Mashups

Overview

- Web 2.0
- Mashups in general
- Mapping Mashups
- Data formats and ressources
- Creating your own mashup
  - Tools

INTRODUCTION

Web 2.0

- Criteria for Web 2.0 Applications (T. O'Reilly): http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
  - Lightweight Programming Models"
  - Design for "hackability" and remixability
  - Innovation in assembly

http://kosmar.de/archives/2005/11/11/the-huge-cloud-lens-bubble-map-web2

What is this “2.0” all about anyway?

- Collaboration
- Interoperability: Similar to interoperability in Geoinformatics
  - Different systems can talk to one another based on acknowledged standards
- Flexibility: continously extended
- Simplicity

- the “read-write” Web

Collaboration: User generated content

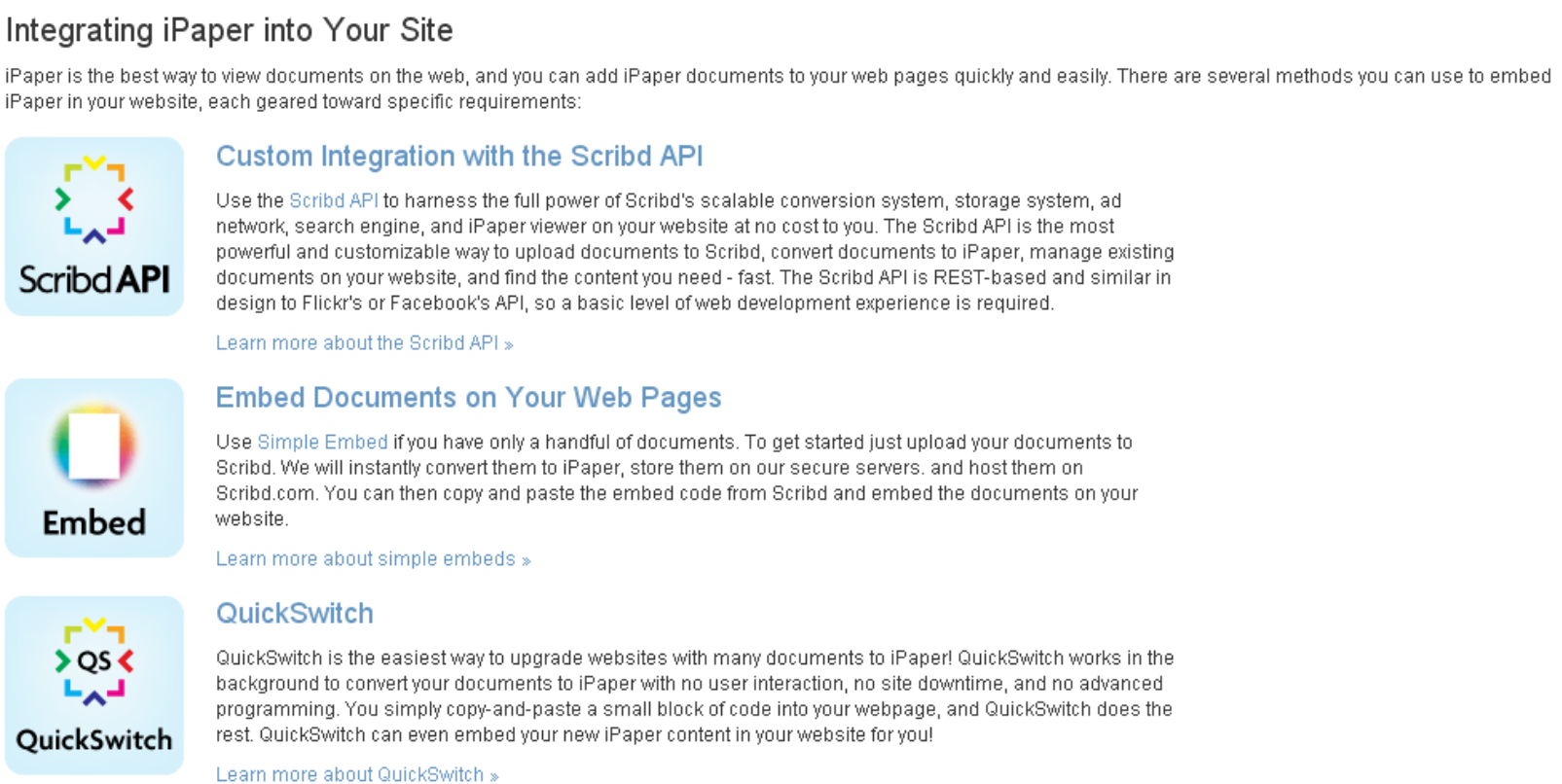
- Participation: Content is created or shared by the users of a service, rather than provided by a central editorial team.

- Examples
  - flickr
  - panoramio
  - Ebay
  - scribd
  - But also comments in amazon.com etc.

Source: http://www.ebizmba.com/articles/user-generated-content [2008-10-17]

Example

- Modern, intiutive user interface
- http://www.scribd.com/publisher/integration



Integrating iPaper into Your Site

iPaper is the best way to view documents on the web, and you can add iPaper documents to your web pages quickly and easily. There are several methods you can use to embed iPaper in your website, each geared toward specific requirements:

Scribd API

Custom Integration with the Scribd API

Use the Scribd API to harness the full power of Scribd's scalable conversion system, storage system, ad network, search engine, and iPaper viewer on your website at no cost to you. The Scribd API is the most powerful and customizable way to upload documents to Scribd, convert documents to iPaper, manage existing documents on your website, and find the content you need - fast. The Scribd API is REST-based and similar in design to Flickr's or Facebook's API, so a basic level of web development experience is required.

Learn more about the Scribd API »

Embed

Embed Documents on Your Web Pages

Use Simple Embed if you have only a handful of documents. To get started just upload your documents to Scribd. We will instantly convert them to iPaper, store them on our secure servers. and host them on Scribd.com. You can then copy and paste the embed code from Scribd and embed the documents on your website.

Learn more about simple embeds »

QS
QuickSwitch

QuickSwitch

QuickSwitch is the easiest way to upgrade websites with many documents to iPaper! QuickSwitch works in the background to convert your documents to iPaper with no user interaction, no site downtime, and no advanced programming. You simply copy-and-paste a small block of code into your webpage, and QuickSwitch does the rest. QuickSwitch can even embed your new iPaper content in your website for you!

Learn more about QuickSwitch »

Collaboration: Opportunities

- Content
- Deep feelings of involvement, reputation
- Showing support for certain activities
- Regular updates to a Web2.0 site
- Viral potential

Collaboration: Social networking

- Social networking sites let people find, contact, and collaborate with each other, based on shared social status or interests.

- Examples
  - Facebook
  - LinkedIn
  - StudiVZ

Social networking: Opportunities

- “Wisdom of crowds” - Crowd-sourcing /
- Leverage resources - Members support each other
- Many connections strengthen a network
- Member-get-member
- Free tools for unions to use

MASHUPS

Definition

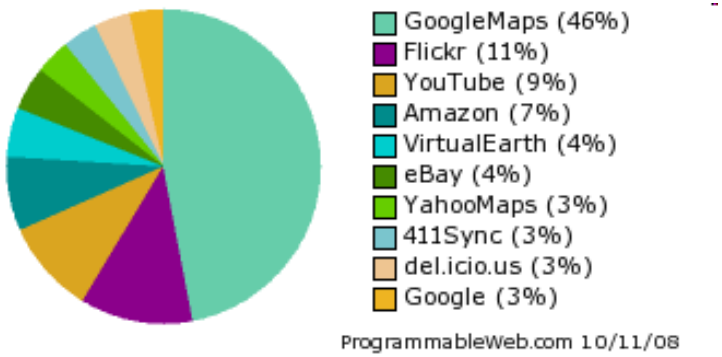
- „A mashup is a combination of one or more data sources to create a unified interface and experience.“ http://mashupawards.com/what-is-a-mashup
- „… a web application that combines data and/or functionality from more than one source“ http://en.wikipedia.org/
- Applications created by third party developers by accessing public APIs

- Websites which combine data and services from across the web
- Remixing information on the web

- Presumably originating from “mixing up music”

