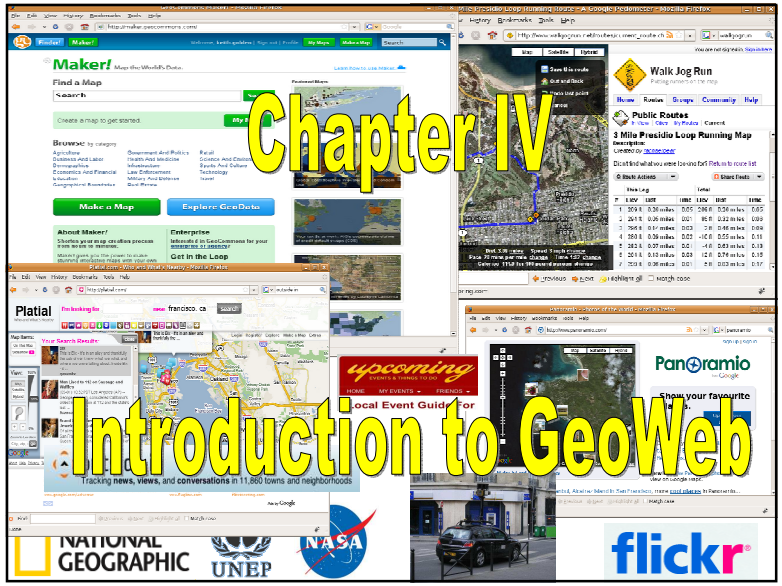
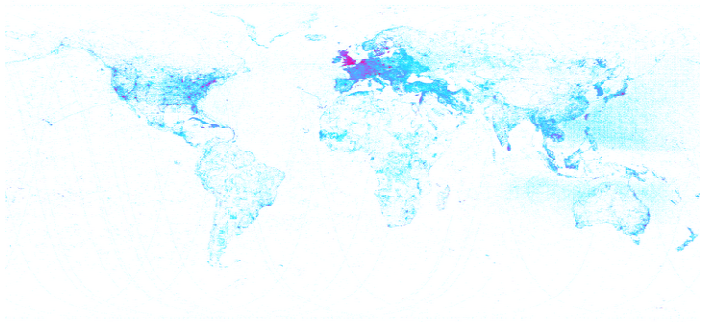
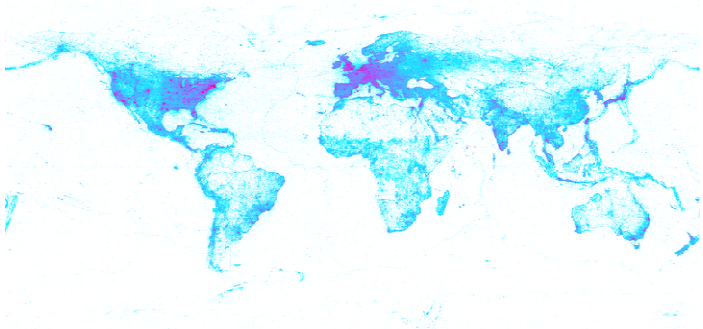


GeoWeb, 3 years ago



GeoWeb, now



4 – Introduction to Geo Web

- 4.1 – Semantic Web / Geospatial Web
- 4.2 – Geocoding, Geonaming, Geoparsing, Geotagging
- 4.3 – Introduction to KML
- 4.4 – Mashups
- 4.5 – Physical Hypermedia
- 4.6 – Visual Portals for LBS
- 4.7 – Google Street View
- 4.8 – Conclusions

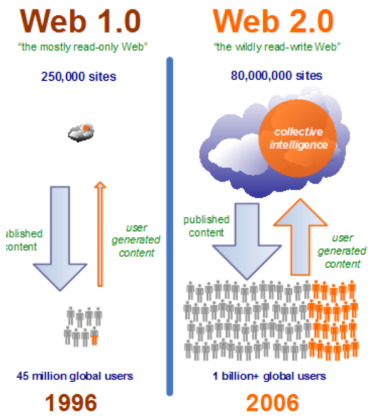
4.1 – Semantic Web / Geospatial Web

- GIS Evolution
- New functionalities
- New mentalities
- All the citizens can contribute

Key-words of today's web

Comunicazione, collaborazione, condivisione, partecipazione, tagging, video online, sharing, widget, filtering, online documents editing, wiki, blog, corporate blogging, peer production, viral marketing, proximity marketing, internet of things, bookmarklet, social media, social networks, links, social news, cityzen journalism, messaging, pooling, strutture emergenti, ordinare, prioritizzare, mashup, feeds...

From yesterday to today



Same technologies

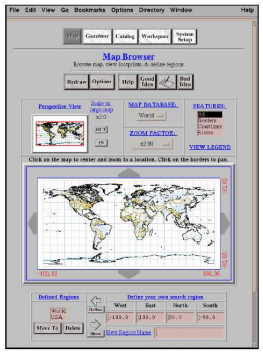
But the context is different

Users not only read, but also contribute

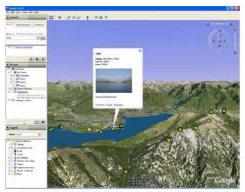
So generating a sort of collective intelligence

Creation of a Social Web

Evolution



From 1993 ➔

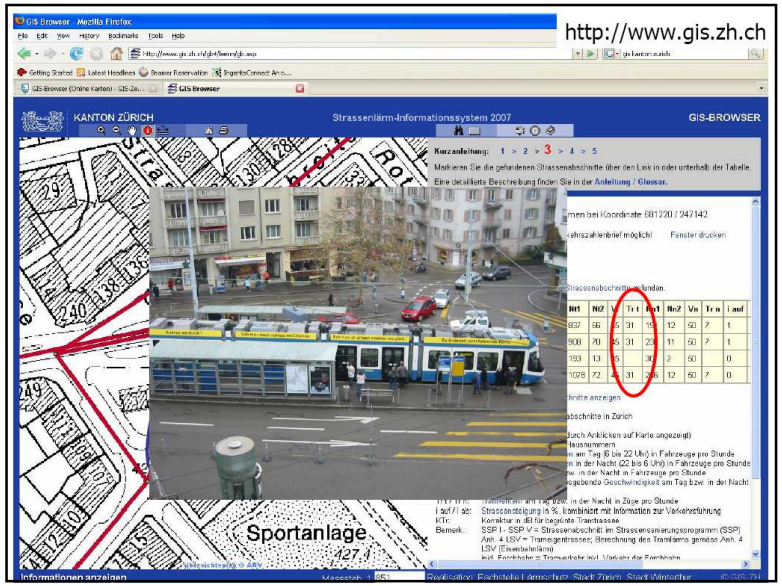


To 2009 ➔

Evolution

From 1993 ➔
Structured spatial data

From 2008 ➔
Non-structured spatial data



Google Earth (and Google Maps)

- Google Maps and Google Earth both have been released in 2005 (although Google Earth was bought from another firm)
- They have revolutionized the use of the spatial data on the web
- Google Maps have offered some AP's (application planning interface) that have made easy to add additional data
- The use of KML allows the consumers to manage their own data in 3D
- A big subset of the OGC vision of interoperability is now happening through Google

Semantic Web

- Transformation of the World Wide Web in an environment where the published (pages HTML, file, images, and so on)
- Association of information and data (metadata)
  - which specifies the semantic context of it in a proper format
  - for querying, to the interpretation and, in general, to the automatic elaboration.

Wikipedia: http://en.wikipedia.org/wiki/Semantic_Web

- With the interpretation of the content of the documents that the Semantic Web advocates:
  - It will be possible to make more evolved searches than the actual ones, based on the presence of key words in the document and
  - other special operations such as the construction of network of relationships and connections among documents according to more elaborate mechanisms than the simple hypertext link

Scope of Semantic Web

- Development of applications for:
  - extraction of information from extemporaneous collections / dynamics of documents
  - validity check of the contents
  - identification of style
  - recognition of virtual hyperlink connections
  - intelligent agents

GeoWeb

- The Geospatial Web or Geoweb is a relatively new term that implies the merging of geographical (location-based) information with the abstract information that currently dominates the Internet.
- This would create an environment where one could search for things based on location instead of by keyword only – i.e. "What is Here?".

http://en.wikipedia.org/wiki/Geoweb

Geoweb

- Intelligent location
- Use of Internet
- Toponyms ➔ location on the globe
- postal Address.
- location on the globe
- Location-based relations
- Gazetteer

Three ingredients of web 2.0

- Technological
  - interactive Web,
  - not more software products but services
- Sociological
  - to belong to a community,
  - to interact with other members
- Economic
  - Who provides the service spends few, but if in case of success, can earn a lot

Sharing

	Web 1.0	Web 2.0
Information	Agencies	Blogs
Knowledge	From writer to reader	Wikipedia
Images	Database/Usenet	Community (Flickr)
Video	Database/Usenet	Community Youtube
Bookmark	Private (user)	Condivisi Del.icio.us
Classification	Taxonomy	Folksonomy

Taxonomy / Folksonomy

- Categories
- Classes
- Rules
- Projected
- Precise
- Deterministic
- Annoying
- Semantic Web
- Used in catalogues

- Individual
- Attribute
- Suggestion
- Implicit
- Fuzzy
- Probabilistic
- Immediate
- Web 2.0
- Used in the community

Mashup: What are they?

- Expression coming from pop music
- Integration of several existing services for generating fresh applications
  - SOAP
  - REST
  - JavaScript
  - RSS/Atom

1 browser, 1000 applications

- E-mail (Gmail)
- Cartography (Gmaps, Yahoomaps, VirtualEarth)
- Word processor (Writely, officelive)
- Spreadsheet (Google spreadsheet)
- Encyclopedia (Wikipedia)
- Agenda (30 boxes, Gcalendar)
- Bookmarks (del.icio.us)
- News, podcast, ecc. (Bloglines)
- Programmation (zimki)

Advantages for users

- Ubiquity of applications
- Zero-install
- Continuous updating (each hour)
- Data on-the-air
- Multi-device

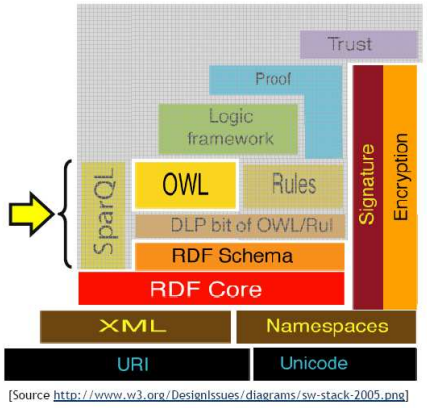
Immense problems for users

- What do they do with our data?
- How not to accept more than one certain service, and to pass to a competing service?
- How can you migrate your own data, metadata, annotations and all that the user and his community have produced?

