

A vertical strip of a topographic map is visible on the left side of the slide. It shows contour lines, a river, and some text labels: 'S LEDGE' at the top, 'WEST' in the middle, and 'RIDG' at the bottom.

The World Bank and the Open Geospatial Web

–Chris Holmes

Geospatial is Everywhere

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.



Spatial Data Infrastructure (SDI)

“...the sources, systems, network linkages, standards, and institutional issues involved in delivering spatially-related data from many different sources to the widest possible group of potential users at affordable costs.”

– Groot & McLaughlin 2000

The Success of SDIs?

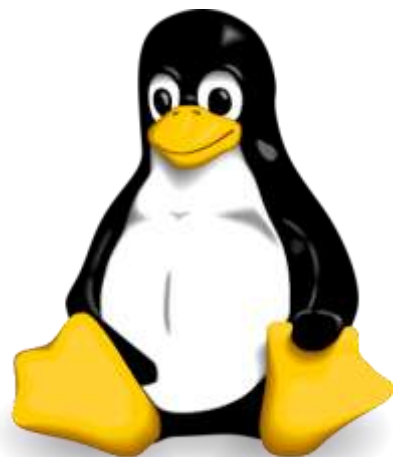
The top screenshot shows the INSPIRE Geoportal search results page. A callout bubble highlights the text "Number of records: 58864".

The bottom screenshot shows a Google search results page. A callout bubble highlights the text "of about 6,470,000 for file".




“Architectures of Participation”

– Coined by Tim O’Reilly



Web^{2.0}



An “Architecture of Participation” is both **social and **technical**, leveraging the skills and energy of users as much as possible to cooperate in building something bigger than any single person or organization could alone.**

Architectures of Participation



Software: The first domain to see benefits



The process can be applied to other fields



Geospatial Data



Creation



Sharing

Factors for Success



Compelling Initiative



User at the Center



User Responsibility

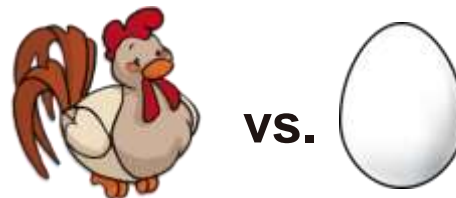


No Barriers or Difficulty

Compelling Initiative: 'give a win'



- No benefit to registering
- Few real users
- No recognition
- No reward for the effort
- Uses stick, not carrot



Compelling Initiative: 'give a win'

The Google logo is displayed in its standard multi-colored font (blue, red, yellow, blue, green, red).

- Quickly add data to quality map
- Ease of customization
- Recognition: Shared, emailed, blogged about...
- Indexed & Searchable



Users as Contributors

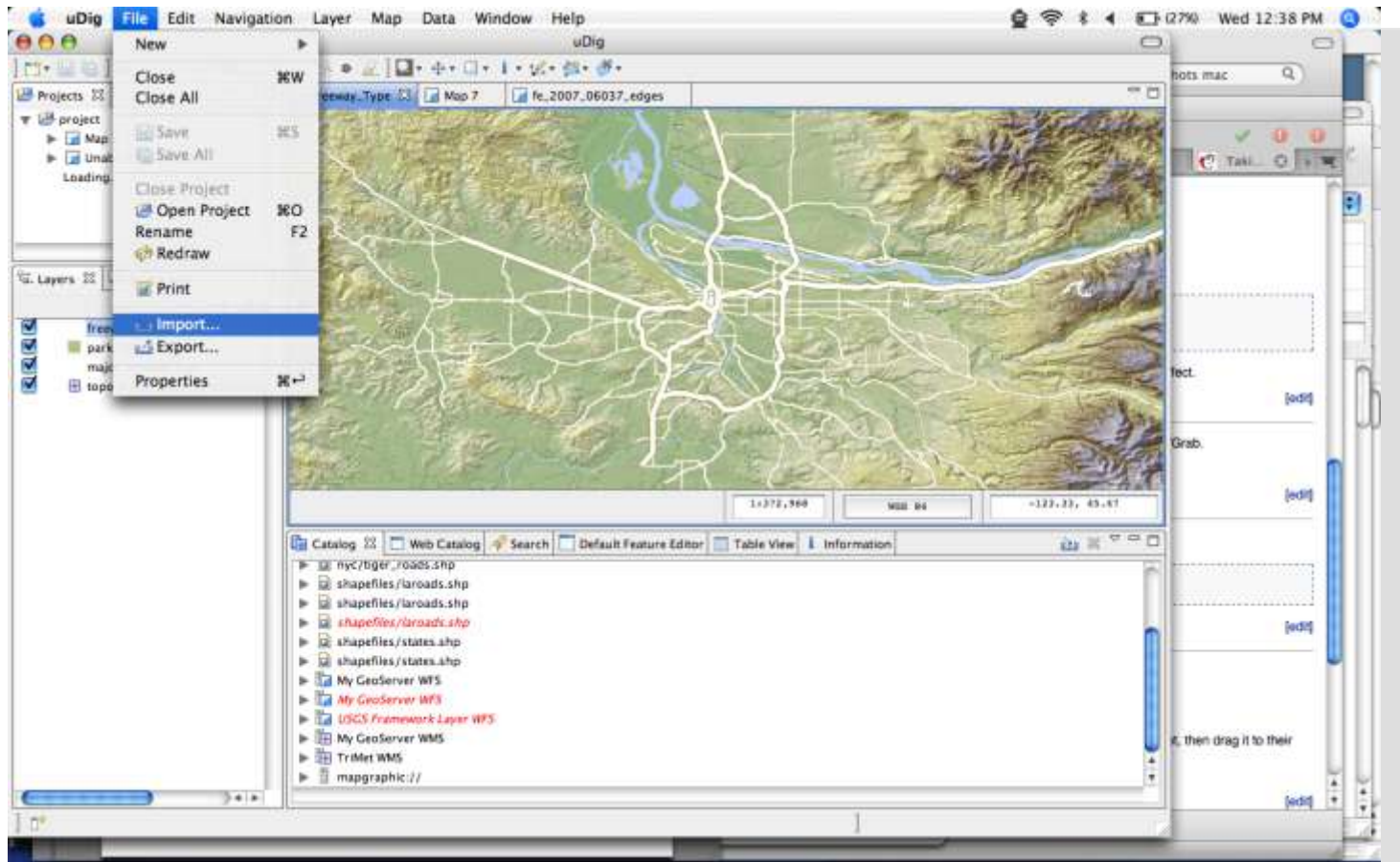
- Consumers \neq Producers
- Data from “official” sources
- Metadata takes training
- GIS Professionals Only



Users as Contributors

- Consumers = Producers
- Everyone encouraged to contribute
- Community members grow in to experts
- Even used for 'real GIS'
...it's easier than getting on an SDI