Mashups

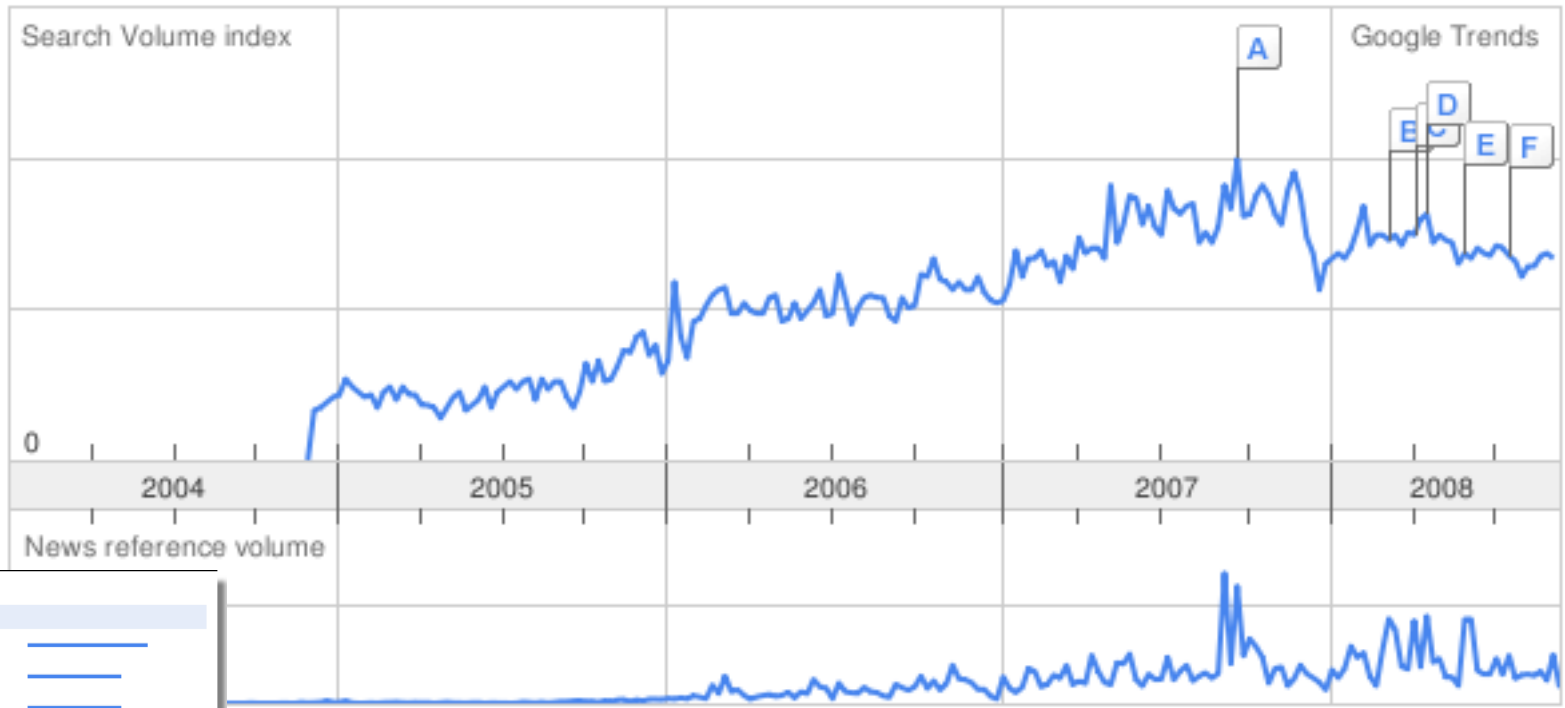
- large amount of APIs – currently 517 (http://www.programmableweb.com/apis)
- using lightweight web services



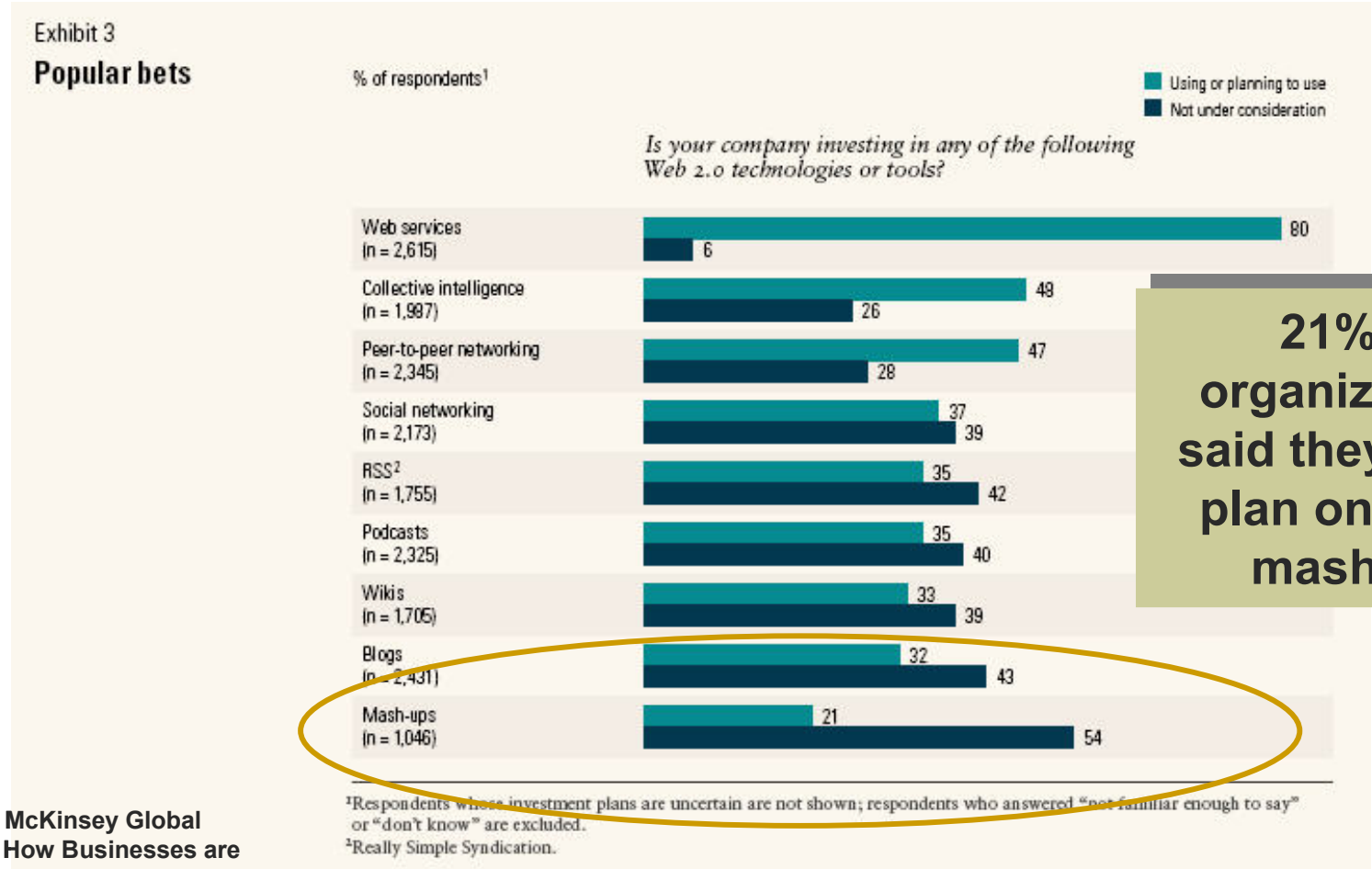
23 30Boxes 411Sync 43Things A9 AdobeOnAir AIM AIMPhoneline Alexa AlexaThumbnail AlexaTopSites AlexaWebInfo Amazon AmazonEC2 AmazonPayments AmazonQueue AmazonS3 AOLMusicNow AOLVideo AOLWebAIM AonawareDictionary Backpack Basecamp BBC BigTribe bLaugh Blinksale Blogger Bloglines BlueDot Box.net BTWeb21C buySAFE Buzznet CafePress ClearForest Clickatell Clicky CNET CommissionJunction Compete DabbleDB Dapper DataUnisonEbayResearch Daylife deCarta del.icio.us DemocracyInAction Digg DigitalPodcast EarthTools EasyUtil eBay EditGrid Entrez eSideWalk ESV Eventful ExactTarget Facebook FedEx FeedBurner FeedMap Findory Flickr FollowTheMoney Fotolia FUTEFWikipedia Garmin geocoder geocoderCanada GeoIQ GeoNames Gigablast GlobeXplorer Google GoogleAdSense GoogleAdWords GoogleAjaxFeeds GoogleAjaxSearch GoogleBase GoogleCalendar GoogleCheckout GoogleClientAuth GoogleCodeSearch GoogleDesktop GoogleHomepage GoogleMaps GoogleMashupEditor GoogleNotebook GooglePicasa GoogleSafeBrowsing GoogleSpreadsheets GoogleTalk GoogleWebAuth GrouperVideo hostip HotOrNot ImageLoop indeed InnerGearsCityState Interfax InternetArchive Jaiku Jots JotSpot Kayak LastFM LiveContactsJS LiveJournal LiveVideo LivingStones Ma.gnolia MacromediaNews Map24 MapPoint MapQuest MechanicalTurk MetaCarta MicrosoftMSDN Mobivity Moreover MSNMessenger Multimap MusicBrainz MusicMobs NASA Naver Nestoria Netvibes NewsCloud NewsGator NewsIsFree Ning NOAA Omnidrive Ontok OntokWikipedia OpenDOAR OpenLayers OpenPatentServices OpenStreetMap Orb Pageflakes Panoramio PayPal PhishTank Pingdom Pixagogo Plaxo Plazes Poly9FreeEarth PriceRunner Prodigem Prosper PubSub Rakuten RapLeaf RawSugar RememberTheMilk Revver Rhapsody Riya Rrove Salesforce SecondLife SeeqPod Shadows SharedBook Shopping.com ShutterPoint Simpy SkyhookWireless Skype SlideShare SmashFly Smugmug Snipshot SNOCAP Sparklines SplogSpot SpokenBuzz SpringWidgets Start stikkit StrikeIronSMSPro StrikeIronTaxes StrikeIronUSCensus SunlightLabs SuperDataPack Syndic8 TagTheNet TagTooga Tailrank Technorati Textamerica Topicalizer TradeSports Trulia Trynt Tunelog Twitter Twittervision TypeKey TypePad UPCDatabase Upcoming UPS UrbanDictionary USGSElevation USPostalService USYellowPages Vast Veoh VirtualEarth WeatherBug WeatherByCity Weblogs WebPurify WebShots WebThumb WeFeelFine Where2GetItSlippyMap WindowsDesktopGagdets WindowsLiveDomains WindowsLiveExpo WindowsLiveGadgets

