
<th>User Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Support Systems</td>
<td>Data Acquisition &amp; Standard Distribution, Sharing &amp; Metadata</td>
<td>Top Down</td>
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<tr>
<td>*Natural Resources &amp; Environment</td>
<td>Remote Sensing &amp; GPS Integration</td>
<td>Experts/Pro...</td>
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<td>*Marine /Coastal GIS</td>
<td>Standalone GIS</td>
<td>Public</td>
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<td>*Government GIS</td>
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<td>*Health &amp; Human Resources</td>
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<td>*Defence &amp; Public Safety</td>
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<td>*GIS in Transportation</td>
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<td>*PPGIS</td>
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<td>Business Application</td>
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<td>*Enterprise GIS</td>
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<td>*GIS in Industry</td>
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<td>Culture &amp; Education</td>
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<td>*GIS in Culture &amp; History</td>
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<td>*GIS &amp; Education</td>
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Community GIS over the Web: A Categorization and Analysis

1. Spatial Data Sources

- Authority-provided (e.g., satellite images, topographical maps).
- Community-generated (e.g., user annotations, landscape photos, GPS traces).
- Publicly accessible, geo-coded data (e.g., census data, zip code boundary).
- From open access to user feedback and interaction, and then to collaborative analysis in real time and from different locations.
- Data interoperability issues (cf. OGC, ISO/TC 211).
### Types of Spatial Data Most Useful to Community Organisations

<table>
<thead>
<tr>
<th>Neighborhood Issue</th>
<th>Spatial Data</th>
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</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Ownership</td>
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<td>Zoning</td>
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<tr>
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<td>Land use</td>
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<td></td>
<td>Assessed land/structure value</td>
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<td></td>
<td>Tax exemption status of land/structure</td>
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<td></td>
<td>Structural information on buildings</td>
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<tr>
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<td>Year of change of assessment code</td>
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<td>Property transfer information</td>
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<td>Tax delinquency status</td>
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<td>Building code violations</td>
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<td>Raze status</td>
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<td></td>
<td>Vacant lots</td>
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<td>Boarded-up homes</td>
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<tr>
<td>Economic Development</td>
<td>Employment opportunities</td>
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<tr>
<td></td>
<td>List of neighborhood businesses</td>
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<td></td>
<td>Membership in business associations</td>
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<td></td>
<td>Small business lending data</td>
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<td>Job training programs</td>
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<td></td>
<td>Youth leadership</td>
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<tr>
<td>Crime</td>
<td>Incidents listed by dates, locations, types of crime data</td>
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<tr>
<td>Health/Environment</td>
<td>Health statistics</td>
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<td>Hazardous material storage sites</td>
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<td>Lead contamination data</td>
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<tr>
<td>Property Investment</td>
<td>Private mortgage data</td>
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<td></td>
<td>Public lending data</td>
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<tr>
<td>School Data</td>
<td>Public school data</td>
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<tr>
<td>Client Data</td>
<td>Contact data about members, participants</td>
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<tr>
<td></td>
<td>Date of participation</td>
</tr>
<tr>
<td></td>
<td>Participation activities</td>
</tr>
</tbody>
</table>

*How would community-generated spatial data help the decision making process?*

*Sample of community-generated spatial data: Real-time crime report.*

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### Relationship between Information Communities (ICs) and Sector or Community Specific Spatial Data Infrastructures (CSSDIs)

<table>
<thead>
<tr>
<th>CSSD1</th>
<th>IC1 (e.g. soil scientists)</th>
<th>IC2 (e.g. ecologists)</th>
<th>ICn (e.g. architects)</th>
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<tbody>
<tr>
<td>CSSD11 (e.g. academic sector)</td>
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<tr>
<td>CSSD12 (e.g. governmental)</td>
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<tr>
<td>CSSD1n</td>
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Web and Community GIS

• Web and access (i.e., web server/browse).
• Web for interoperable geo-data (e.g., GML, SVG).
• Web as community development tool (e.g., mailing list archive, personal/community publishing).

• “Community GIS over the Web” needs all of the above.
Community and Spatial Data

- Two types of community:
  - Concentrated ("local community") – Community is residence-based and concerned about local issues.
  - Dispersed ("web community") – People are distributed globally but collaborating in specific issues.

- Degree of dependence of the community on geo-spatial data?
• The which extent does the community rely on geo-spatial information to communicate and self-develop?

A proposed community GIS categorization.
Zone I – Access to Geo-spatial Data: Show Cases

**UK - What's in your backyard?**

A web-based application that allows the public to view detailed state and local governmental services /information in their neighborhood or place of choice.

- **Authority:** Environment Agency/Environmental Protection Agency
- **Geo-spatial data:** diverse government sources
- **To People/Personal:** your backyard/my window

**US: Window to My Environment (WME)**

A web-based application that provides a window to state, local, and federal information on environmental conditions at a user's place of interest. It is a partnership between the U.S. Environmental Protection Agency, state, and local agencies to provide public access to environmental data and information.