SDI Contributing: Data



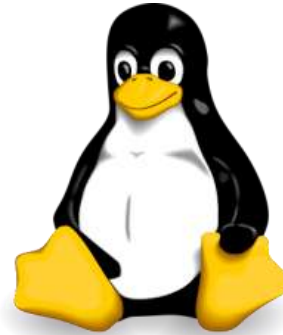
Hardware



Software



GeoServer



Apache



Windows



ESRI



CubeWerx



OPENGEO
www.opengeo.org

Metadata

The screenshot shows the INSPIRE Metadata Editor web application. The browser address bar displays <http://www.inspire-geoportal.eu/InspireEditor/>. The page header includes the INSPIRE logo, the text "INSPIRE Geoportal the EU portal for Geographic Information", and the JRC European Commission logo. Below the header is a navigation menu with tabs: Metadata, Identification, Classification, Keyword, Geographic, Temporal, Quality&Validity, Conformity, Constraints, and Organization. The "Metadata" tab is selected. The main content area is titled "Metadata on metadata" and contains the following fields and controls:

- Metadata point of contact:** A table with two columns. The first column contains input fields for "E-mail Address" and "Organisation Name". The second column contains "Add" and "Remove Selected" buttons. The "E-mail Address" field contains "OpenGeo - pointOfContact - cholmes@opengeo.org".
- Metadata date:** A date input field showing "2008-09-17".
- Metadata language:** A dropdown menu showing "English".

The status bar at the bottom of the browser window shows "Done".

Metadata Training

★ Edition: bd1c7538-1ce8-4e65-8be5-a3f37ed1adc9 - Mapa topograficzna M-34-62-D-b-4 w układzie współrzę...

HTML ISO19115 ISO19115 NEM ISO19115 CORE ISO19115 INSPIRE ISO19115 WISE

- Language (Metadata language)
- Hierarchy level (Resource type)
- Contact (Metadata point of contact)
- Metadata date stamp (Metadata date)
- Identification Information
 - MD_DataIdentification
 - Citation
 - Abstract
 - Point of contact (Responsible organisation)
 - Descriptive keywords
 - MD_Keywords
 - MD_Keywords
 - Keyword (Keyword value)
 - Thesaurus name (Originating controlled vocabulary)
 - CI_Citation
 - Title (Resource title)
 - Date (Temporal reference)
 - Identifier (Unique resource iden

- MD_Keywords
- MD_Keywords
- MD_Keywords
- MD_Keywords
- MD_Keywords
- MD_Keywords
- MD_Keywords
- Resource constraints
- Spatial resolution
- Language (Resource language)
- Topic category
- Extent
- Distribution information
- Data quality information

Identification Information.MD_DataIdentification.Descriptive keywords.MD_Keywords.Thesaurus name (Originating controlled vocabulary).CI_Citation.Date (Temporal reference)

(362)
reference date for the cited resource

Values

Type	Value
------	-------

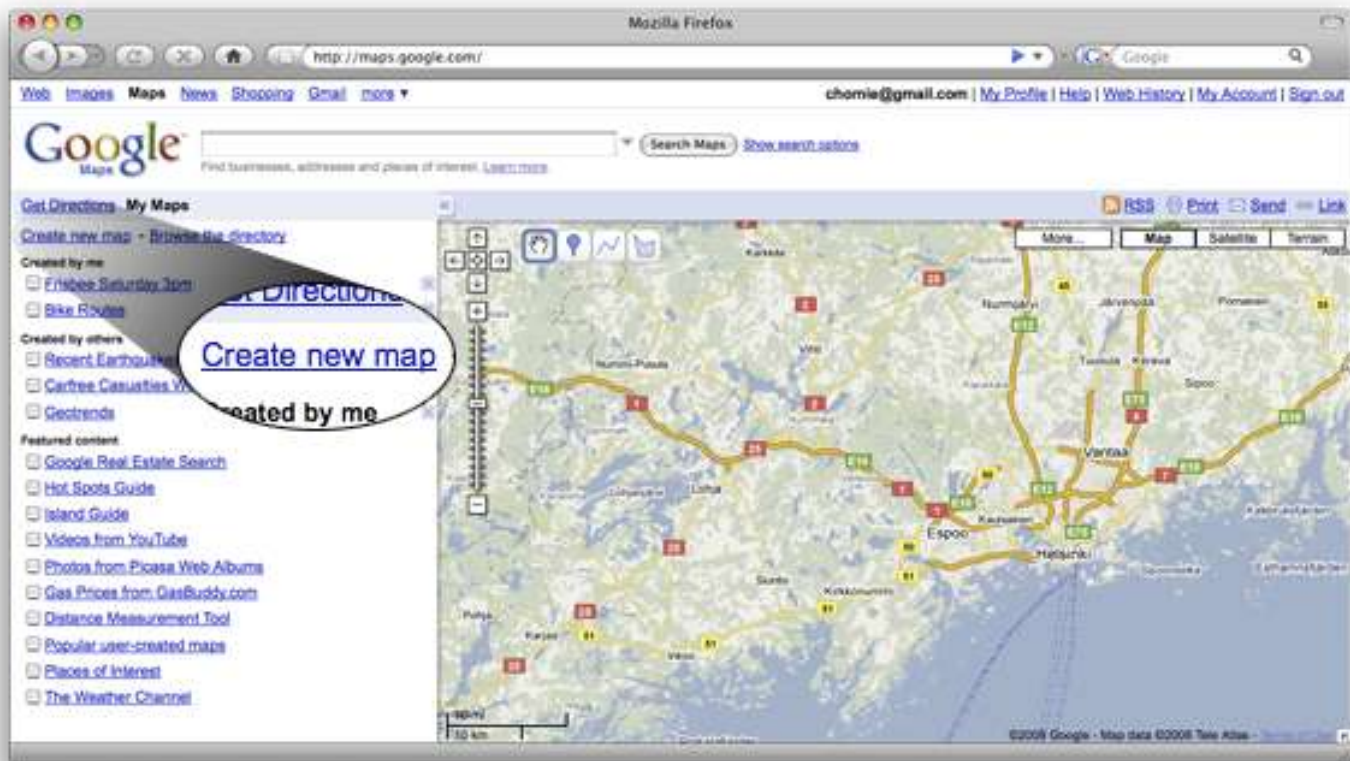
Condition: At least one temporal reference is required [temporal reference is composed

Edit Save Cancel Validate

A Catalog to Register On

The screenshot shows a web browser window titled "JRC Catalogue Service" with the URL <http://www.inspire-geoportal.eu/catalogue/Start.do>. The page features the INSPIRE Geoportal logo and the JRC (Joint Research Centre) logo of the European Commission. The main content area is titled "Select federated catalogues" and includes a "List of federated catalogues" section with a scrollable list of catalogues: BRGM, CeGi GEOcatalog, EFICP Catalogue, Geodatenkatalog (GeoMIS.Bund), and Hazard maps catalogue (GeoHazData). Below the list are "Delete" and "Info..." buttons. A "Search a catalogue" section offers search options: "By title" (selected) and "By category". Underneath, a "How do you want to search?" section has two radio buttons: "Search for all terms" and "Search with some of the terms" (selected). A search input field and a "Start query" button are also present. A left sidebar contains a "Query" menu with options for "Quick search", "Expert search", and "Select catalogues", along with a "Login" link. The browser's status bar at the bottom left shows "Done".