Source: http://www.programmableweb.com/apis [2007-09-

Relevance of Mashups according to Google



Significance of Mashups



21% of organizations said they are or plan on using mashups

Source: McKinsey Global Survey; How Businesses are Using Web 2.0; January 2007

Mashup opportunities

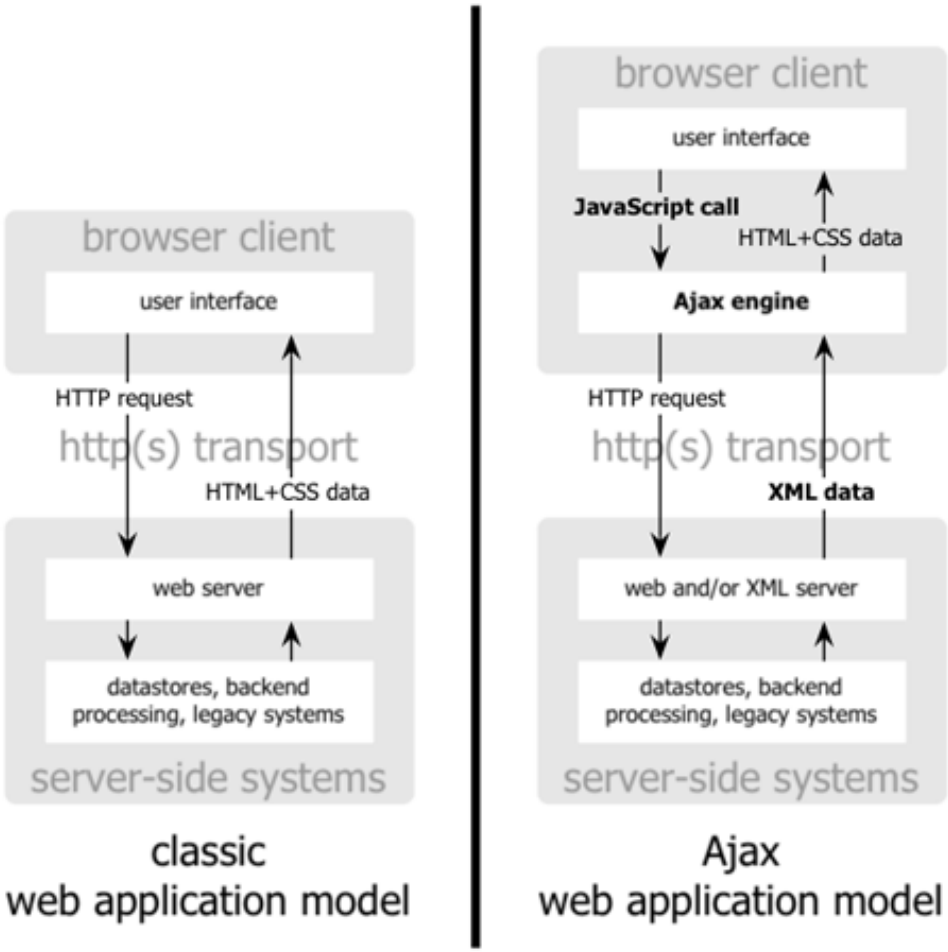
- cheap to maintain if using free APIs / data sources
- Using other people's large data resources will let you present people with tailored pages to their needs
- Useful tools will encourage repeat visits

Technological Background

Ajax: Overview

- Ajax is not an API or a programming language
- Ajax aims to provide more responsive web applications
- In normal request/response HTTP cycles, the browser locks waiting for the response and an entire page must be displayed (☐ synchronous)
- With Ajax, asynchronous requests may be made and responses are used to update part of a page
- User can continue to interact with a page while the request is in progress
- Less data needs to be transmitted
- Page update is quicker because only a part of a page is modified

Ajax



The traditional model for web applications (left) compared to the Ajax model (right). (Source: Garret 2005)

Technologies used

Technologie	Aufgabe
Hypertext Transfer Protocol (HTTP)	Datentransfer über ein Netzwerk
eXtensible Markup Language (XML)	Asynchroner Datenaustausch
eXtensible HyperText Markup Language (XHTML)	Beschreibung von Seiteninhalten
Cascading Style Sheets (CSS)	Aussehen der Website
Document Object Model (DOM)	Repräsentation der Daten bzw. Inhalte
JavaScript	Manipulation des Document Object Models und dynamische Darstellung der Inhalte. JavaScript dient gleichzeitig als Schnittstelle zwischen einzelnen Komponenten.
XMLHttpRequest-Object	Bestandteil vieler Browser, um Daten auf asynchroner Basis mit dem Webserver austauschen zu können.

Approaches to Ajax

- Microsoft introduced the XmlDocument and XMLHTML objects which are used to make asynchronous requests directly from JavaScript
- Other browsers followed this path
- Most browsers now name the object XMLHttpRequest

The request phase

- An `XMLHttpRequest` object is used to create the request
- A callback is a function called when a response is received
  - The function name is assigned to a property of XMLHttpRequest
- The `open` method sets up the request
  - Method parameter, either “GET” or “POST”
  - URL parameter with zip code in the URL
  - A parameter signifying asynchronous or not
- The send method sends the request

The Response Document

- The response from the server is created by a program running on the server
- A string with the city and state is sent as the response
- In our practise, this will be in PHP

16.2 The Receive Phase

- The function that parses the response must have access to the XMLHttpRequest object
- This cannot be global since there may be multiple outstanding requests at any time
- The callback becomes an anonymous function which is defined in the getPlace method and keeps references to the XMLHttpRequest object held in a local variable
- The response handler only acts if the readyState is 4, meaning the response is complete

16.2 Cross-Browser Support

- Older Microsoft browsers uses a different approach to getting the request object
- Testing the existence of `window.XMLHttpRequest` differentiates the browsers
- In the older browsers

```
new ActiveXObject("Microsoft.XMLHTTP")
```

- creates the object needed

MAPPING MASHUPS

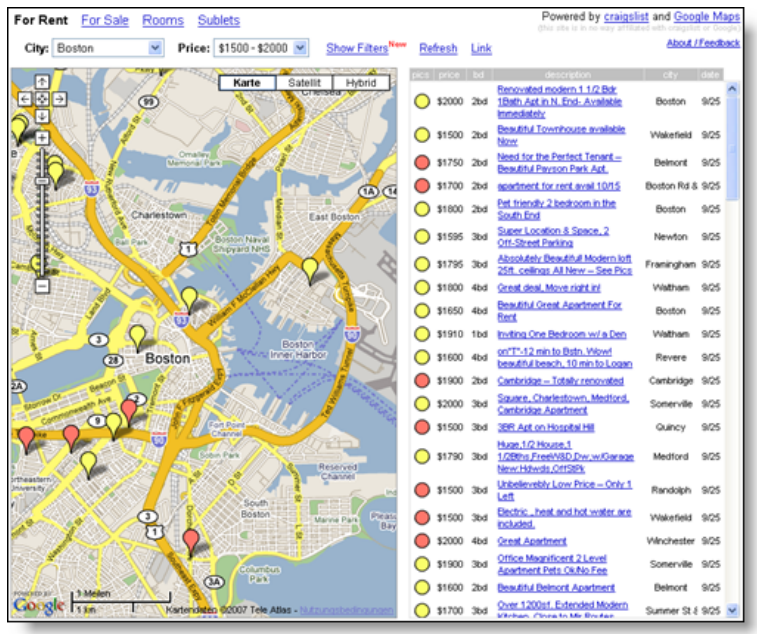
Map-based Web Mashups

- mashups that involve geodata
- ~58% of Mashups are mapping mashups (according to programmableWeb)
- Three main API providers:
  - Google Maps (50% of all mashups)
  - Yahoo Maps (4% of all mashups)
  - Microsoft Virtual Earth (4% of all mashups)

