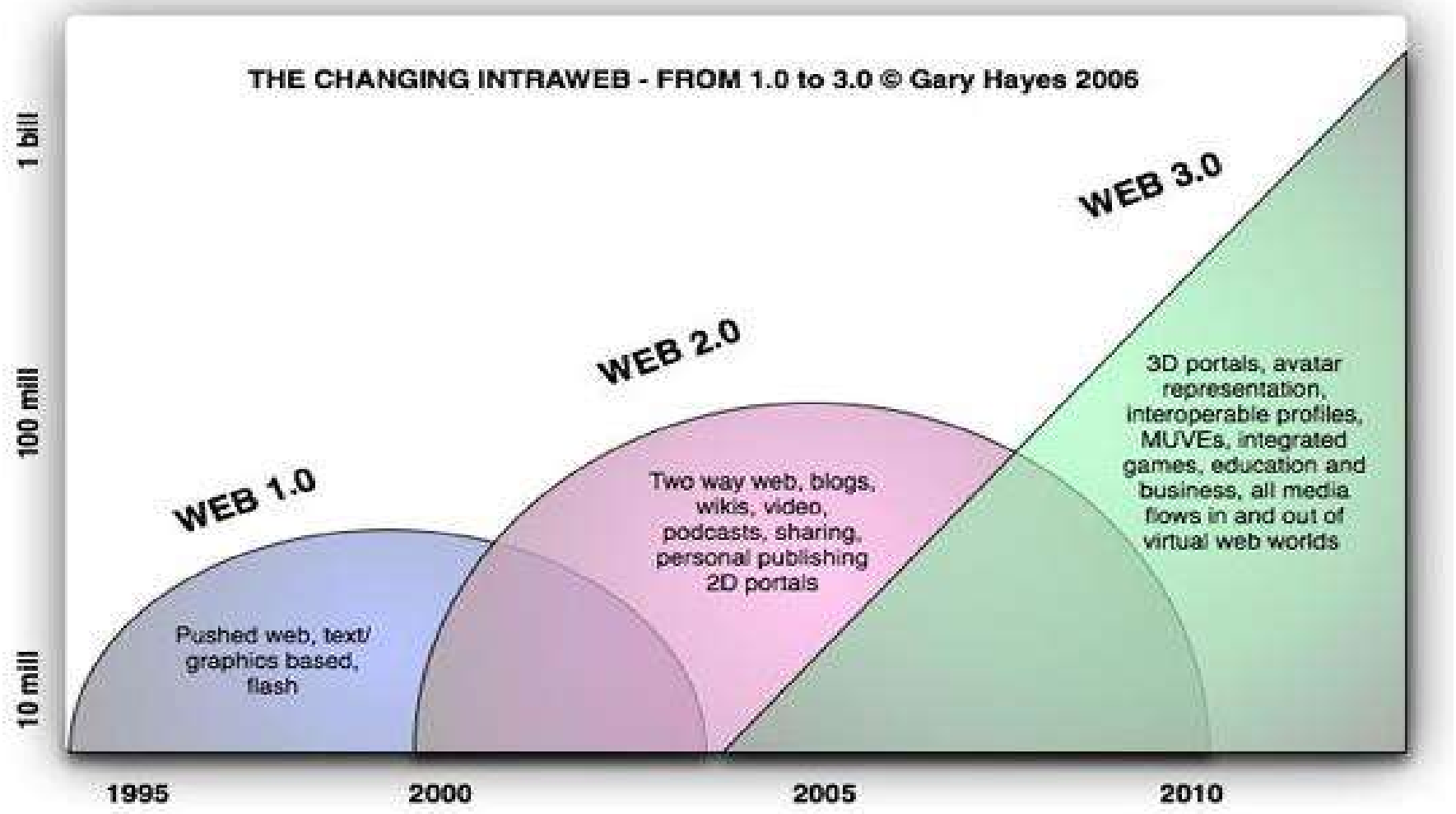
Andrew Nguyen - Brian Payton - Chunyang Xia

Agenda

- Overview
  - History of the web
  - What is web 2.0
  - Key ideas/characteristics
  - Key web 2.0 services/landscape
- Web 2.0 Technologies
- Future of the web
- What IBM is doing

History



Source: Hodgson, Matthew. "Beyond Web 2.0" http://www.theappgap.com/beyond-web-20.html

What is Web 2.0?