Contributing Data to Google...





Google Earth

Search

Fly To Find Businesses Directions

Fly to e.g., 37 25.818' N, 122 05.36' W

Places Add Content

- My Places
 - Butterfly Park
 - Untitled Network Link
 - Super-overlay: glc:glin_benz
 - glc
 - Untitled Network Link
 - Super-overlay: obis:aux_vulg aris_reynaudii
 - trimet neighborhood

Layers

View: Core

- Primary Database
 - Geographic Web
 - Roads
 - 3D Buildings
 - Borders and Labels
 - Traffic
 - Weather
 - Gallery

Butterfly Park

- Cut
- Copy
- Delete
- Rename
- Save As...
- Share / Post...
- Email...
- Directions from here
- Directions to here
- Snapshot view
- Get Info

Image © 2008 TerraMetrics

Streaming 100%

Eye alt 96.37 km

Pointer 40°31'01.07" N 90°43'23.00" W



Barriers to Entry...



Browser



Metadata



Training



Server Hardware



WMS Software



Sharing Agreements



Catalog Registration



OPENGEO
www.opengeo.org



**Does user contribution
alone make an SDI?**



OPENGEO
www.opengeo.org



Let commercial players run SDI?

- SDI's are a public good
- Commercial players have profit motive
- Commercial players seek monopoly

DANGER: Governments are handing over data without opening it to anyone else!



Towards the Open Geo Web

- ✓ Inclusive Infrastructure
- ✓ Single “Geo Web” Project
- ✓ True data accessibility
- ✓ Build on existing Architectures of Participation

Principles: Towards the Open Geo Web



Not just policies,
requirements & mandates



Align incentives to create
a single Geospatial Web



Geospatial Data



Creation



Sharing

Geo Data Creation:



OpenStreetMap



MapShare™



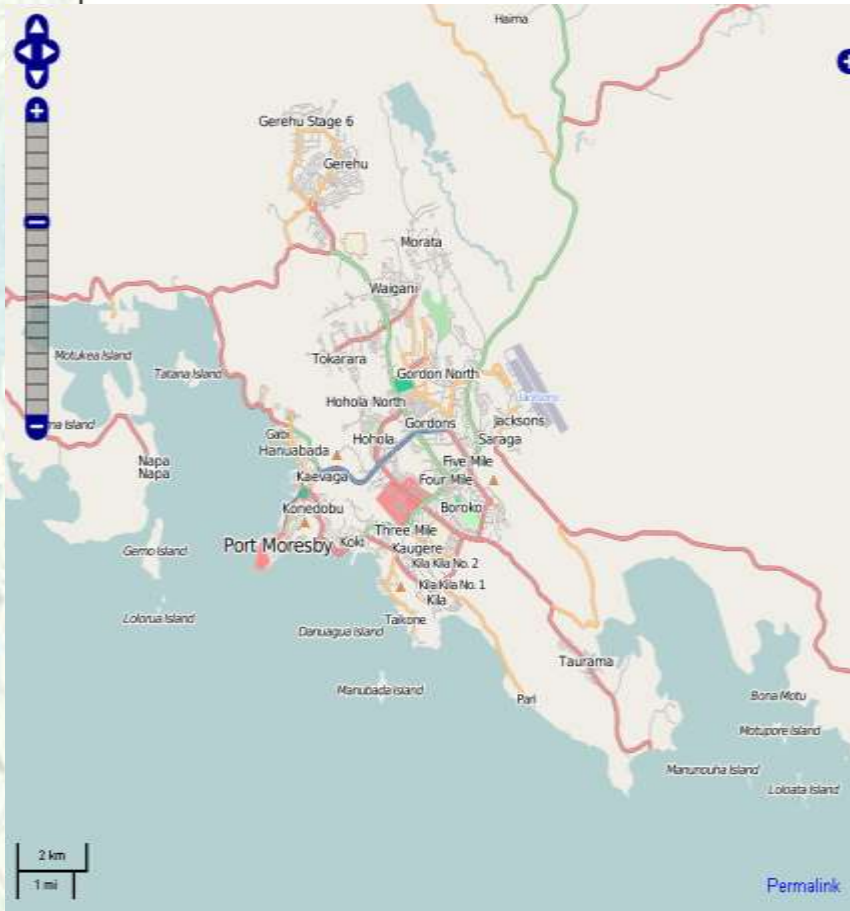
- Is already here...





OSM

Google
Maps



OPENGEO
www.opengeo.org

A vertical strip of a topographic map is visible on the left side of the slide. It shows contour lines and labels for 'S LEDGE', 'WEST', 'TILLES', and 'RIDG'.

...Though far from mature

- Licensing is a big problem
- Tools are unsophisticated
- Few different workflow options
- But huge potential has been proven