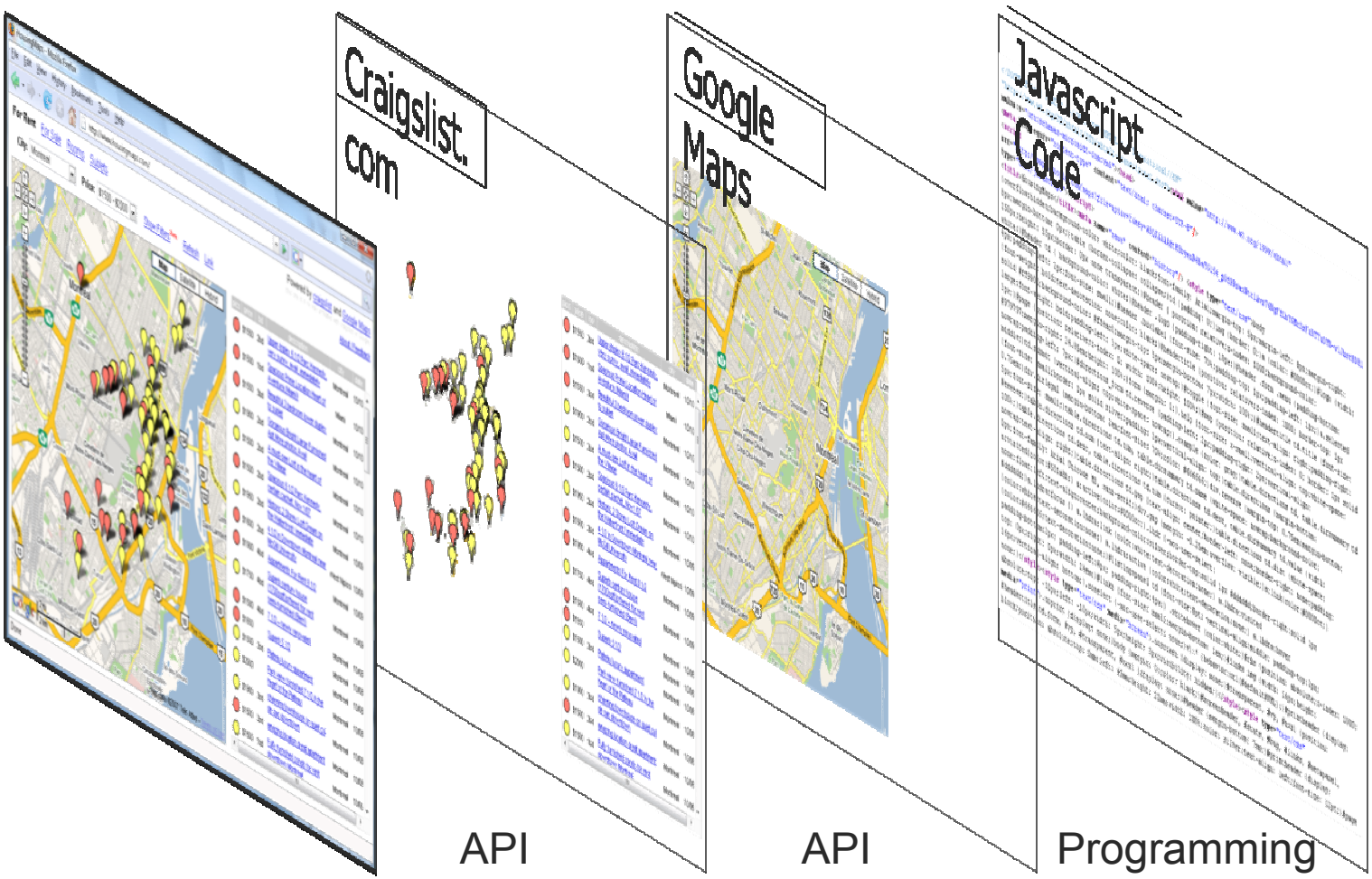
Mapping Mashups

- Typical example: usage of cartographic data from Google Maps

www.craigslist.com + maps.google.com = www.housingmaps.com



Mapping Mashup: What's behind?



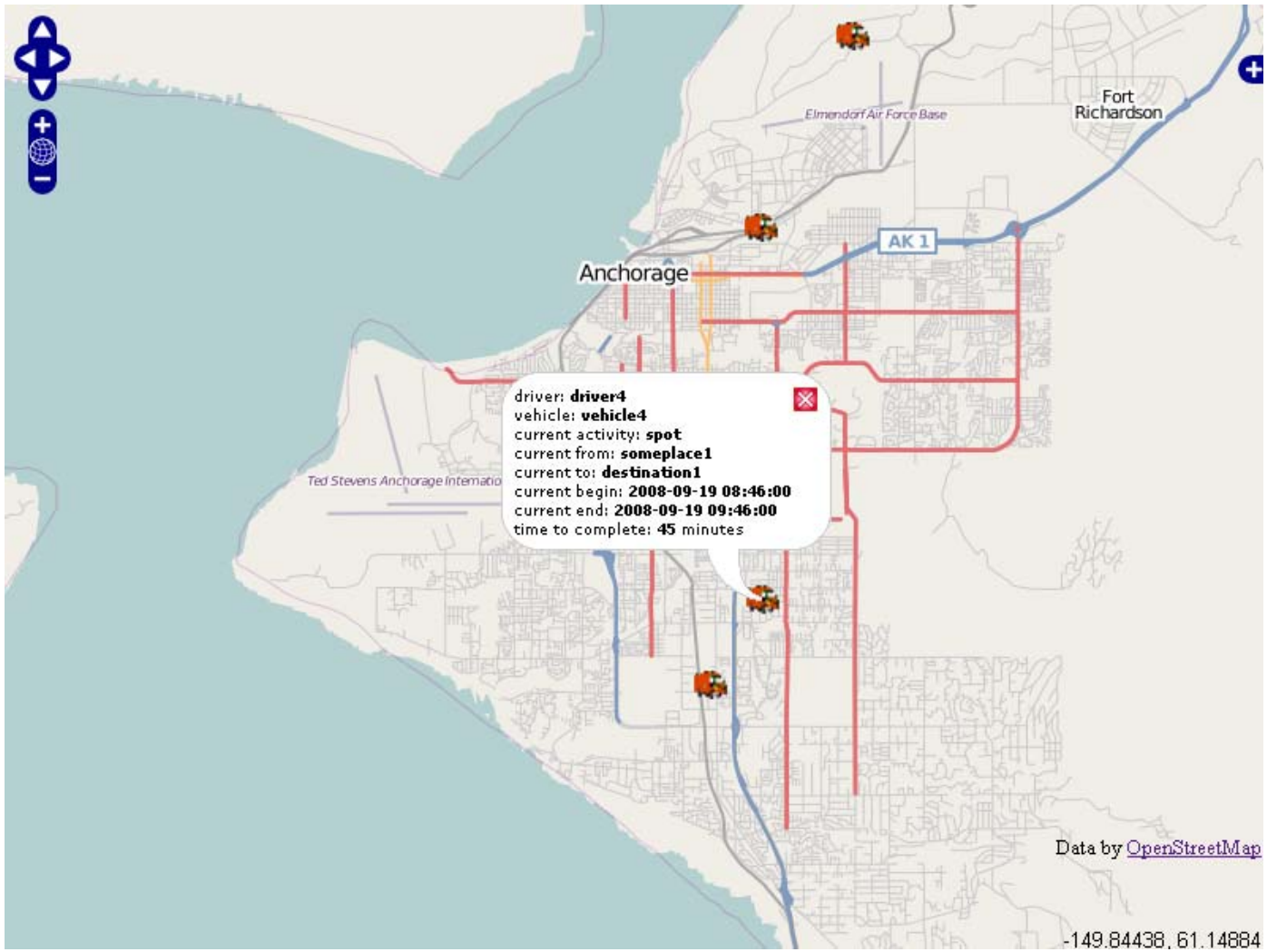
Source: Modified after cameronjones.com/yahoo/cameron_jones_yahoo.ppt [2008-10-11]

Examples

Example: Documentation (by NGOs)

- http://www.altsean.org/Photogalleries/ProtestsMap.php
- Based on http://maps.google.com/maps/user?uid=10889400730916373032 6&hl=en&ptab=2