Monopoly of new giants

- Will every developer end up writing programs that store them in their datacenters?
- The desktop is not the battleground anymore. You are able by now to migrate from Windows to Linux
- Those giants invest billions of dollars in the purchase and in the development of the Web 2.0 services (f.i. Youtube)

Semantic Web Layer cake



[Source http://www.w3.org/DesignIssues/diagrams/sw-stack-2005.png]

Machine-processable Global Web Standard
• Assign unambiguous names (URI)
• Represent data and metadata (RDF)
• Ontological language (RDF schema and OWL)
• Query languages

- Always accessible on the Web

Geographic Information Retrieval (GIR)

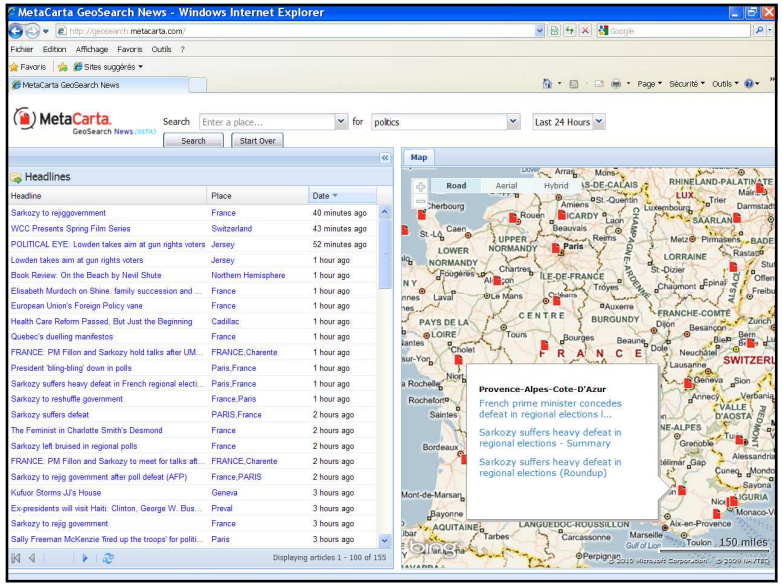
- A great deal of data is not structured
- An investigation on text document says
  - 85% out of 20 000 British documents integrate place names,
  - and 13% out of 4 million queries on Internet have some place names

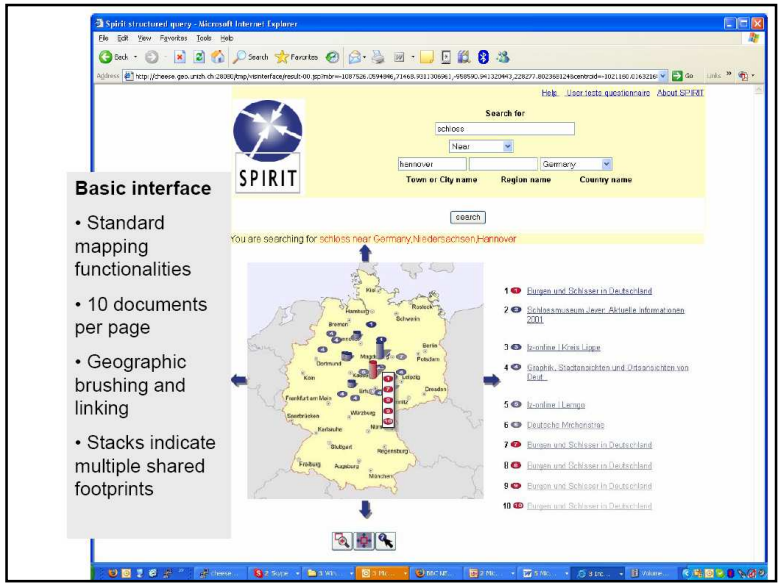
GIR Key-elements

- Identification of footprints : identify place names in non-structured texts
- Query expansion : add place names not present in the initial query
- Spatial indexing and text indexing.
- Ranking : according to theme and location.
- Formulation of queries and result visualization

Expansion of queries and spatial indexing

- Expansion : If Lyon, then add Villeurbanne, Caluire, etc.
- Necessity to know topology and neighboring place names
- Using a gazetteer
- If a user wants « castles around Zurich », a spatial index must integrate only Zurich and the vicinity





4.2 – Geocoding, Geonaming Geoparsing and Geotagging

- Geocoding
  - Finding coordinates of a place
- Geonaming
  - Give a name to a place
- Geoparsing
  - From a text, find the corresponding place
  - Solving ambiguities
- Geotagging
  - Annotate a place on a map

Geocoding

- Assigning coordinates to a place with longitude and latitude
- Two representations
  - Degrees, minutes, second (gg° mm‘ ss")
  - Decimal degrees (gg, ddd)

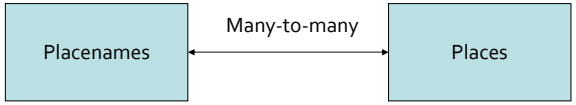
    ddd=mm/60+ss/3600
  - Certain cases: interpolation (f.e. roads)
    - Linear interpolation for the numbers along the roads based the coordinates of the crossroads

Geonaming

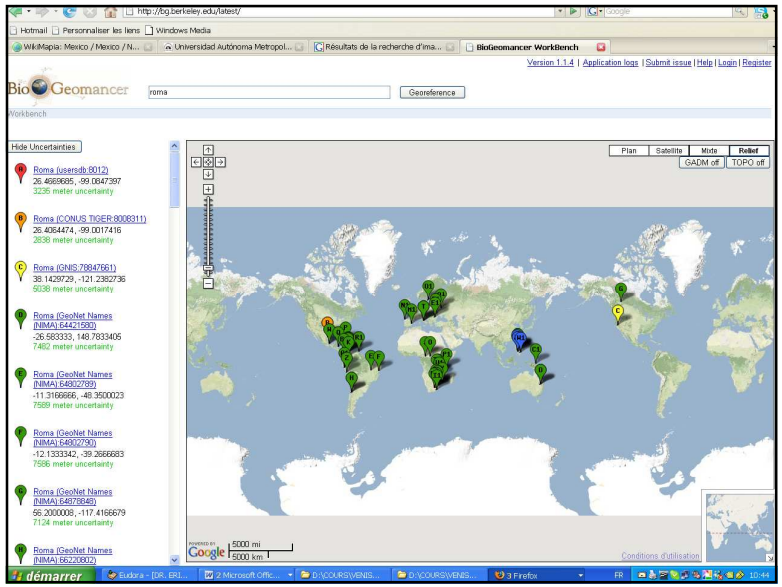
- From the coordinates of a place, assigning a name to this place
  - line
  - area
- Problems of linguistics
  - multilingual problem
- What name?
  - Name in the official language of the country
  - Name in the language of the user
  - Name in the language of the system

GeoParsing

- Analyzing for locating



- Example: Mississipi (river/state ?)
- Example: Roma



GeoParsing: 3 definitions

- Placenames ➔ Location (=coordinates)
  - Where is located Cholula pyramid?
- Relation to a placename ➔Location
  - At 15 Km Southwest of Oaxaca
- Text Analysis ➔Location
  - Historical text, Bible, etc.

Instruments

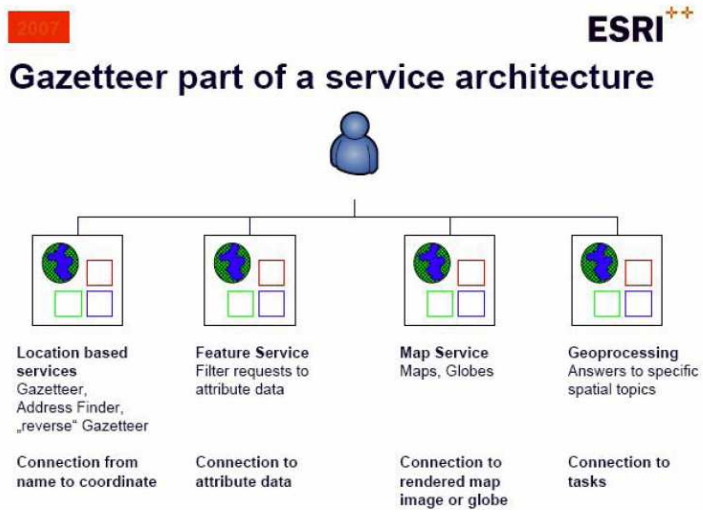
- Gazetteers
- List of placenames (toponyms)
- Languages
  - Venezia, Venice, Venise, Venecia, Venedig, Benetke, Benátky… etc.
  - Monaco di Baviera, Monaco,

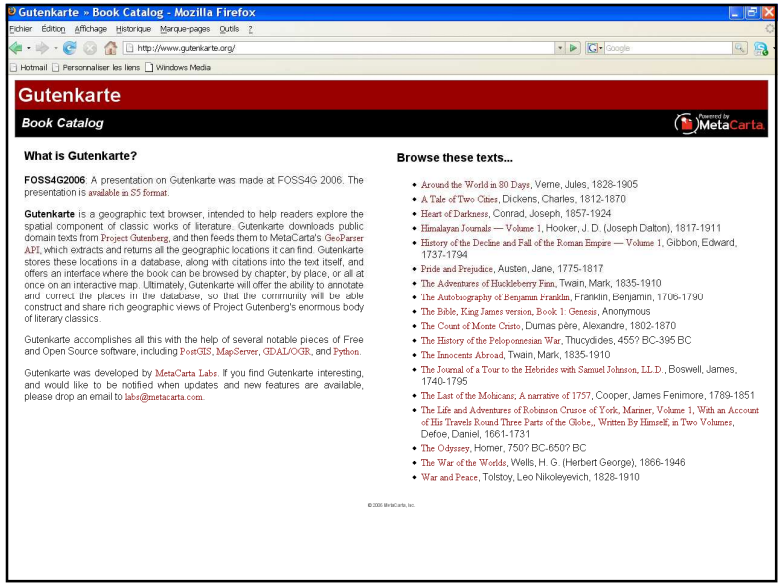
Difficulties for text analysis

- Mrs Florence Manchester
  2345 New York Avenue
  97347 Aberdeen, WA
- Señor Ernesto Madrid
  Garibaldi 345
  Vicente López
  Argentina

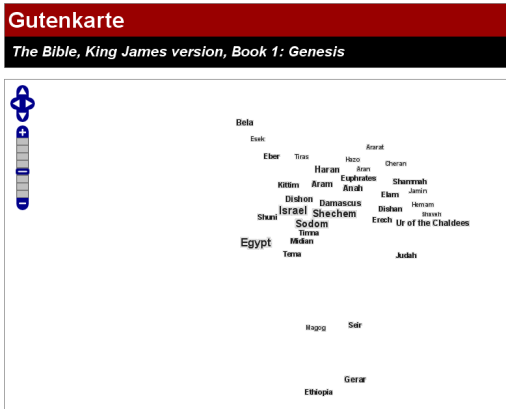
Web Sites for GeoParsing

- NGA GEOnet Names Server (GNS)
  - http://earth-info.nga.mil/gns/html/
- BioGeoMancer
  http://bg.berkeley.edu/latest/
- Edina GeoParser
  - http://edina.ac.uk/projects/geoxwalk/geoparser.html
- Etc.