Towards Maturity: Workflow



WIKIPEDIA
The Free Encyclopedia

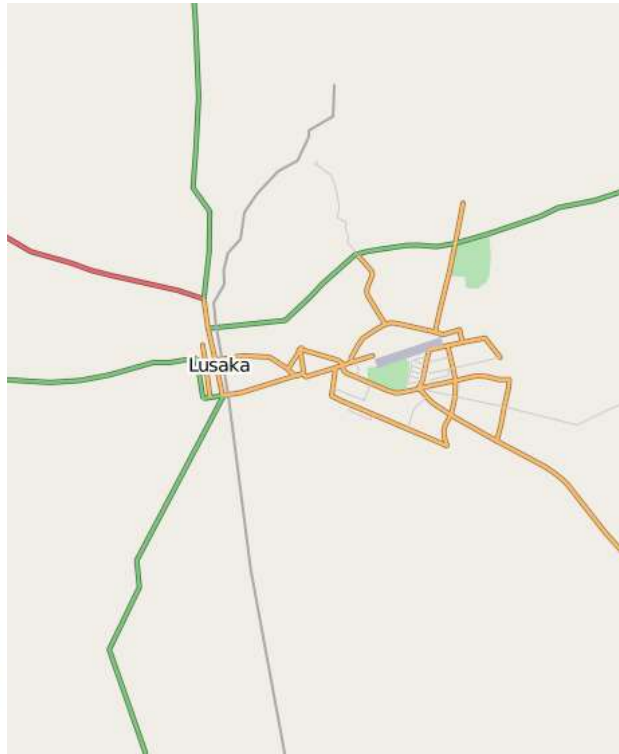
VS



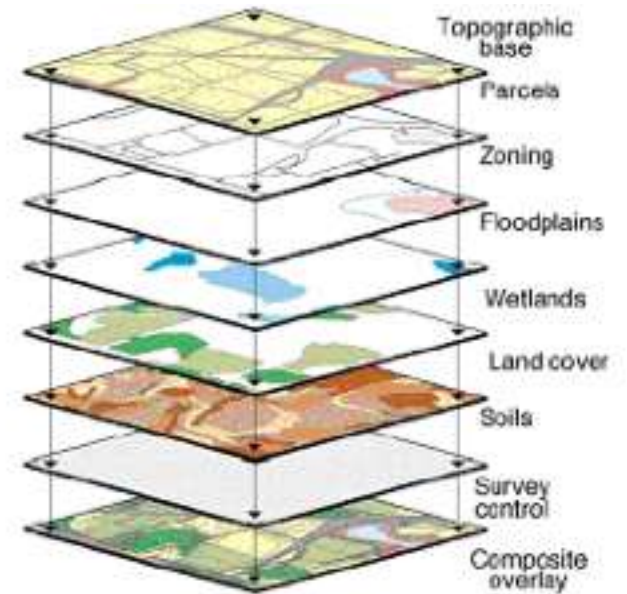
open source

 **OPENGEO**
www.opengeo.org

Towards Maturity: Scope



VS

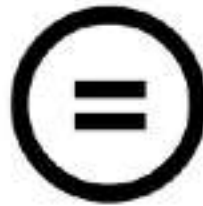




Towards Maturity: Tools

- Compatibility with GIS tools
- Advanced workflow management
 - Sandboxes, approval before acceptance
 - Automatic validation (topology, required fields)
 - Branches and merging with Conflict Resolution
 - Automatic change notification email / rss
- Automatic feature extraction: GPS tracks and Satellite images

Towards Maturity:
Licensing



For
Geodata?

A vertical strip on the left side of the slide shows a topographic map with contour lines and labels such as 'S LEDGE', 'WEST', 'TILLES', 'RIDG', and 'G'.

Towards Maturity: Cooperation

- Align efforts so that amateur, commercial, NGO and governmental creators all naturally collaborate
- Figure out workflows, tools and licenses that work for everyone
- Towards living data, constantly evolving - authoritative *and* always up to date

A vertical strip on the left side of the slide shows a topographic map. It features contour lines, a blue water feature, and text labels: 'S LEDGE' at the top, 'WEST' vertically on the left, 'TILLES' vertically on the right, and 'RIDG' at the bottom.

Building the Open Geo Web

- ‘Architectures of Participation’ - social and technical, build iteratively
- Build infrastructure to align incentives in support of data availability in open formats
- ‘Scratch your own itch’ - no one has solved spatial data sharing, figure out for yourself first
- Think in terms of nodes, each solving the problem locally, network spreads good solutions



Beyond Portals

- Web Portals went out of fashion in 2001
- 'GeoWeb Node' = GeoPortal + Web 2.0
- GeoPortal goal: find existing data
- GeoWeb Node goal: increase creation and sharing of data
- End goal of both is easier to find and use data

No more Aquariums!



Join the Web!