- **Window to My Environment**
- **U.S. Environmental Protection Agency**
- **To People/Personal:** your window
3. People and Community

Zone II – Local Community: Show Cases

- The City of Milwaukee: Community Mapping, Planning, and Analysis for Safety Strategy (COMPASS)
  
  Over 17 grassroots community organisations of inner-city neighborhoods have been using spatial data and GIS in their participatory planning practices...

- Living Independently in Los Angeles (LILA)

- Resident-based actors – Milwaukee & Los Angeles
- Geo-spatial data- diverse government sources
- Also geo-data generated from local community’s participation.
- Local community issues: Urban Planning & Health

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3. People and Community

Zone III – Web Community: Show Cases

- **Canada: CHiRP - Environmental Community Mapping**

- **Blogmapper**

  - **Spatial Data Sources:** on-line community-generated geospatial data in real time and from different locations: Freely published data, User annotations, Uploaded GPS traces, etc.

- **People are distributed globally but collaborating on-line on specific issues.**
UK local groups + hook in annotations (RDF) + real time GPS + GML

CONSUME.NET NODEDB

3. People and Community

Zone III – Web Community: Show Cases

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3. People and Community

Zone III – Web Community: Show Cases

OneMap: http://www.onemap.org/

- Starts from 2002/ Østfold University College, Halden, Norway / based on Open Source and Open Count principles.

- Peer Review:

<table>
<thead>
<tr>
<th>Clearing House</th>
<th>Repository</th>
<th>Gate Way</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on “peer review” principle</td>
<td>Distributed storage infrastructure</td>
<td>Browser based user interface</td>
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<tr>
<td>GML/ WFS Java Servlet</td>
<td>SVG Javascript</td>
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OneMap- a Palm based map viewer and a "geoblogging" application for smartphones: "BeenThere - DoneThat". The work is based on projects in the Digital Maps Course.

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How to ensure the longevity of the community and the information system?

How to couple with rapid changes in social needs and information technologies?

Misund & Hoiberg (2003) identify 10 characteristics of “Sustainable Information Technology for Global Sustainability”

- Longevity
- Demand
- Simplicity
- Quality
- Accessibility
- Responsiveness
- Adaptivity
- Scalability
- Robustness
- Stability

criteria
Using **SWOT model** (Strength, Weakness, Opportunity, Threatness) to analyze the sustainability of web-based Community GIS.
Strength:
- Connecting, Community, Communication
- Efficiency, Effectiveness, Equity (Tulloch and Epstein, 2002)

Weakness:
- Distrust of users: Why is GIS more useful in solving community problem? Does GIS play a central or a complementary role?
- Consistency of human/technical/financial resources: Issues of Institutional support and barrier.
Opportunity

- 80% of information has geo-spatial characteristics (?).
- Open access to authority geo-spatial data.
- Standards-based Web technologies and FLOSS (Free/Libre Open Source Software) development.
- A good way to bridge the digital divide (Ghose R 2003).
Threatness

- **Copyright issues:** For both authority-provided and community-generated data. (Creative Commons License may be a solution.)

- **Privacy issues:** For both individuals and communities.

- **Organizational Issues:** UN Statistic Division in April 2004 says that we are in the “Geographic Information Revolution,” and indicates that the major barriers and impediments to achieve the potentials will not be technical but rather organisational. (The biggest challenge will be for all players to cooperate with one another.)
Thank you for your patience!
Web GIS – A Sound Tool for Neighborhood to Access Information.

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<th>Ubiquitous Computing</th>
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<td>From Desktop to Mobile Devices</td>
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<td>User annotations</td>
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<td>Data gardening</td>
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<td>Upload of GPS traces</td>
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<td>...</td>
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<tr>
<td>Physical/base Data</td>
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Ubiquitous Computing
- From Desktop to Mobile Devices

Location Based Service (LBS)
- Commercial Software: ArcInfo/ArcView, MapInfo, GeoMedia
- Open Source: GML + SVG + RDF
3. People and Community

• **Zone I – Access to Geo-spatial Data**: Geo-spatial data mainly flows from the authority to the people; community development need not depend on GIS.

• **Zone II – Local Community**: Resident based actors focus on local or centered community issues. This community mainly rely on government’s geospatial infrastructure with more and more spatial data generated from physical/local community’s participation. For example, many literatures have evidenced the PPGIS’s achievement facilitating public decision process.

• **Zone III – Web Community**: Distributed geographically characters but collaborative in specific issues on-line, (feedback/interaction) in real time/ from remote locations. Based on the base geo data with the increasing on-line community-generated data in real time and from remote locations. eg: the applications of geo-blogging.