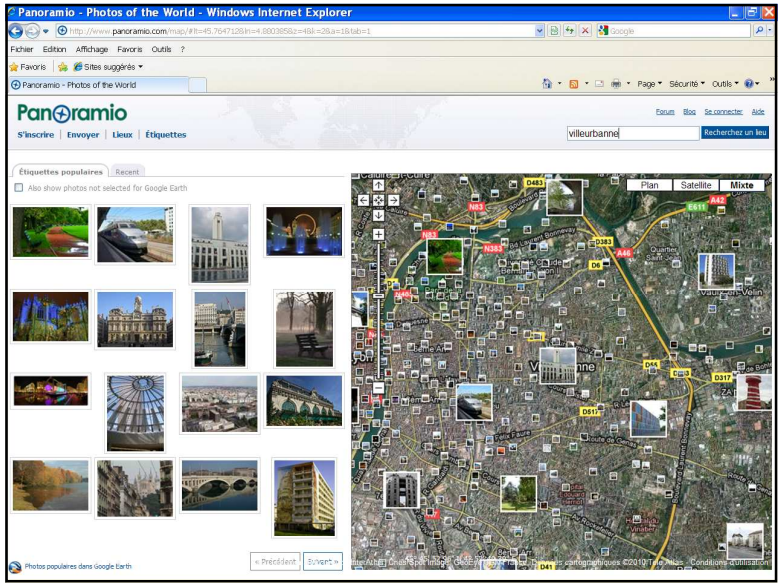


Example in the Bible



Geotagging

- Geographical annotations are generally multimedia
  - Photos
  - Texts
  - Video
  - Voice,
  - Music
- Existing systems
  - Panoramio
  - Flickr
  - Everyscape
  - Wikimapia
  - Trippermap



Other sites

- http://www.flickr.com/map/
- http://www.everyscape.com/washington-dc.us.aspx
- http://wikimapia.org/#lat=19.0361561&lon=-98.2397461&z=10&l=0&m=a&v=2&search=puebla
- http://www.geonames.org/maps/showOnMap?q=puebla+country:MX
- http://www.supergeotagged.com/

Comparison

Features	Google Maps	Google Earth	Panoramic Google	Flickr	EveryScape	Wikimapia	TripperMap	Live Search Maps
Trace Routes	✓	✓				✓ (user)	✓	✓
Places of Interest	✓	✓			✓	✓ (user)	✓	✓
Include items	✓					✓		✓
Add Photos	✓	✓	✓ (best quality)	✓	✓	✓	✓	✓
Links	Wikipédia							
Satellite Images	✓	✓	✓	✓		✓	✓	✓
Real Image as pictures	✓	✓			✓ (360° potos)			✓
Customize maps	✓	✓				✓	✓	✓
Language	JavaScript	JavaScript / XML		Atom, RSS				JavaScript
3D feature								✓
Comments	Usable by Google Mashup Editors		Generally used by bloggers for photo hosting	Not designed for maps	Photos put together	Based on Google Maps	Based on Google Maps	Usable by Microsoft Popfly

4.3 – Introduction to KML

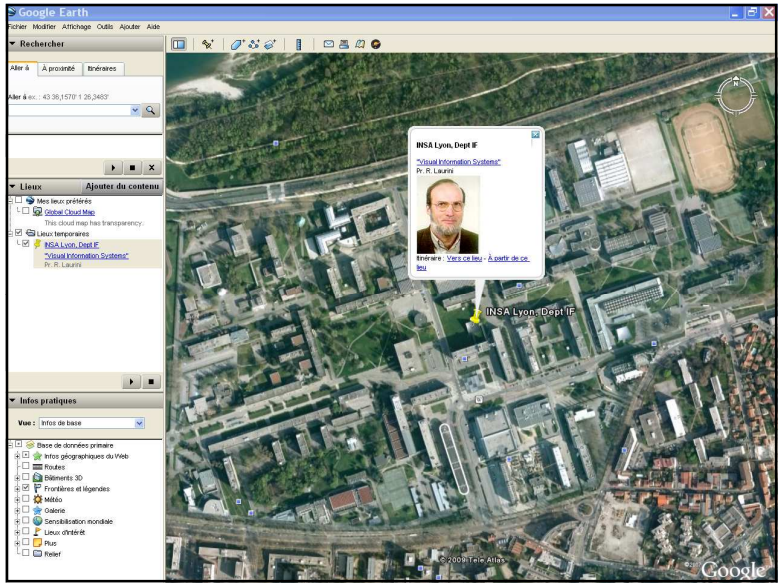
- Created by Google for mapping with Google Earth
- KML: Keyhole Markup Language
- a KMZ file is a zipped version of KML

- KML is an open standard officially named the OpenGIS® KML Encoding Standard (OGC KML).
- Maintained by the Open Geospatial Consortium (OGC).
- The complete specification for OGC KML can be found at http://www.opengeospatial.org/standards/kml/.

- http://code.google.com/apis/kml/documentation/kmlreference.html

KML Example

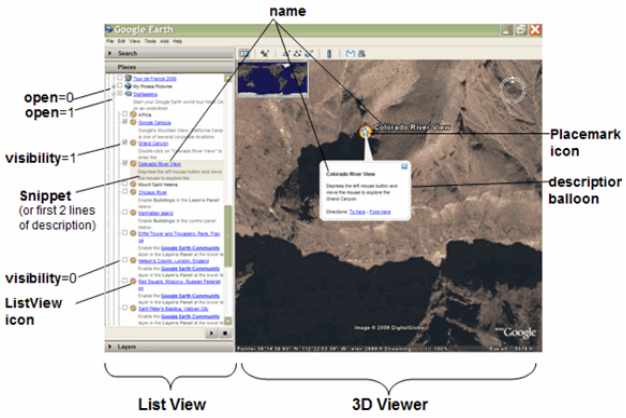
```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<Placemark>
 <name>INSA Lyon, Dept IF</name>
 <description><![CDATA[<a href="http://lisi.insa-lyon.fr/~laurini/"
    target=_blank>"Visual Information Systems"</a><br>
 Pr. R. Laurini<br>
<img src="http://lisi.insa-lyon.fr/~laurini/laurini.jpg" alt="Robert
    LAURINI" height="129" width="105">]]></description>
 <Point id="khPoint600">
  <coordinates>4.8720471, 45.782474</coordinates>
 </Point>
</Placemark>
</kml>
```



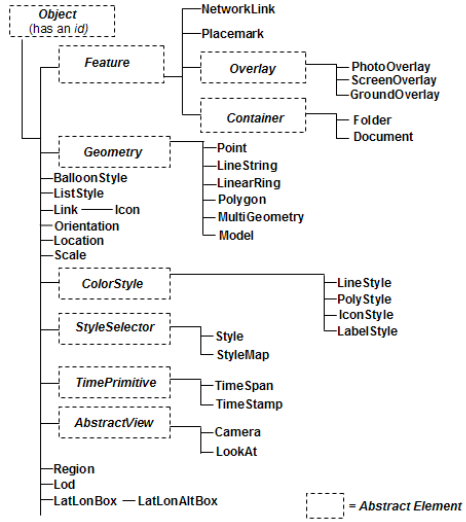
Structure

- Heading XML
  - Declaration of placemark
  - Description of the place
  - Name of the place
- Photographic views for the placemark
- Visibility by default (in this case, it must be inserted by the consumer)
- A style for the place, detailing where the image is individualized and its relative position
- A switch for whether or not the place must lean out
- The type of height that the place should use
- Global position

Layout Stucturing



KML object structure



Points and Polygons

```
<Point id="ID">
  <!-- specific to Point -->
  <extrude>0</extrude>                      <!-- boolean -->
  <altitudeMode>clampToGround</altitudeMode>  <!-- kml:altitudeModeEnum: clampToGround, relativeToGround, or absolute -->
  <coordinates>...</coordinates>            <!-- lon,lat[,alt] -->
</Point>
```

```
<Polygon id="ID">
  <!-- specific to Polygon -->
  <extrude>0</extrude>                      <!-- boolean -->
  <tessellate>0</tessellate>                <!-- boolean -->
  <altitudeMode>clampToGround</altitudeMode>
    <!-- kml:altitudeModeEnum: clampToGround, relativeToGround, or absolute -->
  <outerBoundaryIs>
    <LinearRing>
      <coordinates>...</coordinates>        <!-- lon,lat[,alt] -->
    </LinearRing>
  </outerBoundaryIs>
  <innerBoundaryIs>
    <LinearRing>
      <coordinates>...</coordinates>        <!-- lon,lat[,alt] -->
    </LinearRing>
  </innerBoundaryIs>
</Polygon>
```

Description of a placemark

```
<description>
  <![CDATA[
This is an image
<img src="icon.jpg">
and we have a link http://www.google.com.
  ]]>
</description>
```