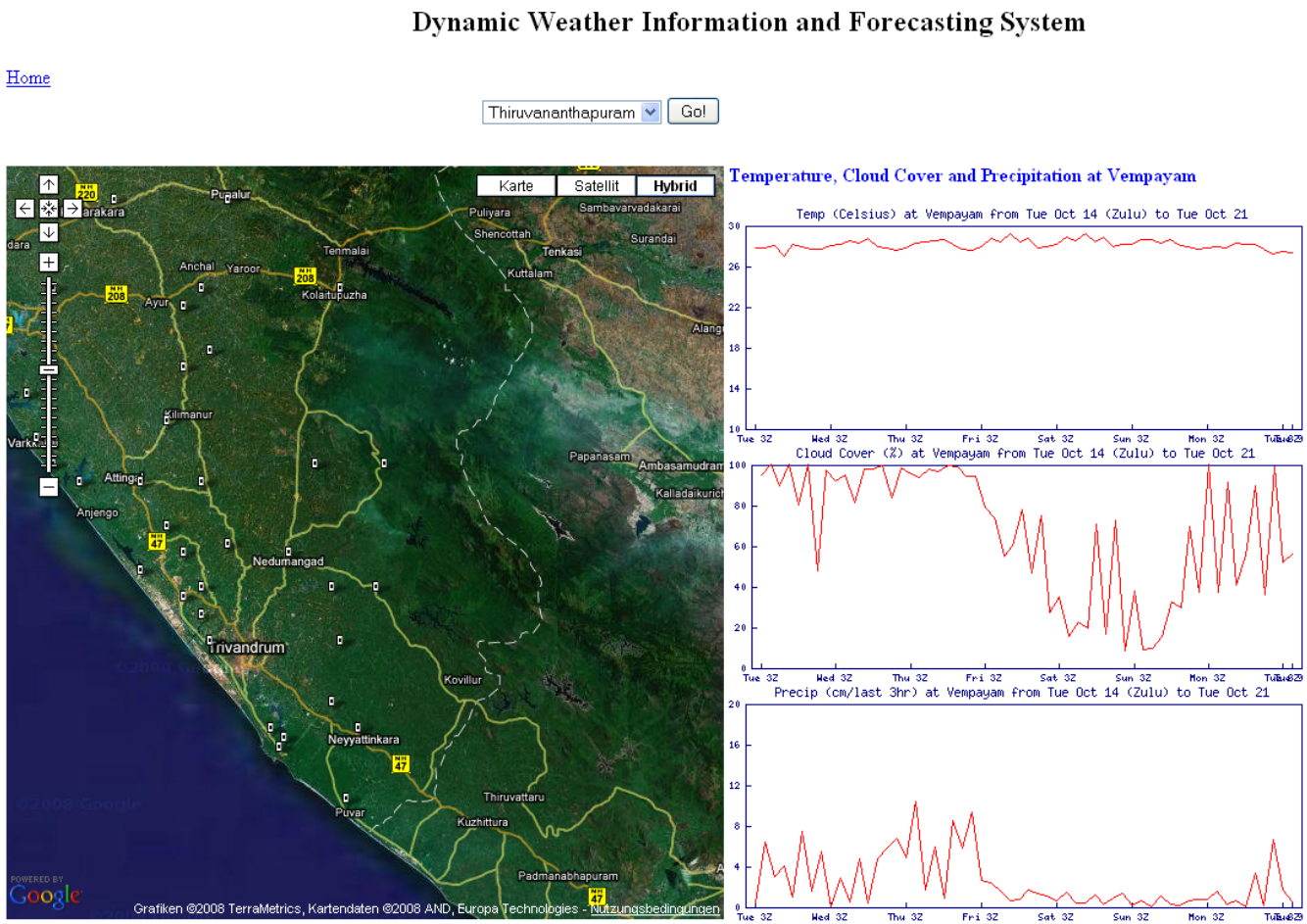
Fleet management



http://maps.dispatchsys.com/dispatch_map/test_map/ol_test27.htm

Example: Integration of weather data

- http://www.edugrid.ac.in/webgis/gwebgis.html



FORMATS

XML (Extensible Markup Language)

JSON (JavaScript Object Notation)

KML (Keyhole Markup Language)

CSV (Comma Separated Value)

Successful Formats (Outside the OGC)

- Geo + RSS/Atom = GeoRSS
- Geo + JSON = GeoJSON
- Geo + Tags = GeoTagging
- KML?

- Prevalent, convenient content creation & compelling viewer

XML (Extensible Markup Language)

- XML stands for e*X*tensible *M*arkup *L*anguage
- XML was designed to describe and to contain data.
- XML is a markup language much like HTML, but XML tags are not predefined in XML. You must define your own tags
- XML uses a Document Type Definition (DTD) or an XML Schema to define the structure of the data.
- XML with a DTD or XML Schema is designed to be self-descriptive.

Principle of MarkUp

```
 10
3463098.153
 20
5430038.584
 30
0.0
```

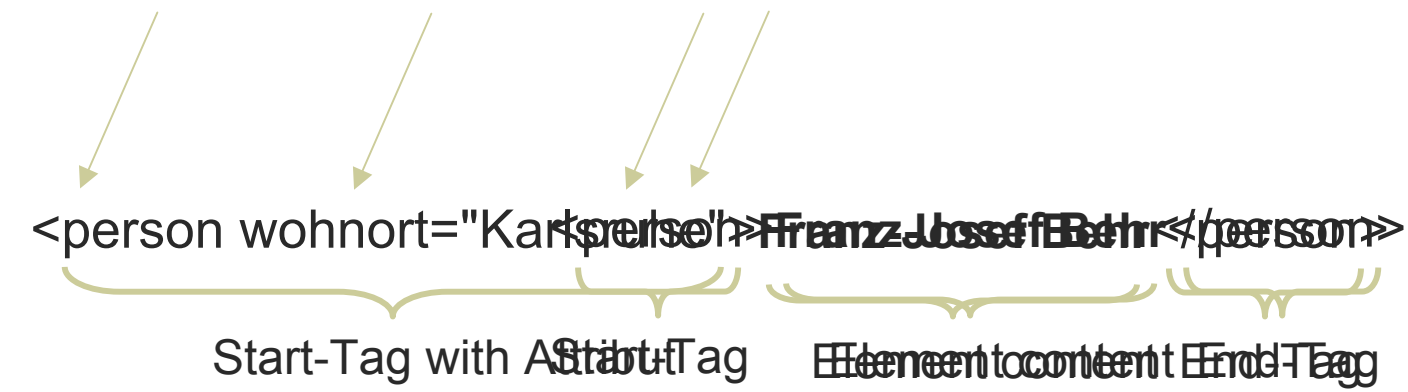
DXF

```
        EF      59009          BGRUND
002660042 000133021 000133022 000133023 000133041
001774001 000147000 002660104 002660041 002660042
          E
```

eXtensible

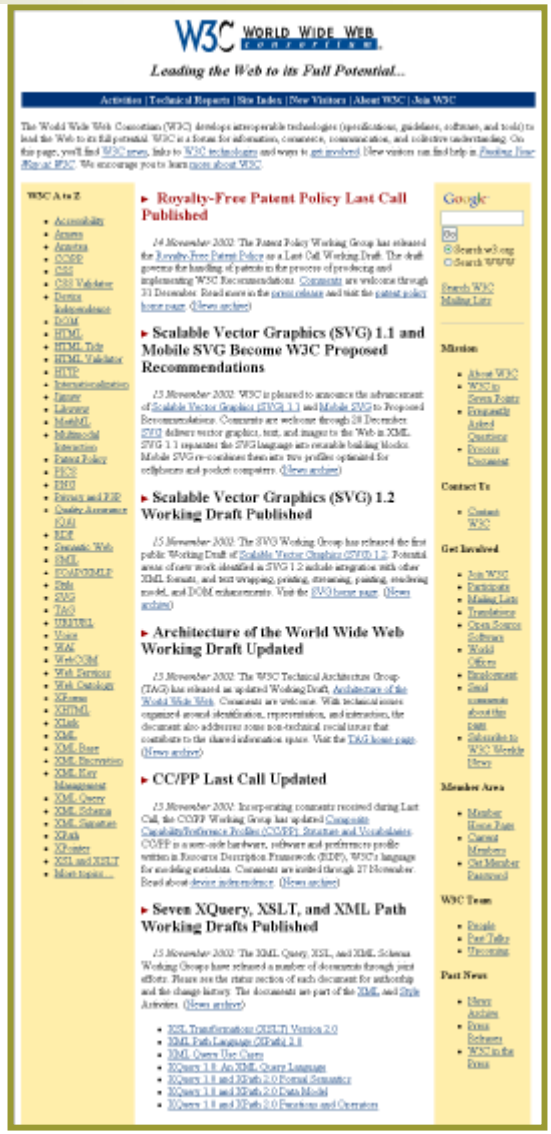
- Markup Language
- Definition of structural elements for data
- Strict syntax

Elementname *Attributname* *Elementwert, free selectable*



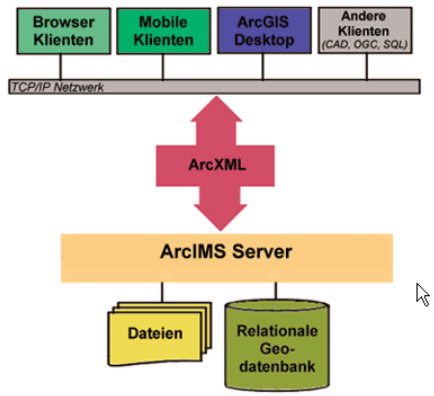
References

- World Wide Web Consortium, XML http://www.w3c.org/XML/



XML and GIS

- XML is often used for the description of meta data
- NAS - the new emerging German data exchange standard, http://www.adv-online.de/veroeffentlichungen/afis-alkis-atkis/geoinfodok-index-3-0.htm
- Open GIS Consortium (OGC)
  - Geography Markup Language (GML)
  - XML-based messaging: GetCapabilities, GetFeature...
- LandXML.org
- World Wide Web Consortium (W3C)
  - Scalable Vector Graphics (SVG)
  - ...
- ESRI: Arc Extensible Markup Language (ArcXML), the ... format ArcIMS uses for communication between ArcIMS components
- Google Earth's KML
- ...