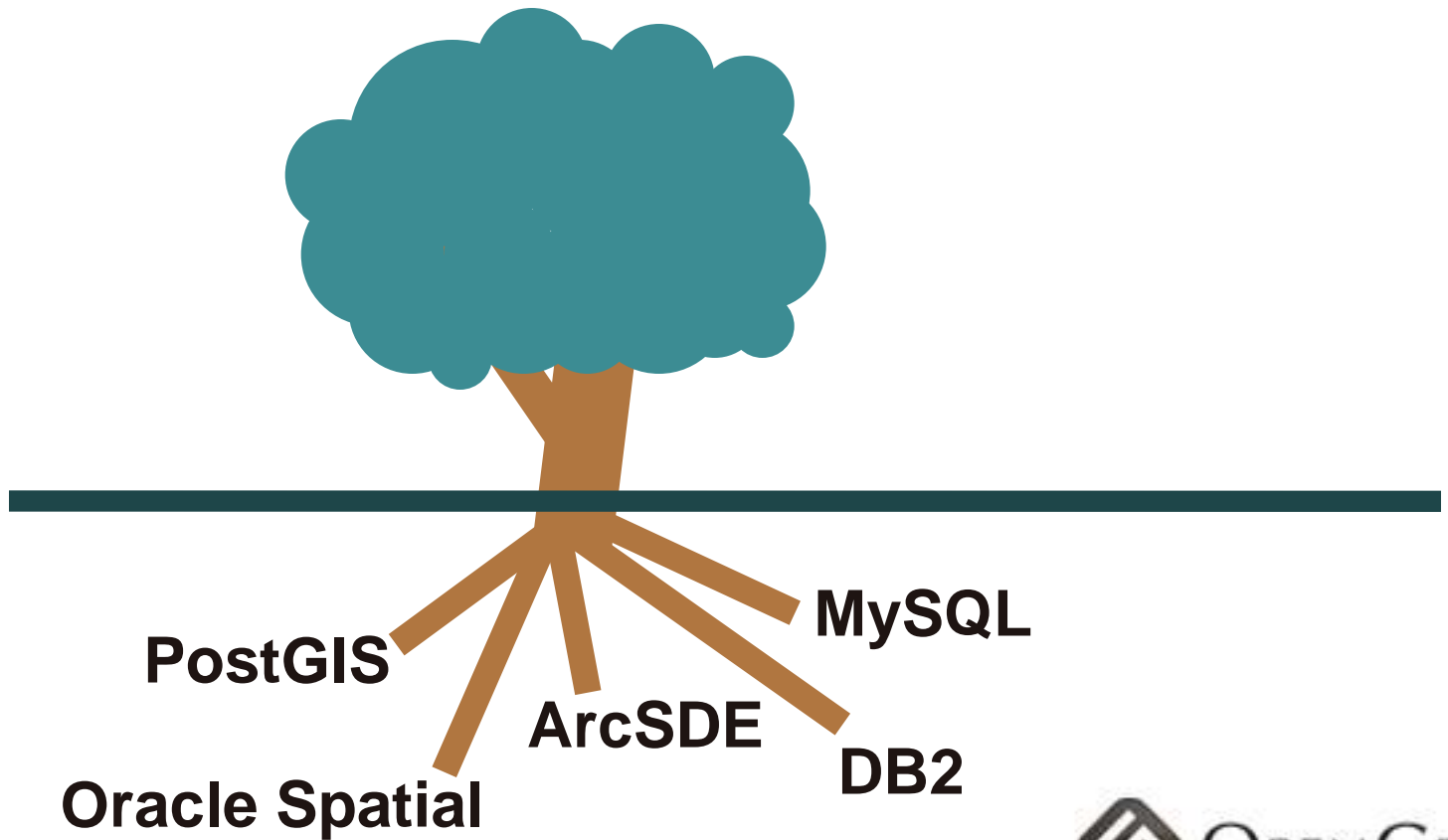
A Geo Web Node



GeoServer

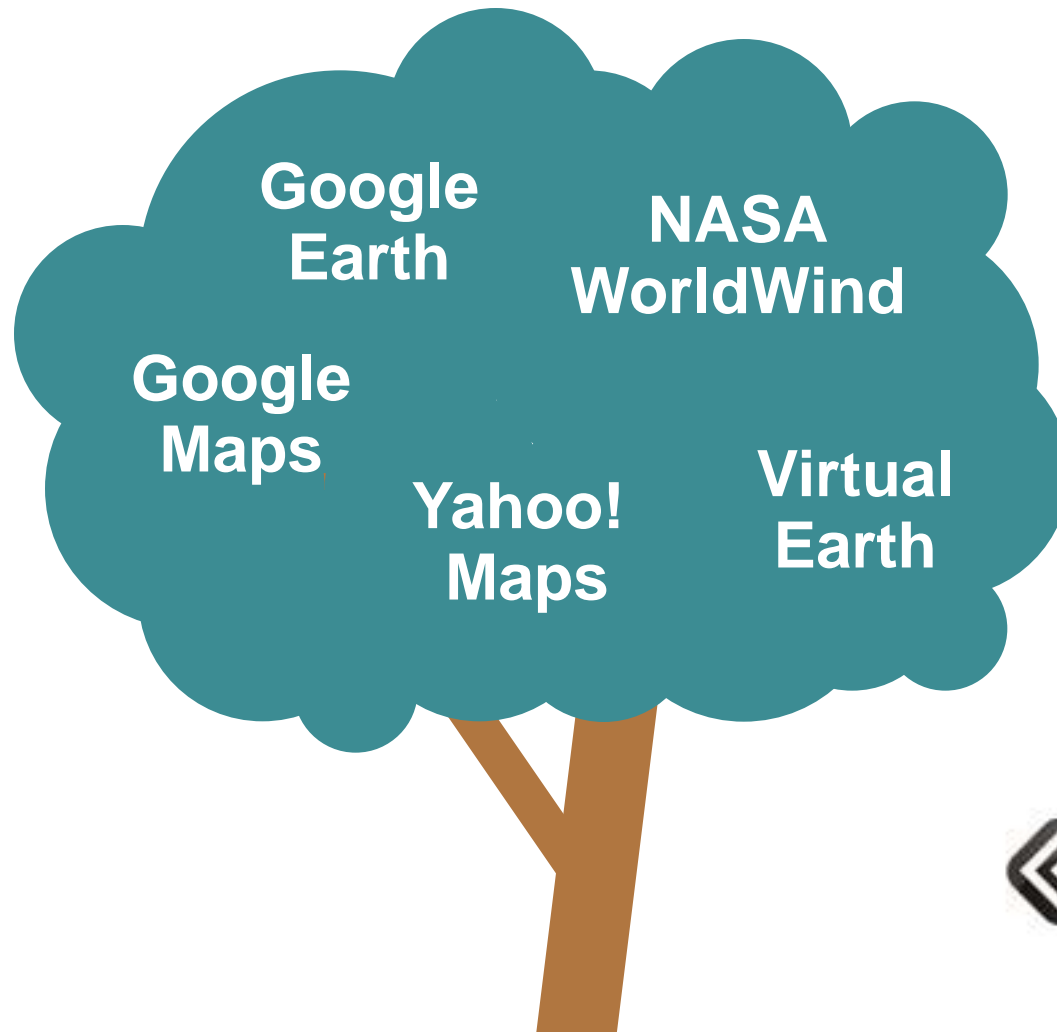
Building SDI's from the bottom up

GeoWeb Node: Rooted in Data Access





GeoWeb Node: Spreading to the Geo Web





GeoWeb Node: Integrated Viewer

GeoWeb Node: Online Styling

Styler - Mozilla Firefox

File Edit View History Bookmarks Tools Help del.icio.us

http://localhost:8000/styler2/debug.html

Meine Services PRISMA derStandard.at heise online GPRS FastKit KickJava.com: Jav... Java Magazin Eclipse Webinars Jash

Style Palette

Marker

Style: square

Size (px): 10

Stroke

Style: solid

Weight (px): 1

Color: #FFFFFF

Opacity (%): 100

Fill

Color: #FF4D4D

Opacity (%): 70

Apply

Shape Details

About Styles

Style inherited from the 2M - 4M rule of the A Test Layer layer

Override styles for this feature

North Pacific Ocean

North Atlantic Ocean

México

Gulf of Mexico

Cuba

Dominican Republic

Guatemala Honduras

POWERED BY Google

Kartendaten ©2008 Leonardo Consulting, Tele Atlas, Europa Technologies - Nutzungsbedingungen