Text in HTML

Documents

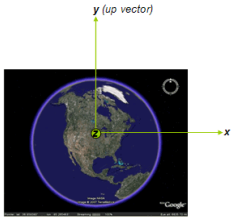
```
<Document id="ID">
  <!-- inherited from Feature element -->
  <name>...</name>                      <!-- string -->
  <visibility>1</visibility>            <!-- boolean -->
  <open>0</open>                        <!-- boolean -->
  <atom:author>...<atom:author>         <!-- xmlns:atom -->
  <atom:link>...</atom:link>            <!-- xmlns:atom -->
  <address>...</address>                <!-- string -->
  <xal:AddressDetails>...</xal:AddressDetails>  <!-- xmlns:xal -->
  <phoneNumber>...</phoneNumber>        <!-- string -->
  <Snippet maxLines="2">...</Snippet>   <!-- string -->
  <description>...</description>        <!-- string -->
  <AbstractView>...</AbstractView>      <!-- Camera or LookAt -->
  <TimePrimitive>...</TimePrimitive>
  <styleUrl>...</styleUrl>              <!-- anyURI -->
  <StyleSelector>...</StyleSelector>
  <Region>...</Region>
  <Metadata>...</Metadata>              <!-- deprecated in KML 2.2 -->
  <ExtendedData>...</ExtendedData>      <!-- new in KML 2.2 -->

  <!-- specific to Document -->
  <!-- 0 or more Schema elements -->
  <!-- 0 or more Feature elements -->
</Document>
```

KML Fields

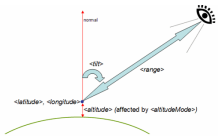
Field Type	*Value*	*Example Use*
altitudeModeEnum	clampToGround, relativeToGround, absolute	See <LookAt> and <Region>
angle90	a value ≥−90 and ≤90	See <latitude> in <Model>
anglepos90	a value ≥0 and ≤90	See <tilt> in <LookAt>
angle180	a value ≥−180 and ≤180	See <longitude> in <Model>
angle360	a value ≥−360 and ≤360	See <heading>, <tilt>, and <roll> in <Orientation>
color	hexBinary value: *aabbggrr*	See any element that extends <ColorStyle>
colorModeEnum	normal, random	See any element that extends <ColorStyle>
dateTime	*dateTime, date, gYearMonth, gYear*	See <TimeSpan> and <TimeStamp>
displayModeEnum	default, hide	See <BalloonStyle>
gridOrigin	lowerLeft, upperLeft	See <PhotoOverlay>
refreshModeEnum	onChange, onInterval, onExpire	See <Link>
shapeEnum	rectangle, cylinder, sphere	See <PhotoOverlay>
styleStateEnum	normal, highlight	See <StyleMap>
unitsEnum	fraction, pixels, insetPixels	See <hotSpot> in <IconStyle>, <ScreenOverlay>
vec2	x=*double* xunits=*kml:unitsEnum* y=*double* yunits=*kml:unitsEnum*	See <hotSpot> in <IconStyle>, <ScreenOverlay>
viewRefreshEnum	never, onRequest, onStop, onRegion	See <Link>

Camera

```
<Camera id="ID">
   <longitude>0</longitude>          <!-- kml:angle180 -->
   <latitude>0</latitude>            <!-- kml:angle90 -->
   <altitude>0</altitude>            <!-- double -->
   <heading>0</heading>              <!-- kml:angle360 -->
   <tilt>0</tilt>                    <!-- kml:anglepos180 -->
   <roll>0</roll>                    <!-- kml:angle180 -->
   <altitudeMode>clampToGround</altitudeMode>
         <!-- kml:altitudeModeEnum: relativeToGround, clampToGround, or absolute -->
</Camera>
```



1. **<altitude>** - translate along the *Z* axis to <altitud
2. **<heading>** - rotate around the *Z* axis.
3. **<tilt>** - rotate around the *X* axis.
4. **<roll>** - rotate around the *Z* axis (again).



Spanish Missions in California

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<Document>
  <name>El Camino Real de la Misionero de las Californias</name>
  <open>1</open>
  <description><![CDATA[Placemarks are organized in chronological order. Twenty-seven missions (excluding vistas &
presidios) were built along the Baja California peninsula between 1697 and 1854 by members of three Catholic religious
Orders ... Jesuits (1697-1767), Franciscans (1767-1773) and Dominicans (1773-1854. Each location includes (1) a road map
or topographic map; (2) location placemark with latitude-longitude coordinates; (3) image; (4) reference source or hyperlink;
(5) description.</b></font>
</description>
  <LookAt id="khLookAt1834">
    <longitude>-112.8605981633207</longitude>
    <latitude>25.88651139494181</latitude>
    <range>1314599.738850886</range>
    <tilt>34.70820511314311</tilt>
    <heading>-5.60533736594153</heading>
  </LookAt>
  <Style id="khStyle1849">
    <IconStyle id="khIconStyle1850">                                    320601-missions_baja.kmz
      <Icon>
      </Icon>
    </IconStyle>
  </Style>
……..
```

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<Placemark>
  <description>Tethered to the ground by a customizable tail</description>
  <name>Tethethed placemark</name>
  <LookAt>
    <longitude>-122.0856375356631</longitude>
    <latitude>37.42240551227282</latitude>
    <range>305.8880792294568</range>
    <tilt>46.72425699662645</tilt>
    <heading>49.06133439171233</heading>
  </LookAt>
  <visibility>0</visibility>
  <Style>
    <IconStyle>
      <Icon>
        <href>root://icons/palette-3.png</href>
        <x>96</x>
        <y>160</y>
        <w>32</w>
        <h>32</h>
      </Icon>
    </IconStyle>
  </Style>
  <Point>
    <extrude>1</extrude>
    <altitudeMode>relativeToGround</altitudeMode>
    <coordinates>-122.0856204541786,37.42244015321688,50</coordinates>
  </Point>
</Placemark>
</kml>
```

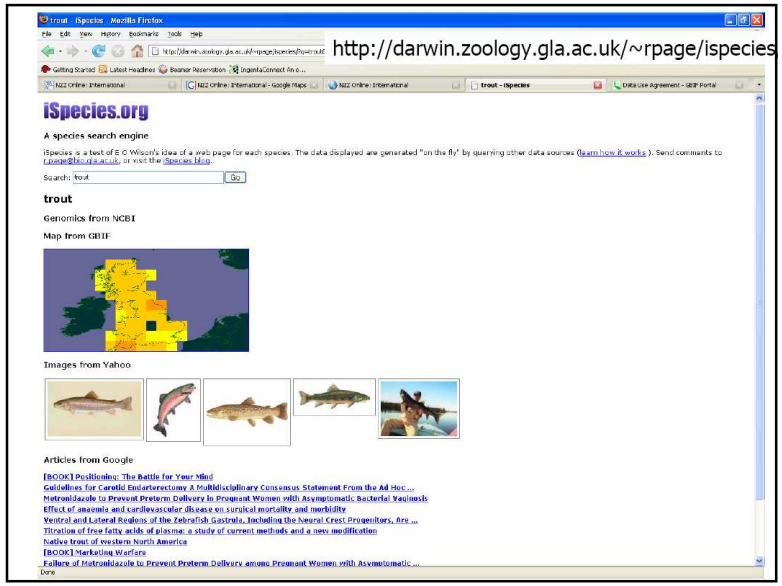
```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<GroundOverlay>
  <description>Overlay shows Mount Etna erupting on July 13th, 2001.</description>
  <name>Large-scale overlay on terrain</name>
  <LookAt>
    <longitude>15.02468937557116</longitude>
    <latitude>37.67395167941667</latitude>
    <range>30350.36838438907</range>
    <tilt>58.31228652890705</tilt>
    <heading>-16.5581842842829</heading>
  </LookAt>
  <visibility>0</visibility>
  <Icon>
    <href>http://bbs.keyhole.com/ubb/z0302a1700/etna.jpg</href>
  </Icon>
  <LatLonBox id="khLatLonBox751">
    <north>37.91904192681665</north>
    <south>37.46543388598137</south>
    <east>15.35832653742206</east>
    <west>14.60128369746704</west>
    <rotation>0</rotation>
  </LatLonBox>
</GroundOverlay>
</kml>
```

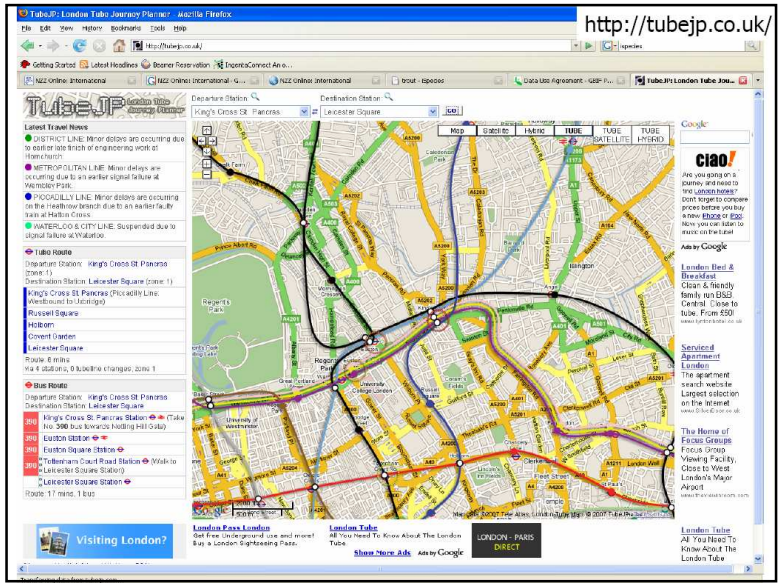
4.4 – Mashup

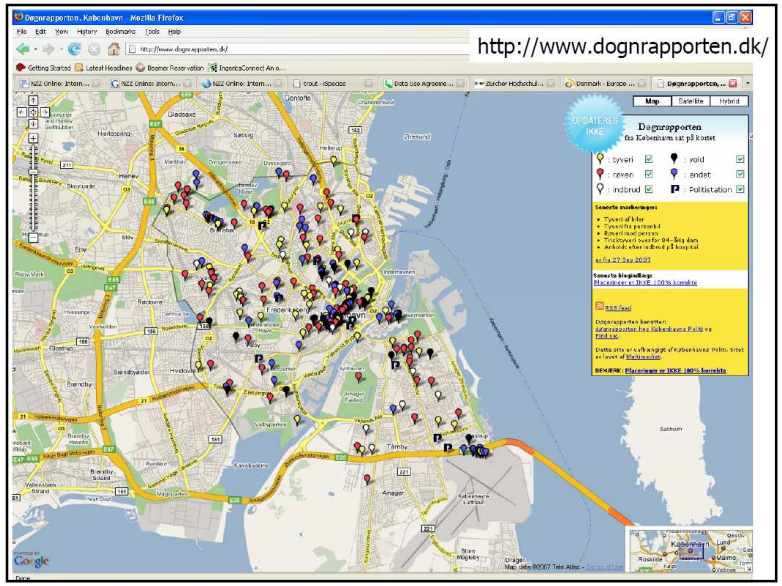
- Mash-up / Mashup
- Expression coming from music
- Mash-up = *An audio recording that is a composite of samples from other recordings, usually from different musical styles*

Internet Mashup

- The mashups integrate data coming by multiple sources to realize new products and useful applications
- To allow the creation of the mashups with data and services, and the suppliers must furnish the interfaces to their data in order to create a chain of services on the web
- The mashups allow the interactive mapping of the data in real time.
- This was not possible with the paper maps (for example where is now my train?)