JavaScript Object Notation (JSON)

- uses JavaScript notation to define (geo-) objects.
- has recently become quite intensively used throughout the web
- For example, several of Google's web-based applications and services can provide feed data in JSON format.
- Advantage: compactness of data representation.
- Certain security aspects must be considered, especially the need to take precautions with user-entered data since it could contain malicious code which then could be executed.

JavaScript Object Notation (JSON)


```
{"markers": [
   {"lat":40.078678917425364, "lng":116.58738613128662,
    "html":"<center><div id='ISPRS'><a href='http://... '>Airport</a>
    <img src='home/line.gif'\><br><img src='home/ISPRS/airport.jpg'\></div></center>",
    "label":"Beijing Capital International Airport", "icontype":"airport"
   },
   {"lat":39.902773622574756, "lng":116.42115354537964,
    "html":"<center><div id='ISPRS'>
     <a href='http://www.bjrailwaystation.com.cn/'>Railway Station</a>
     <img src='home/line.gif'\><br><img src='home/ISPRS/train.jpg'\></div></center>",
    "label":"Beijing Railway Station", "icontype":"train"
   }
  ],
 "lines": [
    {"colour":"#33FF00", "width":4, "opacity":0.8,
     "points": [
               {"lat":39.903390903993035,"lng":116.41884684562683 },
               {"lat":39.90309049439747 ,"lng":116.4180314540863 },
               {"lat":39.900543132699426,"lng":116.41479134559631 },
     ]
   },
   {"colour":"#FF0000", "width":4, "opacity":0.8,
    "points":[
       {"lat":39.95119273428447 ,"lng":116.40208840370178 },
       {"lat":39.95773923195536 ,"lng":116.40189528465271 },
]
   }
 ]
}
```

GeoJSON

- JSON = JavaScript Object Notation
- lightweight data-interchange format
- efficient use in JavaScript programs

```
{
    "type": "Feature",
    "id": "OpenLayers.Feature.Vector_122",
    "properties": {
    },
    "geometry": {
        "type": "Point",
        "coordinates": [
            115.3125,
            24.9609375
        ]
    },
    "crs": {
        "type": "EPSG",
        "properties": {
            "code": 4326
        }
    }
}
```

CSV

- Comma seperated (delimited) values
- popular in spreadsheets and database technolgy
- adopted in GIS field

```
Road_0001;Aimin_Jie;Road;Polyline;116.376;39.9309;116.376;39.9266;116.376;39.9317;LINESTRING(116.375686 39.931674,116.375683 39.931593,116.375747 39.93026,116.375806 39.926574)
```

RSS, GeoRSS

- When you think about RSS as the start of a programmable Web, as you expose APIs to your Web sites, amazing things can happen.

When you think about RSS as the start of a programmable Web, as you expose APIs to your Web sites, amazing things can happen.

Bill Gates (2006) [1]

[1] http://www.microsoft.com/presspass/exec/billg/speeches/2006/03-20MIX.mspx [2008-10-22]

GeoRSS: Example

```
<item>
  <title>
    A5: Karlsruhe Richtung Heidelberg
  </title>
  <link>
    http://www.antenne.de/antenne/meldungen_deutschland.php
  </link>
  <description>
    Zwischen  Bruchsal und  Kronau Bauarbeiten,
    rechte Spur gesperrt bis 13.03.2008 16:00 Uhr
  </description>
  <pubDate>
    Tue, 29 Apr 2008 21:33:09 +0200
  </pubDate>
  <georss:line>
    8.6033 49.2269 8.56665 49.1583 8.56 49.148
  </georss:line>
</item>
```

GeoRSS: Geometries

- <georss:point>45.256 -71.92</georss:point>
- <georss:line>
  45.256 -110.45 46.46 -109.48 43.84 -109.86</georss:line>
- <georss:polygon>45.256 -110.45 46.46 -109.48 43.84 -109.86
  45.256 -110.45</georss:polygon>

Simple Marker Definition

```
<marker>
  <name>Aksu</name>
  <lng>80.333330000</lng>
  <lat>41.166670000</lat>
</marker>
```

Keyhole Markup Language - KML

- "Language of Google Earth"
- KML (Keyhole Markup Language) is an XML-based markup language for locating and visualizing features on a 2D or 3D digital map/surface (e.g., Google Earth/Maps)
- Originally developed by Keyhole, Inc. who was acquired by Google in 2004
- KML now is an open standard officially named the OpenGIS® KML Encoding Standard (OGC KML). It is maintained by the Open Geospatial Consortium, Inc. (OGC). The complete specification for OGC KML can be found at http://www.opengeospatial.org/standards/kml/.

- The complete XML schema for KML is located at http://schemas.opengis.net/kml/.

- Unlike GML, KML includes tags and attributes that allow the user to describe how the feature should be rendered and visualized on the digital map
- KML uses geographic coordinates (lat/long) in WGS84 for its coordinate reference system
- Each feature is located in 3D space, using one or more x,y,z coordinates

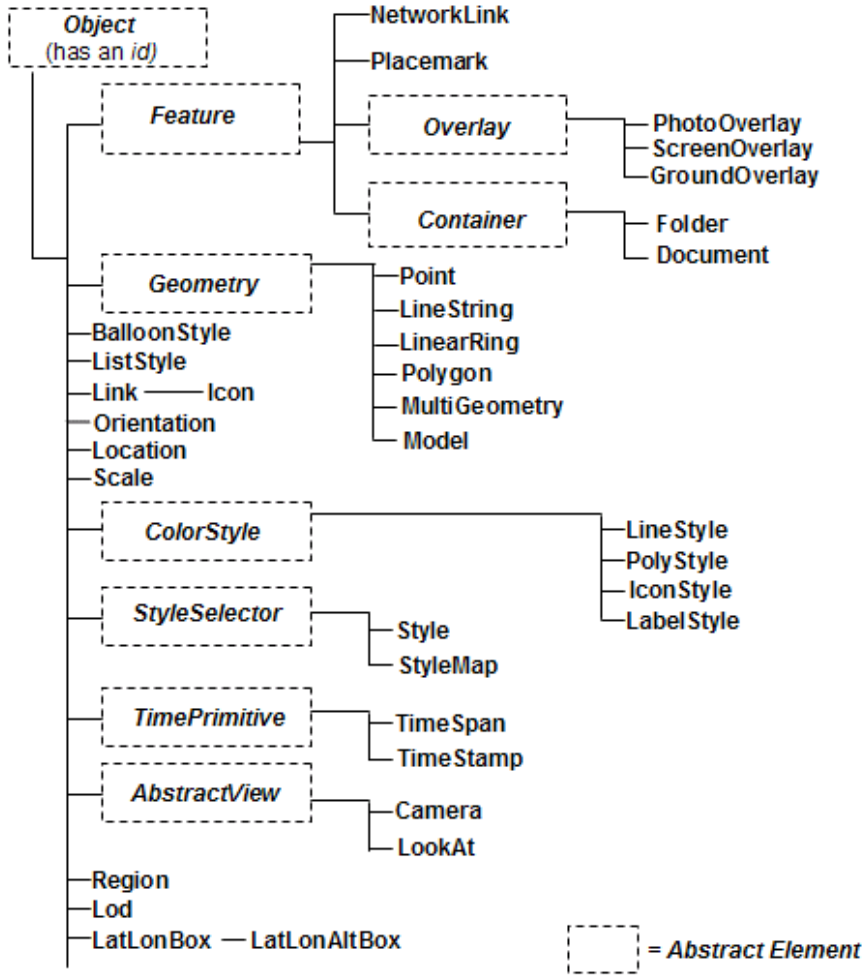
Interoperability

- In addition to Google, many other vendors now utilize KML such as:
  - ArcGIS Explorer
  - Live Search Maps
  - Microsoft Virtual Earth
- Users share locations of events and features

- You can create KML files in Google Earth
- Once you create a KML file, you can copy and paste the KML into a text editor or XML editor to edit
- ArcGIS can create a KML file from features using an ArcScript
- MapInfo can create a KML file using the Google Earth Link Utility (8.5+)

KML Elements

- Features specified in the KML schema include:
  - Placemarks
  - Images
  - Polygons
  - 3D models
  - Textual Annotation