Find: 3654

Next Previous Highlight all Match case

http://localhost:8000/styler2/debug.html#



GeoWeb Node: Easy upload

Choose File



Geofile.shp

Upload



OPENGEO
www.opengeo.org

GeoWeb Node: Searchable by Google

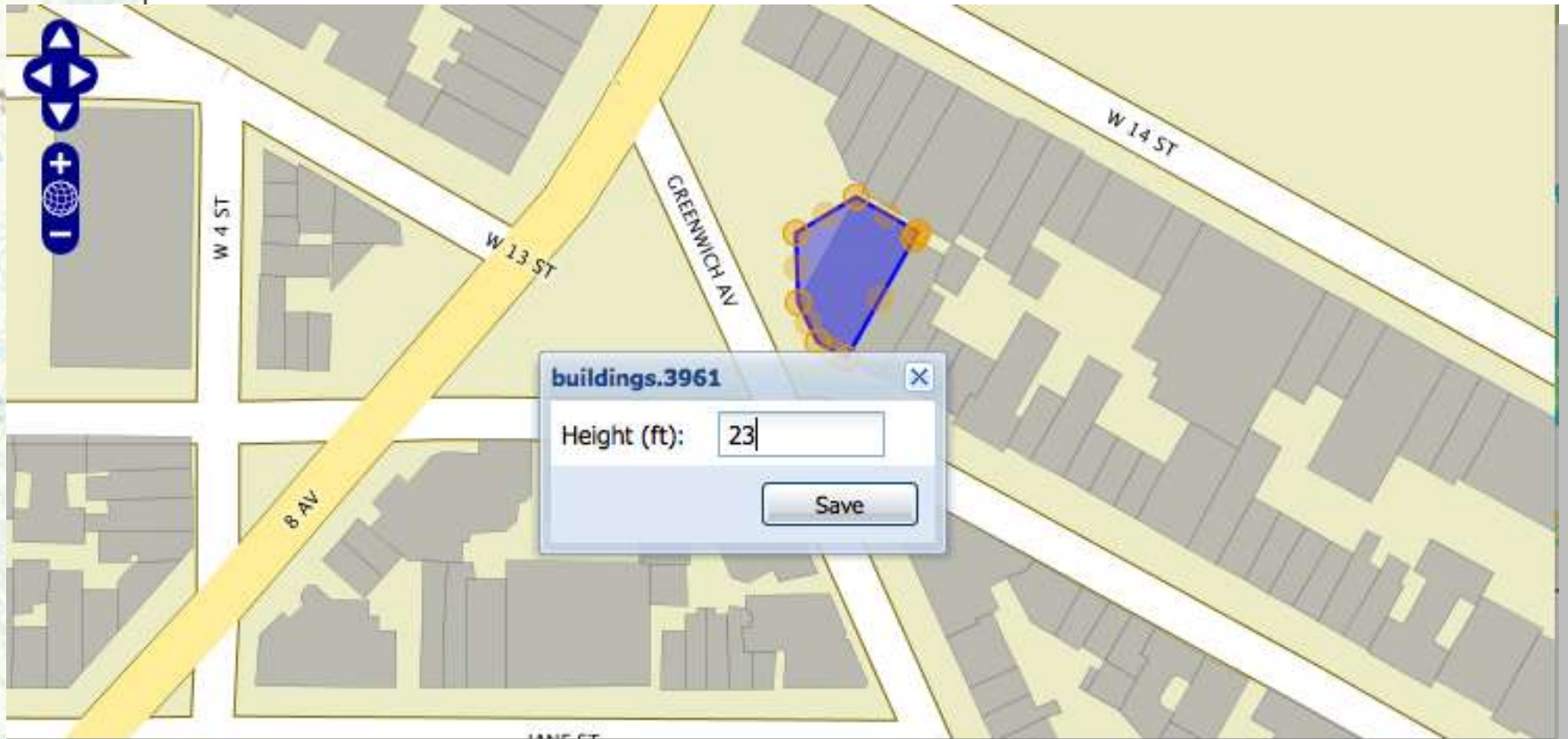
The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://maps.google.com/`. The search bar contains the text "laticeps". The search results are displayed on the left side of the page, showing five entries for "laticeps" with associated record counts and links to "GBIF Data Portal Occurrence Search".

User-created content
Results 21 - 30 of about 161 for laticeps

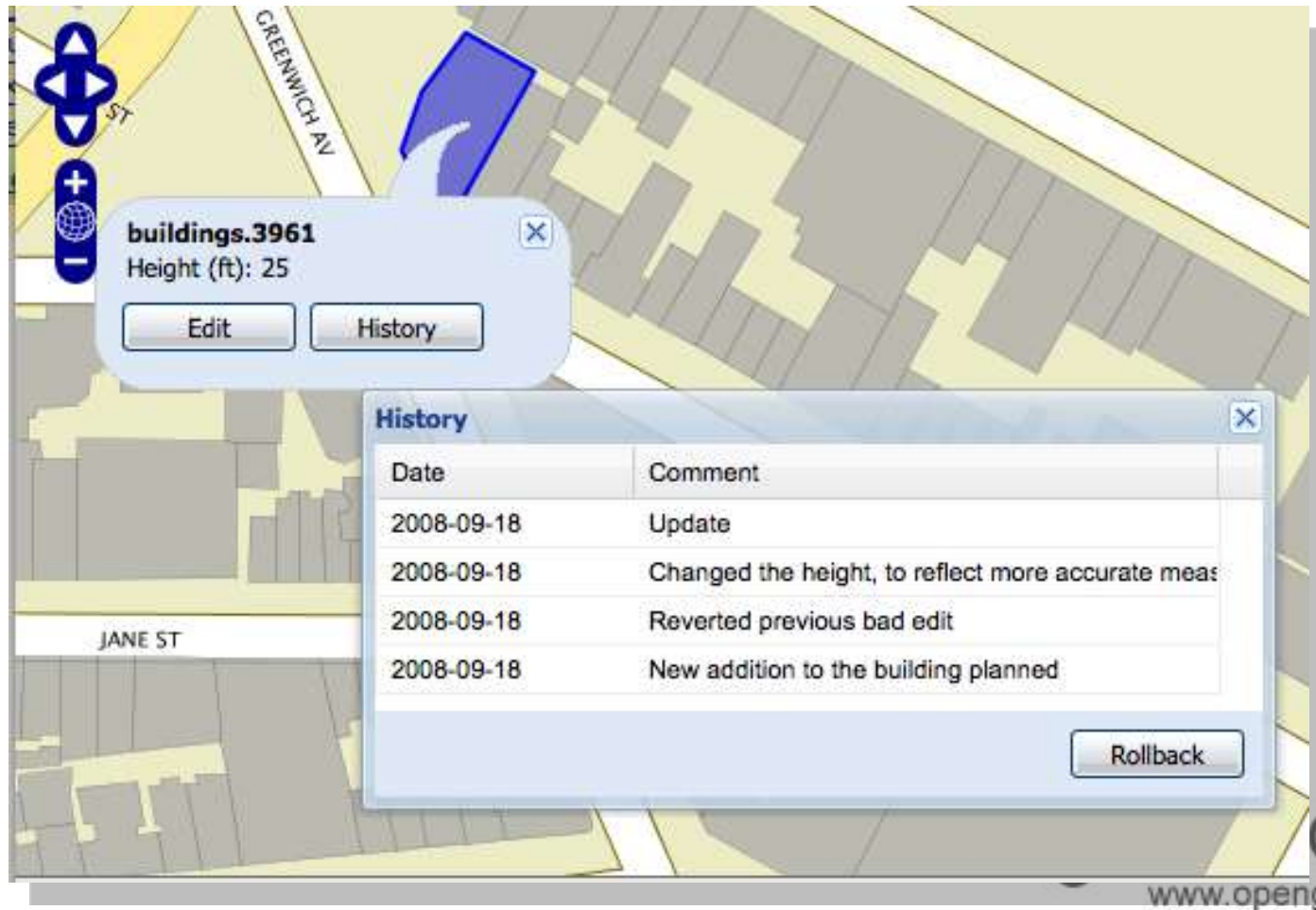
- A Salomona laticeps (3 records)** - [more info »](#)
Salomona **laticeps**.
1 of 190 placemarks in [GBIF Data Portal Occurrence Search](#) - [kr.mirror.gbif.org](#)
- B Clausocalanus laticeps** - [more info »](#)
Clausocalanus **laticeps**.
1 of 62 placemarks in [GBIF Data Portal Occurrence Search](#) - [kr.mirror.gbif.org](#)
- C Clausocalanus laticeps** - [more info »](#)
Clausocalanus **laticeps**.
1 of 25 placemarks in [GBIF Data Portal Occurrence Search](#) - [kr.mirror.gbif.org](#)
- D Clausocalanus laticeps** - [more info »](#)
Clausocalanus **laticeps**.
1 of 25 placemarks in [GBIF Data Portal Occurrence Search](#) - [kr.mirror.gbif.org](#)
- E Clausocalanus laticeps** - [more info »](#)
Clausocalanus **laticeps**.
1 of 78 placemarks in [GBIF Data Portal Occurrence Search](#) - [kr.mirror.gbif.org](#)