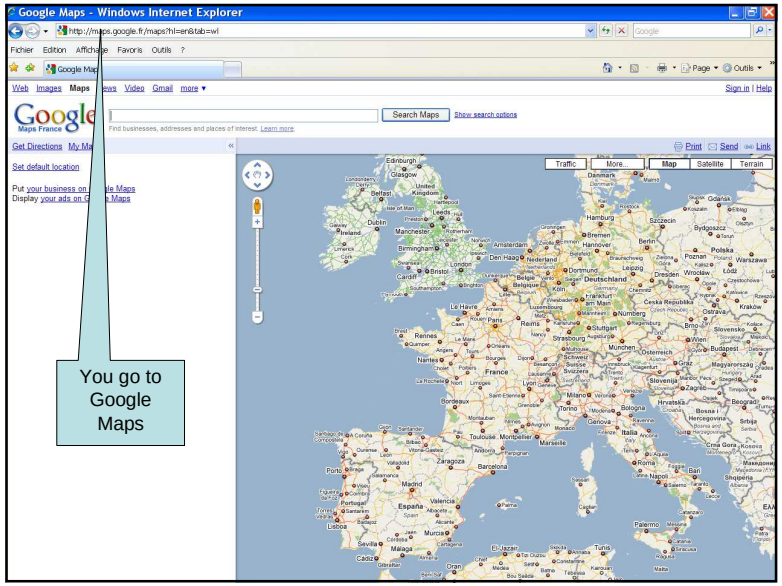


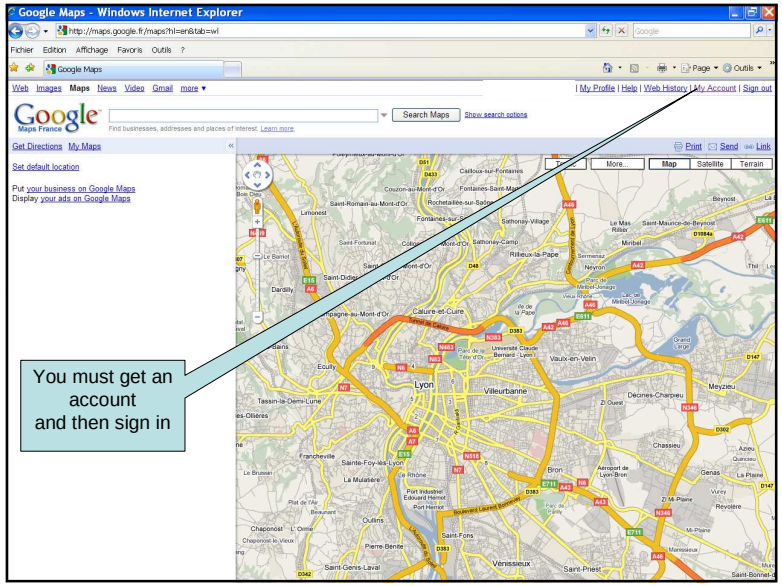
Mashup examples

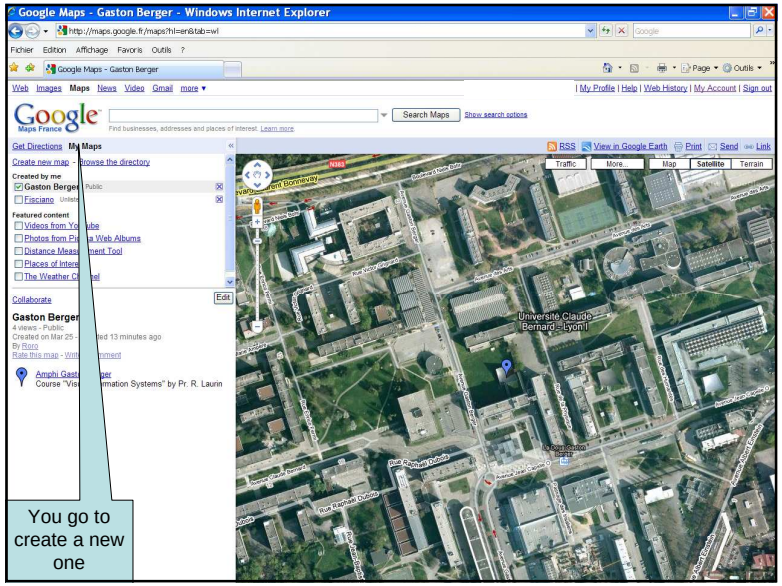
- To question the animal species, to ask information on their distributions, on the images and on the scientific articles or the books on demand
- To map an itinerary on the subway stations
- To map airplanes and relative information in real time near Zurich
- To map the crimes in Copenhagen

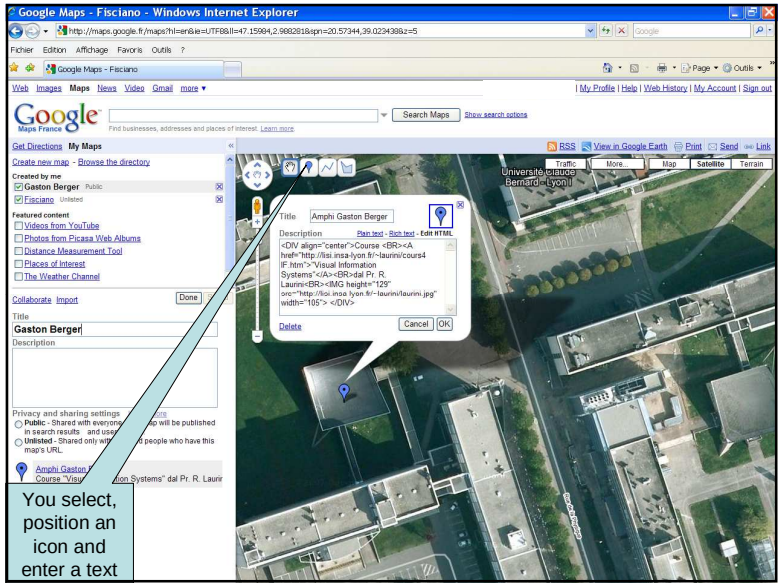
Example: Creating a mashup

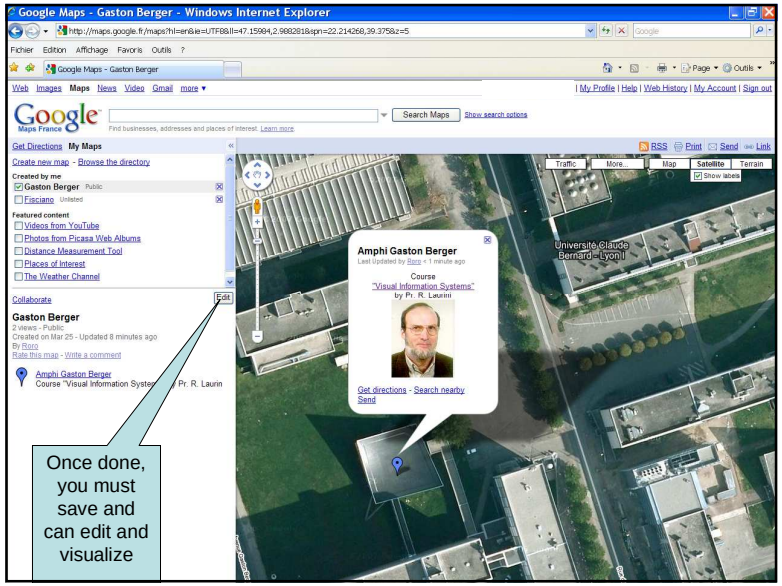
- Run Google Maps
- Create/use a Google account
- Creating a map with annotation
- Getting the HTML fragment
- Inserting the HTML fragment into a web page
- Uploading the web page on the server

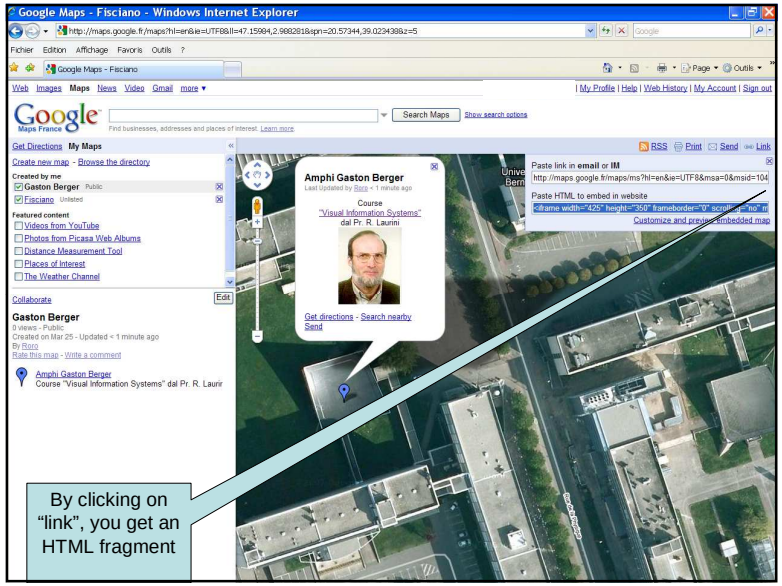



Google Maps - Windows Internet Explorer
You must get an account and then sign in


Google Maps - Gaston Berger - Windows Internet Explorer
You go to create a new one