KML Placemark Sample

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.0">
<Placemark>
    <description>New York City</description>
    <name>The Big Apple</name>
    <Point>
            <coordinates>-74.006393,40.714172,0</coordinates>
    </Point>
</Placemark>
</kml>
```

Creating KML Files

- You can create KML files in Google Earth
- Once you create a KML file, you can copy and paste the KML into a text editor or XML editor to edit
- ArcGIS can create a KML file from features using an ArcScript
- MapInfo can create a KML file using the Google Earth Link Utility (8.5+)

Using KML Files

- Double-clicking on a KML file will automatically launch Google Earth and zoom to the feature(s)
- KML and KMZ files can be used in Google Maps, however your file must be hosted on a web server
- Google Maps doesn't support every type of KML feature
- ArcGIS Explorer utilizes KML files
- KML files can be shared through the KML Gallery and Google Earth Community

Keyhole Markup Language - KML

```
<Folder>
<name>USGS M&gt;2.5 Earthquakes</name>
<description>Real-time, worldwide earthquake list for the past 7 days
</description>
<Placemark>
<name>M 2.6, Greater Los Angeles area, California</name>
<description>February 22, 2006 09:01:09 GMT<br/>
http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/ci14213880.php
</description>
<Style>
<IconStyle>
 <scale>0.5</scale>
 <Icon><href>http://labs.google.com/ridefinder/images/red.png</href></Icon>
</IconStyle>
</Style>
<LookAt>
 <longitude>-117.4733</longitude>
 <latitude>34.2235</latitude>
</LookAt>
<Point>
 <coordinates>-117.4733,34.2235,0</coordinates>
</Point>
</Placemark>
</Folder>
```

HOW TO CREATE A MASHUP

GeoStack

- According to Andrew Turner
  http://highearthorbit.com/

- Create
- Publish
- Aggregate
- Consume

Come up with an idea

- The first thing you'll need, of course, is an idea - simple is good, useful is better.
- A good place to start: Take a common task, like searching for something … and make it easier or more efficient

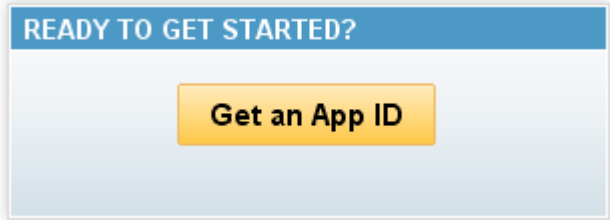
Choose data sources

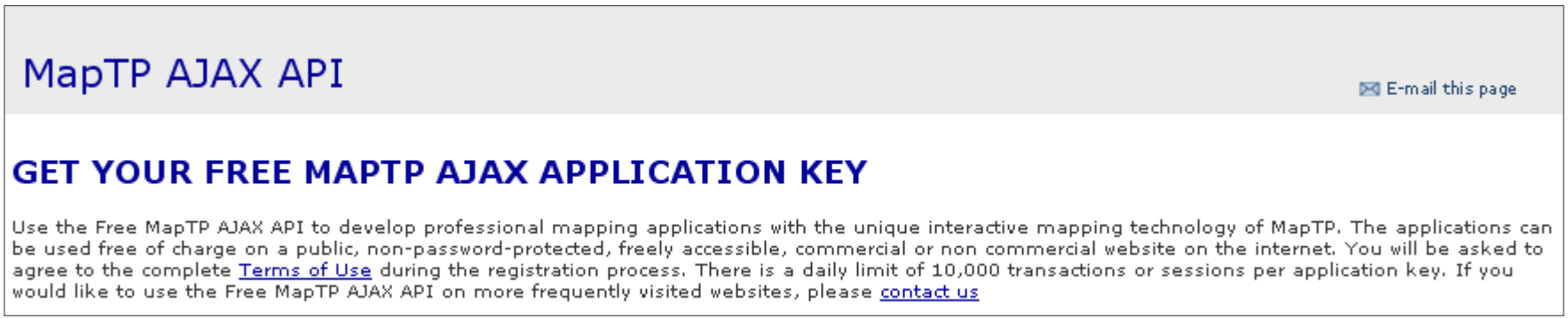
- Data is provided usually through APIs.
- Popular APIs (Flickr, YouTube): relatively simple to use
- Others, like a shopping cart service, require a bit more fortitude to master (and rightly so).
- Most APIs are built to work with a variety of programming languages

You need an ID

How do I start?

1. Sign up for a Google Maps API key.
2. Read the Maps API Concepts.
3. Check out some Maps API Examples.
4. Read the Maps API Reference.

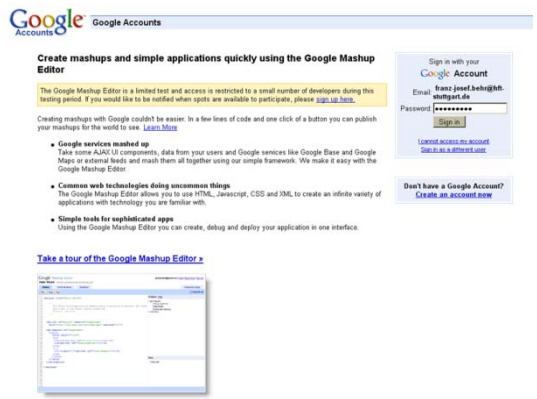


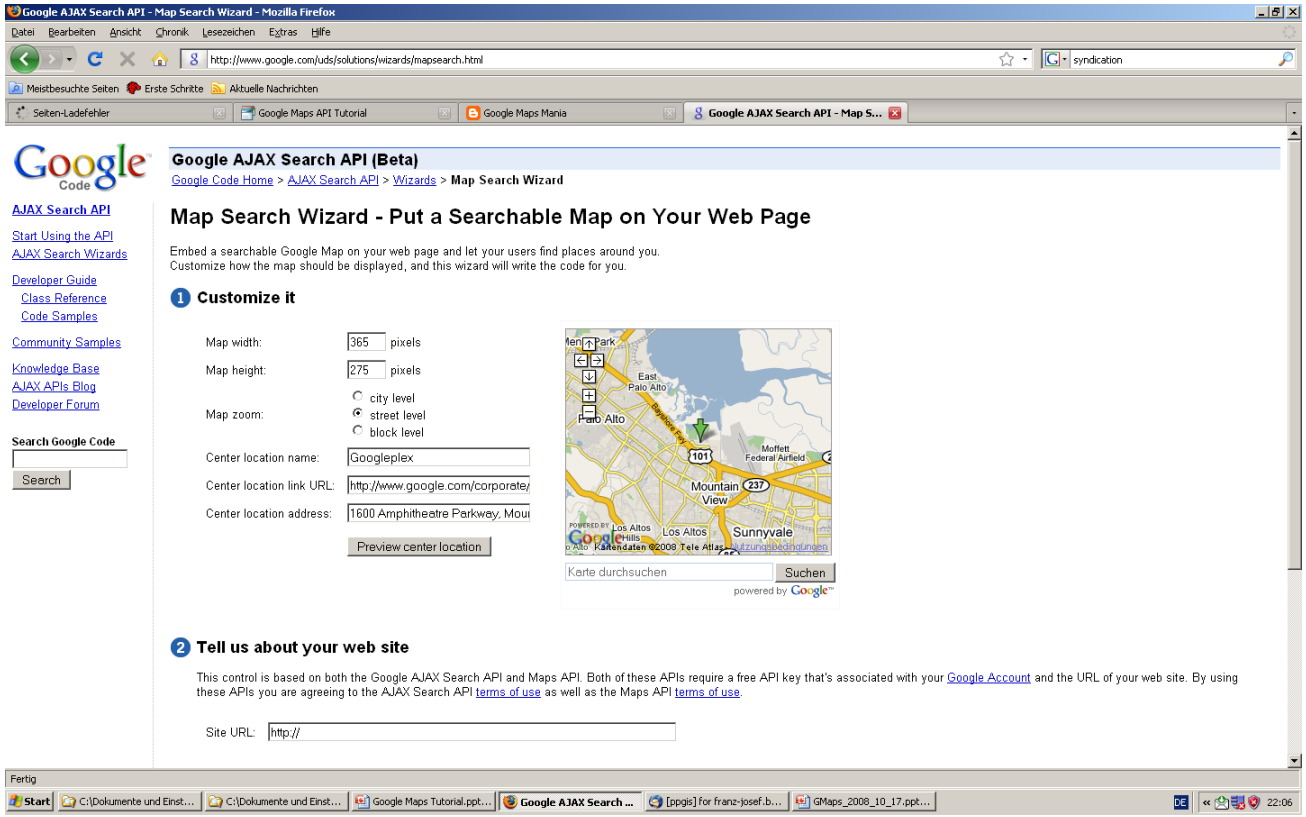


Build the mashup

- From scratch: different scale of complexity
  - use HTML, Javascript, CSS and XML to create a variety of applications with technology you are familiar with.

- Using Mashup editors:
- Popular Mashup Editors, i.e. lightweight mashup environments "for assembling personal, enterprise, and Web content into simple, flexible, and dynamic applications" (IBM, http://services.alphaworks.ibm.com/graduated/qedwiki.html)