The map on the right shows the region of Australia and Papua New Guinea, with several blue location pins labeled A through J. The map includes a scale bar (1000 mi / 1000 km) and a copyright notice: ©2008 Google - Map data ©2008 Europa Technologies - [Terms of Use](#)

GeoWeb Node: Editing



GeoWeb Node: Versioning and advanced workflow



The screenshot displays a map interface with a building node selected. A tooltip for the node 'buildings.3961' shows its height as 25 feet and provides 'Edit' and 'History' buttons. The 'History' window is open, showing a table of changes:

Date	Comment
2008-09-18	Update
2008-09-18	Changed the height, to reflect more accurate meas
2008-09-18	Reverted previous bad edit
2008-09-18	New addition to the building planned

A 'Rollback' button is located at the bottom right of the history window. The map background shows streets like WEST ST, GREENWICH AV, and JANE ST.



GeoWeb Node: User accounts

- User statistics
- Comments, ratings, tags
- Collaborative Filtering
- Rankings of best 'views' and data sets contributed
- Highest rated, most viewed, most shared

A vertical strip on the left side of the slide shows a topographic map. It features contour lines, a blue water feature, and labels such as 'S LEDGE', 'WEST', 'TILLES', 'RIDG', and 'G'.

GeoWeb Node: Metadata

- Derive from data and user actions
- Don't require metadata to put out data
- Wiki type editing of metadata
- Automatically available with the Catalog standards



GeoWeb Node: The bottom up SDI

- Traditional SDI start with metadata
 - Metadata -> Users -> Data
- GeoWebNodes start with data
 - Data -> Users -> Metadata
- Align incentives so everyone gets some benefit from contributing
- Make it easy and open for anyone to use, not just specialists
- Build iteratively

A vertical strip on the left side of the slide shows a topographic map. It features contour lines, a blue water feature, and labels such as 'S LEDGE', 'WEST', 'TILLES', 'RIDG', and 'G'.

Where to put these nodes?

- Everywhere!
- Anywhere you might put a portal
- Anywhere you have an 'Enterprise GIS System'
- Anywhere people share data with each other
- Handling all these use cases will evolve GeoWeb nodes to be truly useful



A Spatial Data Clearinghouse

- Focus on one region and one domain
- Easy for anyone to create, edit and share maps
- Compelling styling, export options on webpages, Google Earth, WorldWind
- Tagging/rating/commenting and traditional metadata combining for ease of use
- Resulting maps available as all open standards and real data downloads
- Users just viewing add value with rating, making maps, statistics

A vertical strip on the left side of the slide shows a topographic map. It features contour lines, a blue river or stream, and labels such as 'S LEDGE', 'WEST', 'TILLES', and 'RIDG'.

Spreading the GeoWeb Nodes

- Build the first Spatial Data Clearinghouse on Open Source Software
- Allow anyone to use the same package
- Other domains and regions will improve software in other ways that all nodes can use
- Encourage internal use, make it the easiest way to create and share data
- Sync nodes up and down for increased performance
- Result is a true information infrastructure

Building the GeoWeb Node

The OpenGeo Suite



GeoExt



GeoWebCache



GeoServer



PostGIS



OPENGEO
www.opengeo.org

Don't have to go it alone



OpenGeo
Enterprise
o

The Future: Beyond Portals

- The future is users
- Geo Participation
 - GIS Professionals
 - Amateur Neo Geographers
 - Anyone with a locative device
- Technology & Community





My GeoWeb Goal

Let's build a Geo Web that's so **compelling** and **easy-to-use** that everyone: Citizens, Governments, NGO's and Companies all naturally collaborate towards the same infrastructure for public good.



Learn more...

www.geoserver.org

www.opengeo.org

www.cholmes.wordpress.com



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In the beginning



(The Open Planning Project)

The first project

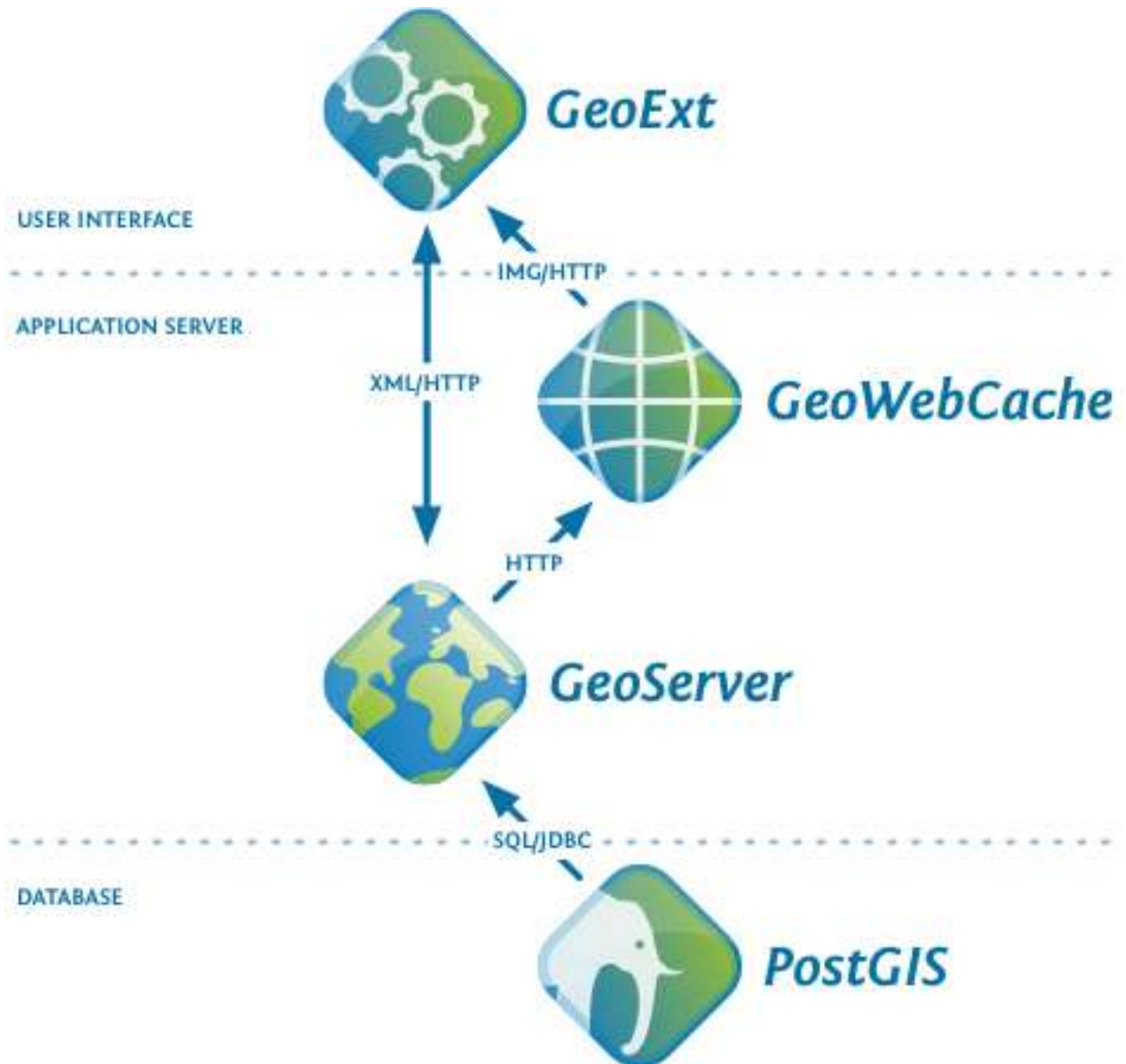
QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Towards OpenGeo