Google Maps - Fisciano - Windows Internet Explorer
You select, position an icon and enter a text

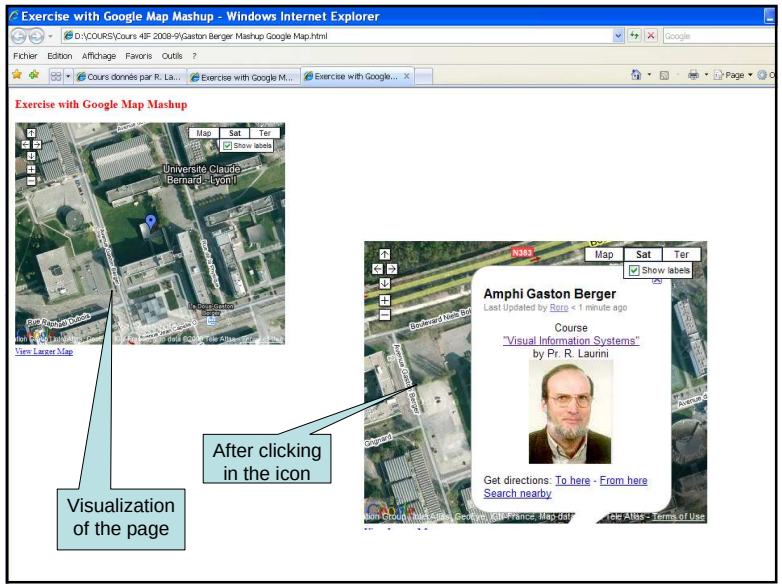

Google Maps - Gaston Berger - Windows Internet Explorer
Once done, you must save and can edit and visualize




```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01//EN"
    "http://www.w3.org/TR/html4/strict.dtd"><html><head>
<meta content="text/html; charset=ISO-8859-1" http-equiv="content-
    type"><title>Exercise with Google Map Mashup</title>

</head><body><big style="font-weight: bold; color: red;">
Exercise with Google Map Mashup</big><br>
<br>
<div>
```

You insert the HTML fragment into your page

```
<iframe width="425" height="350" frameborder="0" scrolling="no" marginheight="0"
    marginwidth="0"
src="http://maps.google.fr/maps/ms?hl=en&amp;ie=UTF8&amp;msa=0&amp;msid=
    104519661041078174045.000465f0013f392a2795a&amp;ll=45.782444,4.872061&
    amp;spn=0,0&amp;t=h&amp;output=embed">
</iframe><br />
<small><a
    href="http://maps.google.fr/maps/ms?hl=en&amp;ie=UTF8&amp;msa=0&amp;m
    sid=104519661041078174045.000465f0013f392a2795a&amp;ll=45.782444,4.8720
    61&amp;spn=0,0&amp;t=h&amp;source=embed"
style="color:#0000FF;text-align:left">View Larger Map</a></small>

</div>
</body></html>
```



KML vs Mashup

- Knowing KML
- Totally independent application
- You own the code
- Integrating a map into an existing application
- You don't own the code

Aspects of mashups

- Many mashups are only based on a point geography (For example GeoNames returns a centroid for Switzerland)
- Mashups can unite data coming from a lot of different sources, with a sense which was not originally designed for
- The aspects of data quality are generally ignored
  - For example georeferencing has often errors
- Privacy aspects of are rarely introduced
- Certain services can very quickly become popular

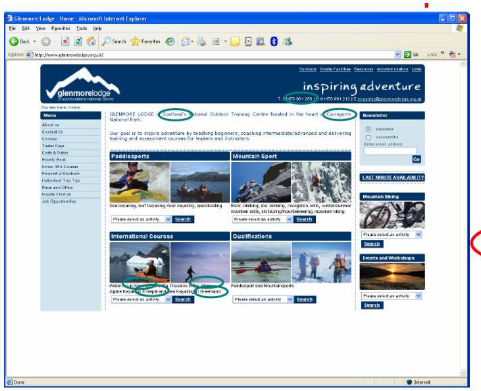
Geographic Information Retrieval

- Huge part of data that we see on a daily base are not structured or partially structured (for example textual documents)
- Research shows that
  - 85% of 20 000 British documents contain a placename (Purves and others, 2007);
  - 13% of 4 million questions on the web contain a geographical component (Zhang and others, 2006)

Key-elements of GIR

- Identification of the place:
  - identify places mentioned in not structured texts
- Expansion of a query:
  - adding names not introduced in the query
  - spatial indexing and textual indexing
- Classifications:
  - according to the theme and the location
- Formulation of queries and visualization of the results:
  - interface allowing the consumers to formulate and to explore the spatial queries

Analysis of documents



Scotland
Cairngorm National Park
Norway
Alps
Nepal
Greenland
01479 861256

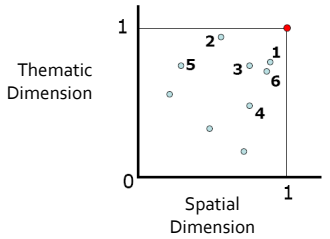
Glenmore Lodge
Glenmore
Aviemore
Inverness-Shire
PH22 1PL
Tel: **01479 861256**

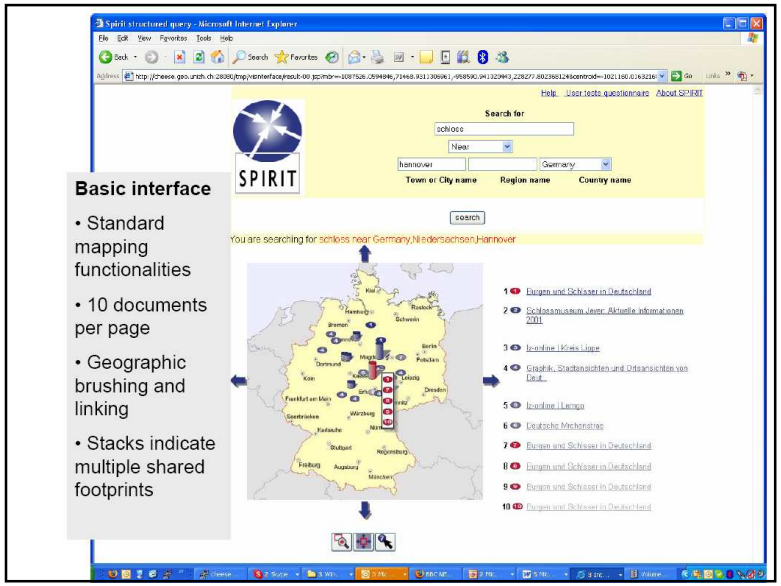
Query Expansion and spatial indexing

- Expansion of queries means that if a consumer seeks documents on Puebla-City, we add Cholula, etc. to the query
- For that, we need to know the topology, the near places and their spatial relationships
- Using geographical dictionaries
- If a user asks documents about " castles in Zurich", a spatial index will reduce the number of documents

Classification

- A search engine generally returns documents with a score
- In GIR this score has, typically, two dimensions (thematic and spatial)





Mashups and portals (1/2)

	Portal	Mashup
Classification	Older technology, extension to traditional web server model using well defined approach	Using newer, loosely defined "Web 2.0" techniques
Philosophy/Approach	Approaches aggregation by splitting role of web server into two phases - markup generation and aggregation of markup fragments	Uses APIs provided by different content sites to aggregate and reuse the content in another way
Content dependencies	Aggregates presentation-oriented markup fragments (HTML, WML, VoiceXML, etc.)	Can operate on pure XML content and also on presentation-oriented content (e.g., HTML)
Location dependencies	Traditionally content aggregation takes place on the server	Content aggregation can take place either on the server or on the client

Mashups and portals (2/2)

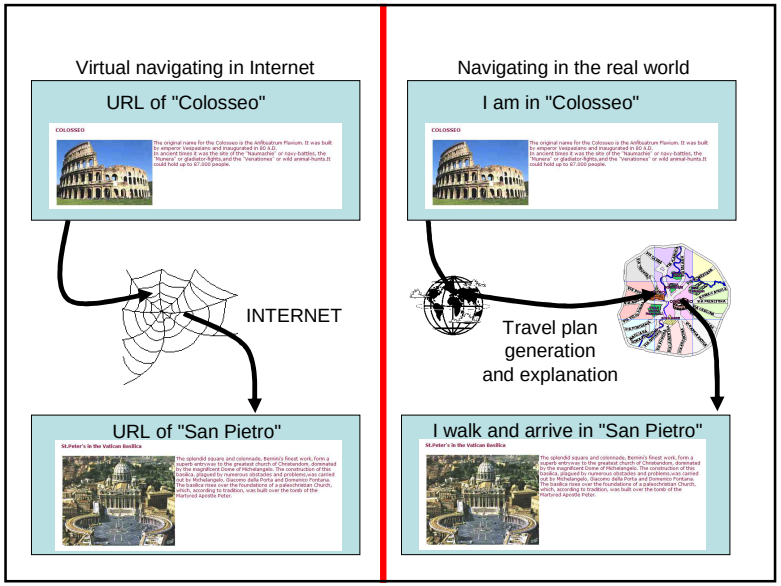
	Portal	Mashup
Aggregation style	"Salad bar" style - Aggregated content is presented 'side-by-side' without overlaps	"Melting Pot" style - Individual content may be combined in any manner, resulting in arbitrarily structured hybrid content
Event model	Read and update event models are defined through a specific portlet API	CRUD operations are based on REST architectural principles, but no formal API exists
Relevant standards	Portlet behaviour is governed by standards JSR 168, JSR 286 and WSRP, although portal page layout and portal functionality are undefined and vendor-specific	Base standards are XML interchanged as REST or Web Services. RSS and Atom are commonly used. More specific mashup standards are expected to emerge.