  - Yahoo! Pipes, „a powerful composition tool to aggregate, manipulate, and mashup content from around the web", http://pipes.yahoo.com/pipes/
  - Dapper, http://www.dapper.net/
  - QEDWiki




Google AJAX Search API - Map Search Wizard - Mozilla Firefox
http://www.google.com/uds/solutions/wizards/mapsearch.html
Google AJAX Search API (Beta)
Google Code Home > AJAX Search API > Wizards > Map Search Wizard
Map Search Wizard - Put a Searchable Map on Your Web Page
Embed a searchable Google Map on your web page and let your users find places around you.
Customize how the map should be displayed, and this wizard will write the code for you.
1 Customize it
Map width: 365 pixels
Map height: 275 pixels
Map zoom: city level / street level / block level
Center location name: Googleplex
Center location link URL: http://www.google.com/corporate/
Center location address: 1600 Amphitheatre Parkway, Mour
Preview center location
Karte durchsuchen
Suchen
powered by Google
2 Tell us about your web site
This control is based on both the Google AJAX Search API and Maps API. Both of these APIs require a free API key that's associated with your Google Account and the URL of your web site. By using these APIs you are agreeing to the AJAX Search API terms of use as well as the Maps API terms of use.
Site URL: http://

Publish your Mashup

- Mashup hosting? Which provider?
- Consider where you'll host your mashup
  - Which server-side language is needed? PHP, Java, Ruby on Rails, …?
  - Operating system: Linux or Windows based hosting?

Judging your Mashup

- Uniqueness
- Creativity
- Usefulness
- Content
- User Experience: intuitively usable? Too many (confusing) data sources?

Caveats

- More visitors than contributers!?
- Will you get the quality you need?
- Can't control people's creativity

DATA SOURCES

Common free data sources

Own data

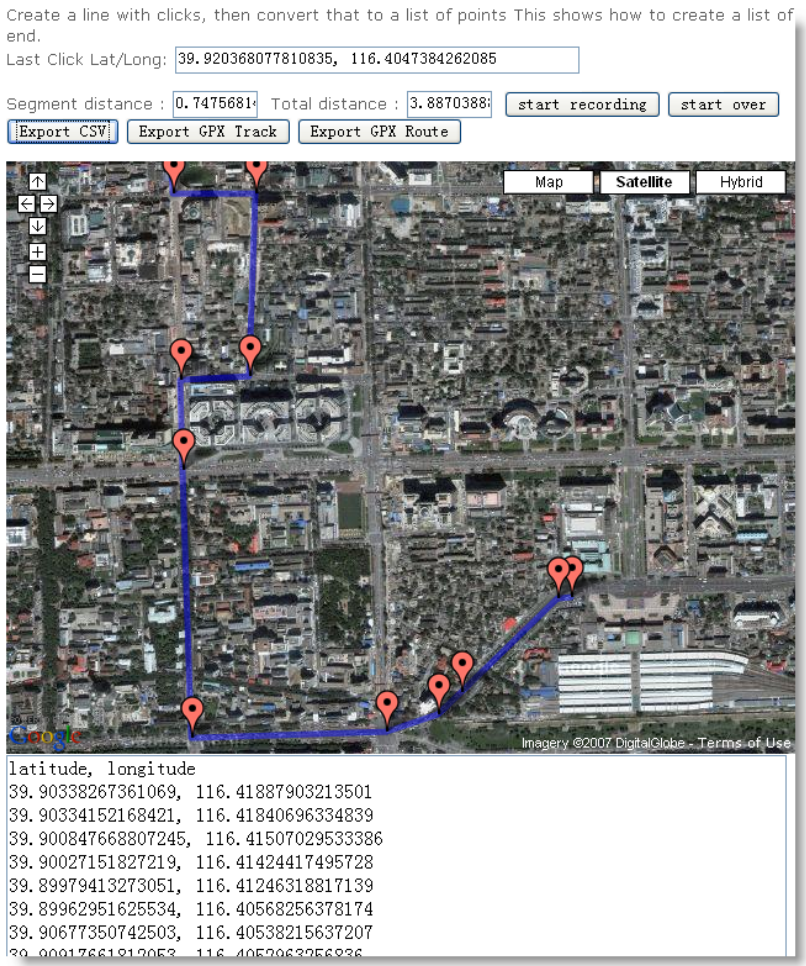
Common free data sources

- http://www.geonames.org
- http://OpenStreetMap.org
- Wikipedia, like http://en.wikipedia.org/wiki/List_of_cities
- https://www.cia.gov/cia/publications/factbook/appendix/appendix-d.html

- But lack of geodata for developing countries

Create your own vector data

- Using Google Maps Mashups which can export data in a format suited for further processing
- Using Google Earth (KML output)



http://www.meulensteen.nl/maps/

TOOLS

Code Editors

- UltraEdit; powerfull
- Notepad++: Open Source
- HTMLKit, http://www.chami.com/ (Shareware)

- Dreamweaver, and other Adobe products

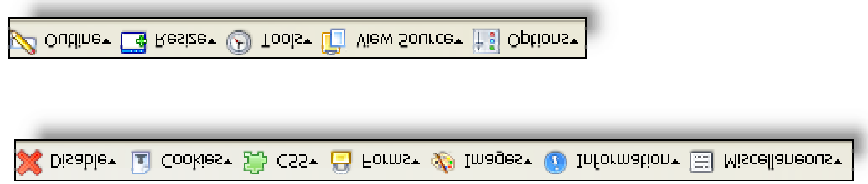
Useful Tools

- Firefox Addon: Validator

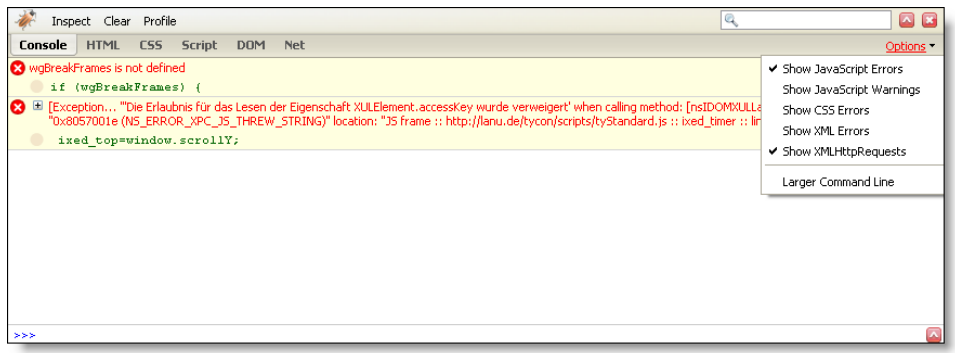
HTMLKit, http://www.chami.com/

Browser extensions

- Web Developer
  - indispensable Firefox Extension for general web development which I use very often



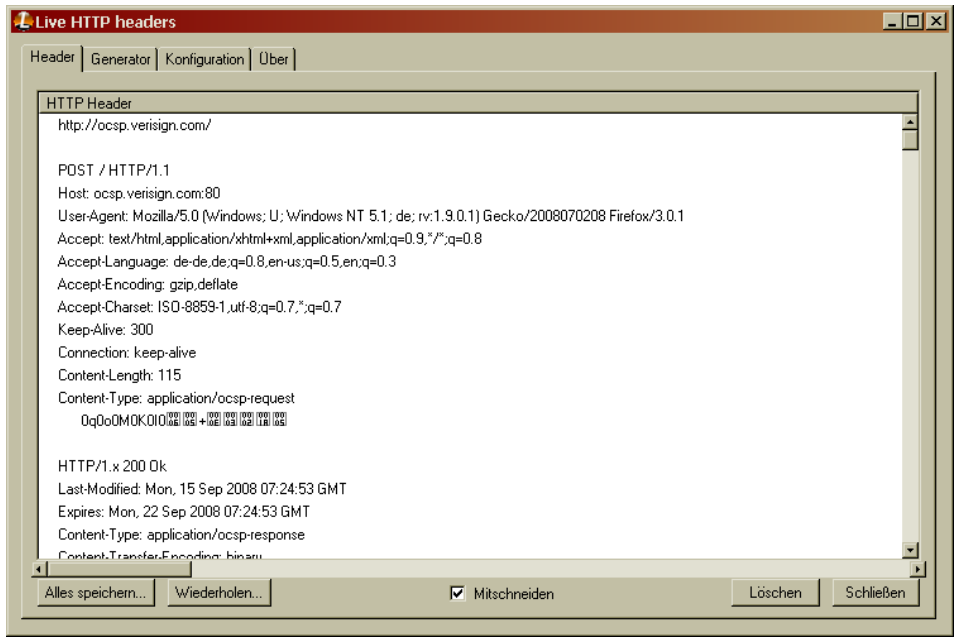
- Firebug
  - an extension that integrates with Firefox.
  - You can edit, debug, and monitor CSS, HTML, and JavaScript live in any web page



Browser extensions

- Validator

- Live HTTP Headers



- Thank you!