Grow!

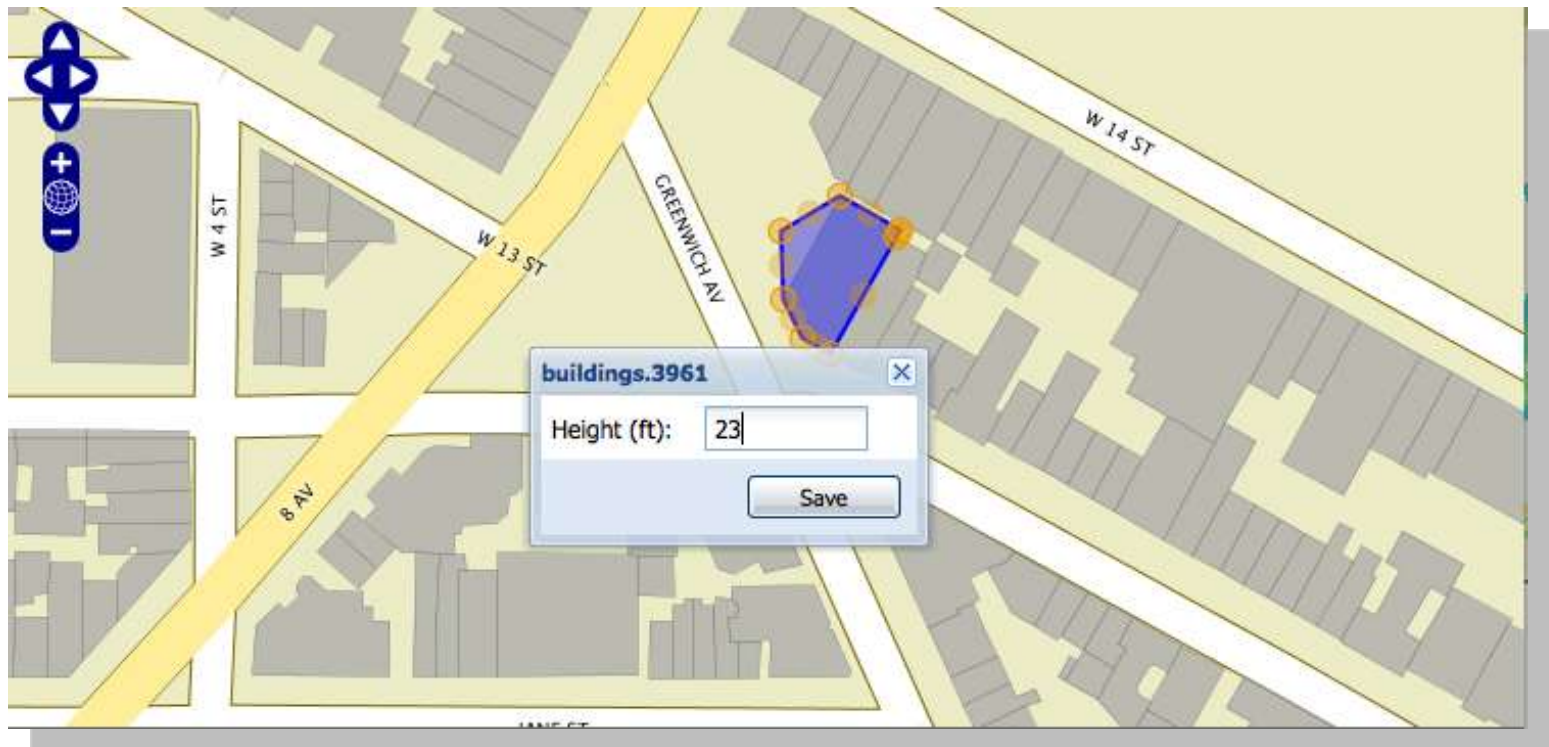
Building a stack



The Client



OpenLayers



The Cache



The Database



PostGIS



OPENGEO
www.opengeo.org

The Rich Client



GeoExt



OPENGEO
www.opengeo.org



GeoServer



OPENGEO
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The OpenGeo Suite



OPENGEO
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Funding





OPENGEO

[ABOUT](#) [BLOG](#) [SERVICES](#) [TECHNOLOGY](#) [OUR EXPERTS](#) [CONTACT](#)

Introducing OpenGeo,
the geospatial division of
The Open Planning Project

If 'off the shelf' software packages just aren't living up to their promises after opening the box, talk with us about how a partnership with OpenGeo can take you exactly where you want to go.

Your partner in the Open Geospatial Web

OpenGeo is a social enterprise that offers consulting and support services around best of breed, open source, geospatial software.

We combine flexible functionality with seamless user experience, tailored to meet the needs of your organization.

OpenGeo Introduces

GEO SERVER

ENTERPRISE EDITION

Two new ways to get the finest in services and



OPENGEO
www.opengeo.org

Towards a Product



GEO SERVER

Enterprise



OPENGEO
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Building the Open Geospatial Web

Making Geospatial Information Open and Accessible

By bringing Open Source Principles to Geo Working by building OS software that gets used by all

In the context of a hybrid organization

The full solution



OpenGe
Enterprise
o