Conclusion on mashups

- Generation of simple and complicated maps by mixing information coming from different sources
- Web services for cartography
- Interfaces to data that allow consumers to query and provide data
- Methods to realize such services and to use the standard OGCs in order to allow exchanging different elements
- The use of the mashups allows such chains of the services
- Necessity of techniques web to allow exploit not structured data

VI – Physical Hypermedia

- Definition: Application of web navigation metaphor to pervasive systems
- Itinerary in the web: URL (protocol)
- Itinerary in the real world: list of nodes and arcs generated through Internet
- Example: walk from Coloseo to Vaticano



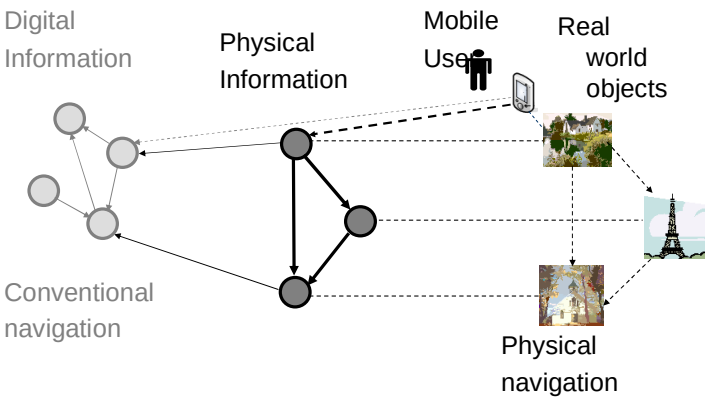
From URL to W-links

- URL links
  - In Internet world
- Walking links (W-links)
  - Roadmap issued from Internet

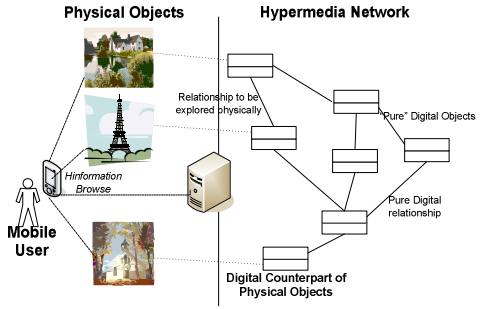
Software for Physical Hypermedia

- A PH application is a specific class of pervasive software whose basic objective aims at enhancing objects of the real world with digital information and links

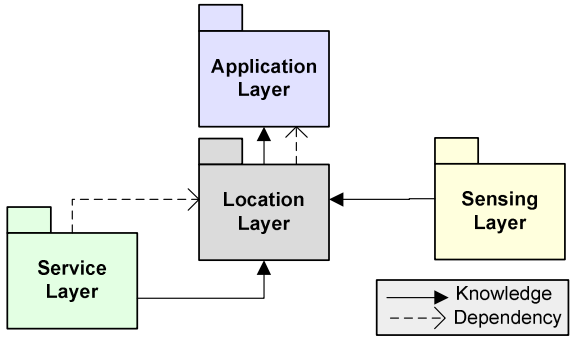
Physical Hypermedia Application



Enriching real world objects with hypermedia



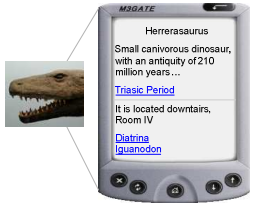
An architecture for pervasive hypermedia services



Example

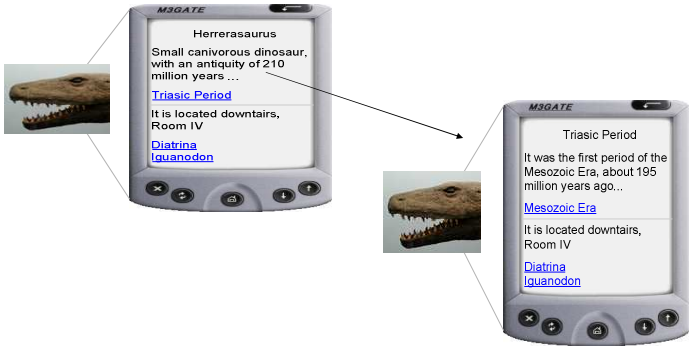
- Natural Science Museum of La Plata.
- Prototypical application
- The physical objects are skeletons of pre-historical animals, which have been enriched with simple digital information and hypermedia links. The prototype uses a HP iPaq 2210 with infrared as sensing hardware.

Let's suppose that the user is facing an Herrerasaurus

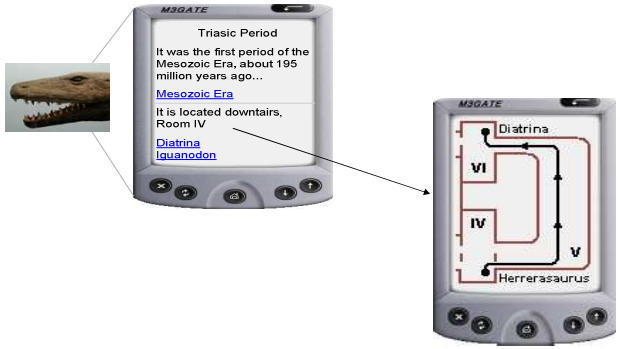


Example of service offered by the browser

Let's suppose that the user is facing an Herrerasaurus



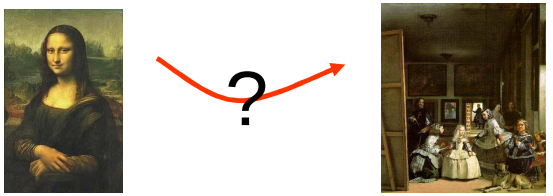
Roadmap to another animal



Consequence

- The user A is moving from Velociraptor to Tyranosaurus; when he faces Herrarosaurus, the object plays the role of Navigation Point, indicates that the user is the correct way and offers some additional services, one of which is to view the Herrarosaurus's information.
- Meanwhile, user B is not traversing any physical link and therefore when he faces Herrarosaurus, the some default service is triggered showing the hypermedia information.

Roadmap generation between two Physical Hypermedia



- How to go from *la Gioconda* of Leonardo of the Louvres Museum in Paris to *las Meninas* in the Prado Museum in Madrid?
- Generation of a W-link in the PH domain.

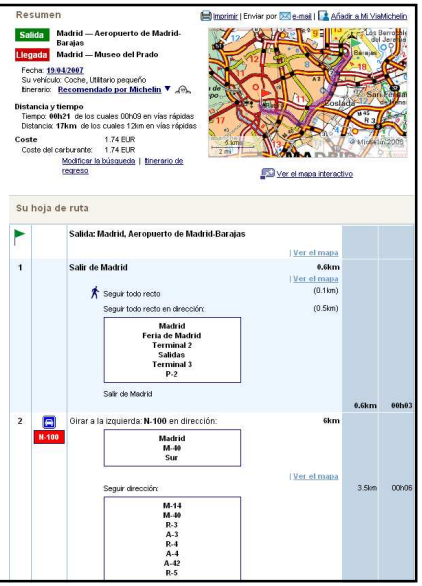
Example of pervasive cooperation

- From Louvres database ➔ exit from *Gioconda* to the next metro station
- From Paris public transportation company database ➔ go from this station to Paris airport
- From airline database ➔ go from Paris airport to Madrid airport
- From Madrid public transportation company database ➔ go from Madrid airport to Prado museum nearest station
- From Prado database➔ go from the previous station to the Prado gate, and then to *Meninas*.

Various types of roadmaps

- Text
- Voice
- Map
- Pictures

Example with text and map

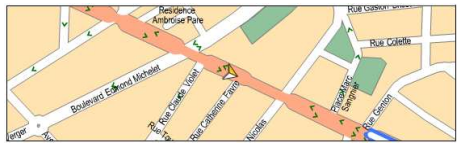


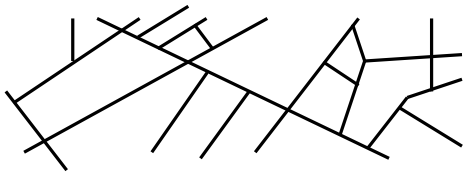
Lost in China!

Itinerary based on pictures

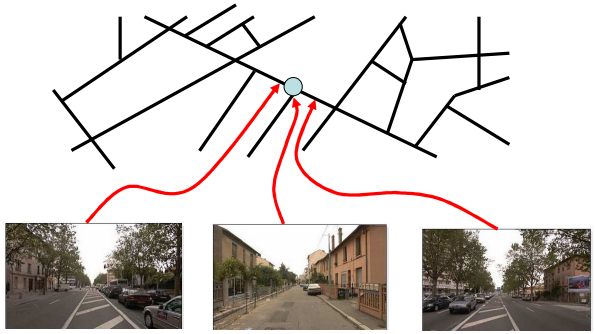
- Objective
  - Generate a sequence of pictures to explain an itinerary
- Pre-requisites
  - Outdoor and indoor network
  - Taking pictures and storing them
  - Locating pictures

Road network





Assigning pictures to nodes



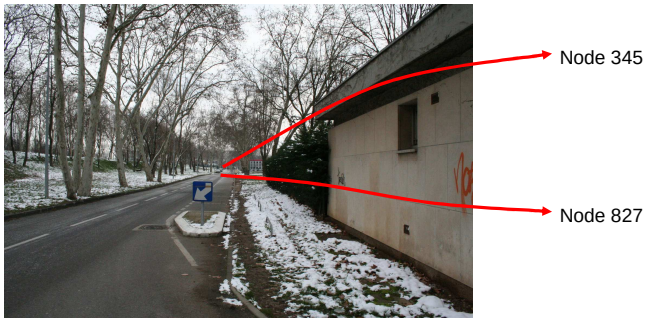
Explanations for itineraries

- Not only a sequence of pictures
- How to inform to turn right or left?
- Solution
  - Decorating the picture with a located arrow
- Consequences
  - Locate node (= crossroads) in pictures
  - Pixels (*x*, *y*) ➔ nodes

Arrow indicating where to go

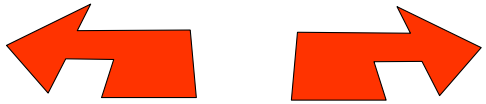
Turning arrow

Assigning nodes

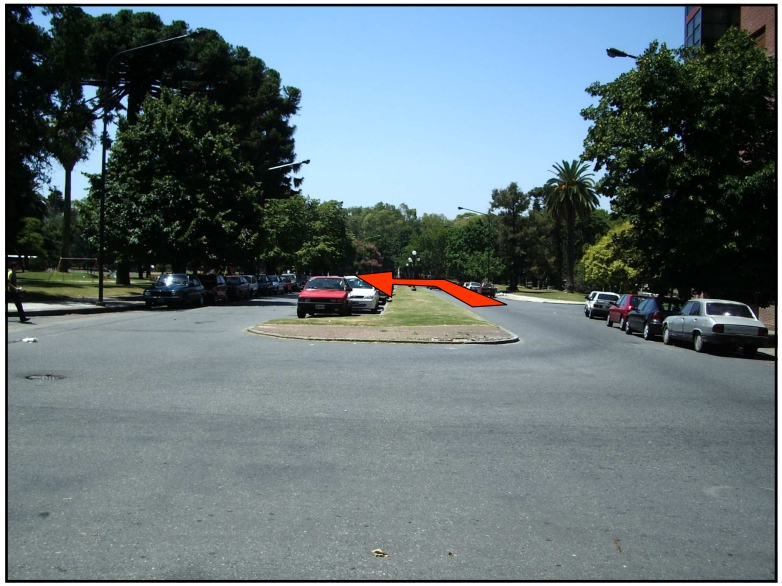


Directions

- Decorate pictures with arrows showing the direction, and located at the node



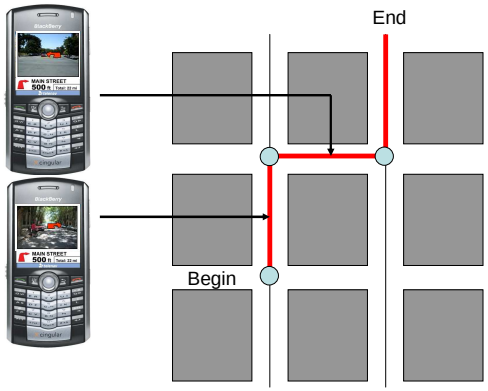
- No decorated pictures
- Arrow-decorated pictures



Generation of itineraries

- Running a shortest path algorithm
- Results
  - A sequence of nodes and arcs
  - A sequence of decorated pictures

Itinerary with arrow-decorated pictures

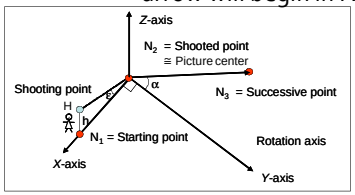


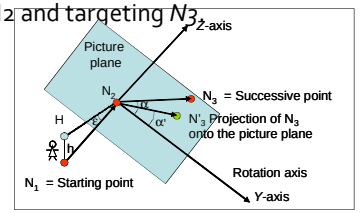
Arrow positioning

- its source will be located at the *N2* pixel coordinates as stored in the picture database,
- its length and width can be parameters of the system, for instance 20 % of the picture size for the length

Angle computation

- we need to know the coordinates of three nodes
  - the starting node, *N1*, in which the observer is standing to take the picture,
  - the shooted node, *N2* which will appear approximately in the centre of the picture,
  - and the successive node *N3*, knowing that the arrow will begin in N2 and targeting *N3*.





Result

$$tg\ \alpha' = tg\ \alpha \sin \varepsilon$$

- When the photography is vertical ($\varepsilon = 90°$), then $\cos \varepsilon = 1$, ➔ $tg\ \alpha' = tg\ \alpha$, i.e. a classical aerial photo
- When the photographer is laying on the soil ($\varepsilon = 0°$), then $\cos \varepsilon = 0$ ➔ $\alpha' = 0$, i.e. the objects are not recognizable
- When the angle is right ($\alpha = 0$), then $\alpha' = 0$

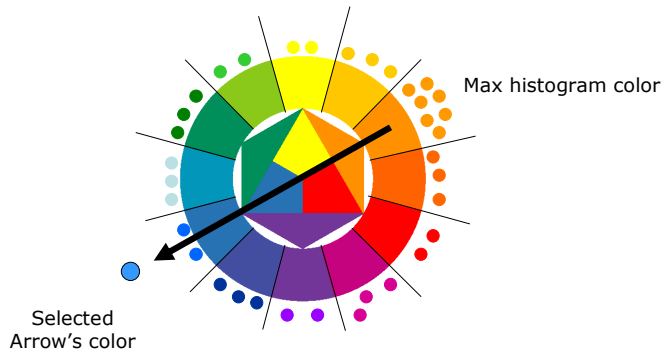
Color selection

- Two solutions
  - a priori to select one fixed color which is used for all pictures
  - computing the optimal color for each picture by using Itten's theory

Itten's contrast theory

- In Red-Yellow-Blue, not RGB
- Transform all colors in HLS
- Make an histogram on hues (12 buckets)
- Select the max color
- Arrow's color is at the opposite

Methodology



Synchronizing photo-pace

- User's position is always known by the system
- Photos are sent when possible
- Photos are displayed according to user's walking pace

Characteristics of a Picture-aided Navigational System

- This mobile system must be based on the following components
  - a server storing the pedestrian graph, the picture database, the minimum path algorithm,
  - a handheld device for the user always in connection with the server ,
  - a communication infrastructure perhaps based on WIFI systems allowing the service roaming,
  - and a positioning system such as GPS for outdoor, or based on beacons indoor

Visual Interface

- The user must specify the place where to go and give his preferences
- So a path query is sent to the server which runs the minimum path algorithm and returns a set of pictures
- The decoration phase can be made either on the server or in the client

User Positioning

- two different positioning systems :
  - outdoor (GPS)
  - indoor (beacons, RFID)
- We have to ensure the continuity of services

User Disorientation

- If the user is lost:
  - The path must be recalculated
  - A new picture set must be computed

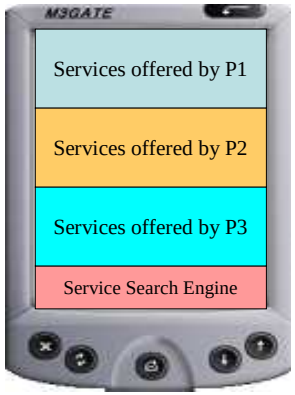
Conclusion on W-links

- Using Internet to generate roadmaps from one object to another one
- Picture-based roadmaps look a good candidate for pedestrian in tourist cities

4.6 – Visual Portals for LBS

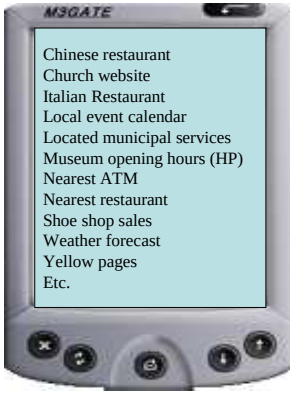
- Provider 1 (generalist)
  - Yellow pages, Nearest restaurant, Nearest ATM
- Provider 2 (local information)
  - Museum opening hours (HP), Shoe shop sales, Chinese restaurant, Italian Restaurant, Church website
- Provider 3 (municipal information)
  - Local event calendar (Sports, Culture, etc.)
  - Located municipal services
  - Weather forecast

Provider-oriented portal



- The simplest to generate automatically
- Few providers
- Small list of services offered by each provider

Service-oriented portal

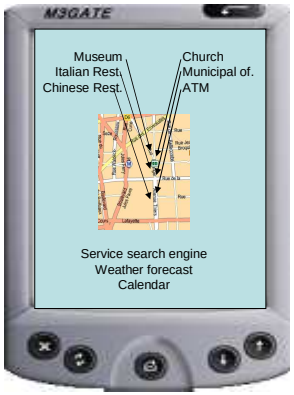


- Services sorted by alphabetic order
- Mixing city-wide and street-wide information
- What if a long list of services?

Profile-oriented portal

- Services ranked according to user's profile

Map-oriented portal



- Services are sorted by places
- Clickable zones or with arrows
- ➔Algorithm for arrow positioning when moving

Street-view-oriented portal

- Dedicated to pedestrians
- Services are sorted by street
- ➔Algorithm for arrow positioning when moving

4.7 – Google Street View

- Navigate in a city such as a pedestrian
- Panoramic photos (360 grades) in all streets
- Create a giant image database
- Provide an access system

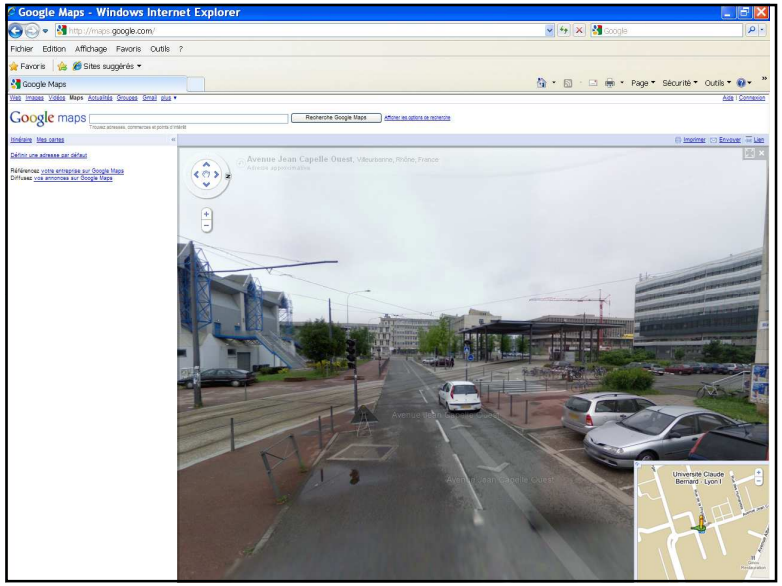
Google Street View

- Provides street pictures, 360° horizontally and 290° vertically
- Launched in May 2007 with only 4 US cities
- Extended to several thousands cities throughout the world.

Vehicles with camera

Vehicles with camera

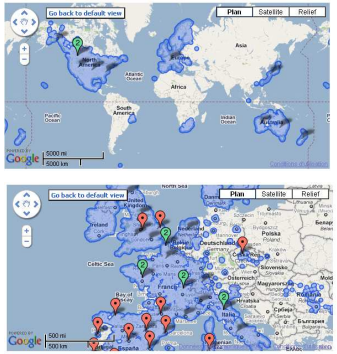
Street View Interface



Bike with camera

For skiing tracks

Street View



http://maps.google.fr/help/maps/streetview/where-is-street-view.html

4.8 – Conclusions

- Towards the future
  - real time
  - pervasivity
  - mobility
- Located Services
- Physical hypermedia
- Explaining itineraries with photos