- NOT a new web technical specifications
- Coined by Darcy DiNucci in 1999
- The first O'Reilly Media Web 2.0 conference in 2004
- A perceived second generation of the web

Source: Wikipedia. "Web 2.0". http://en.wikipedia.org/wiki/Web_2.0

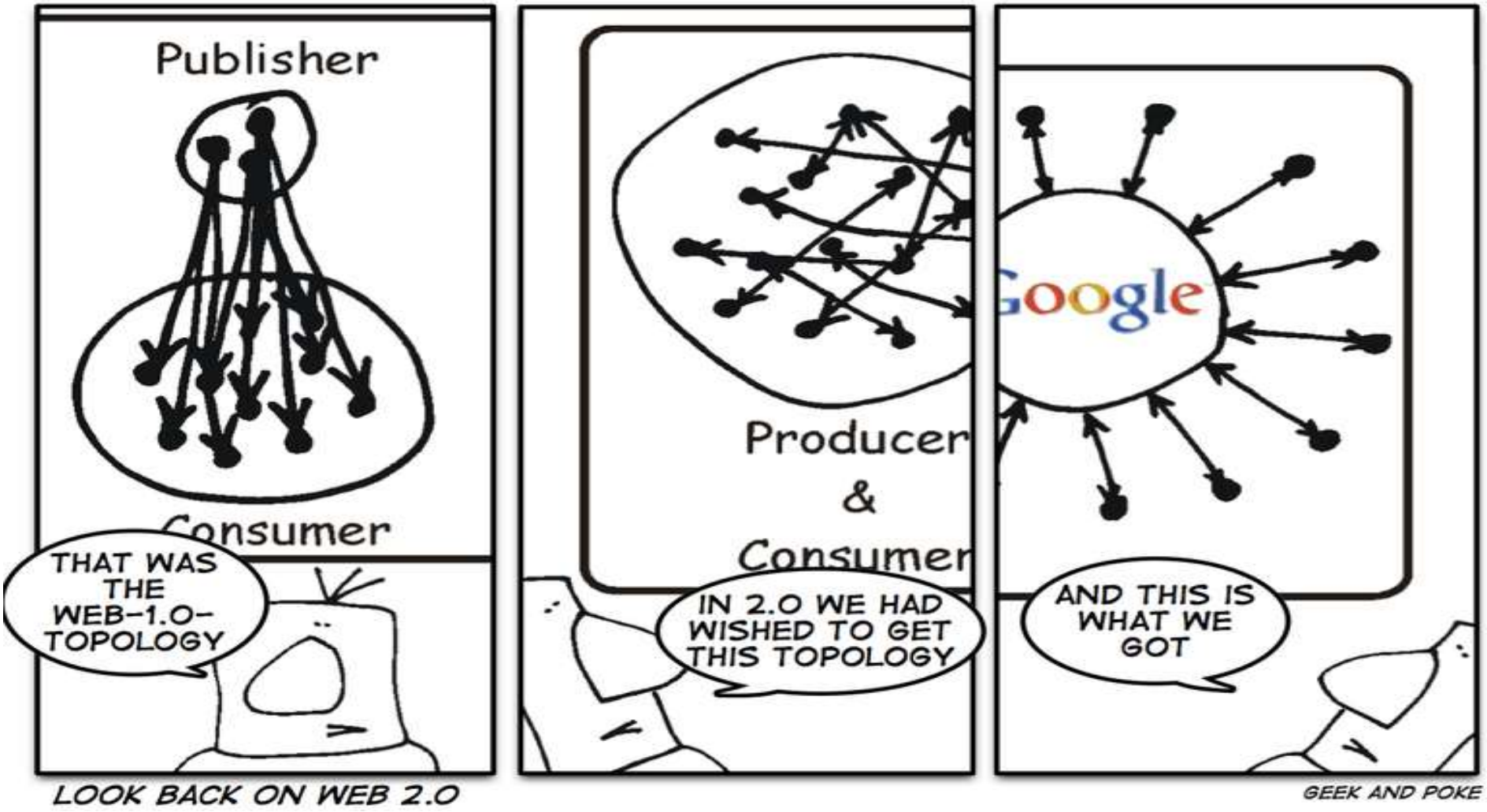
Themes

Source: Wikipedia. "Web 2.0". http://en.wikipedia.org/wiki/Web_2.0

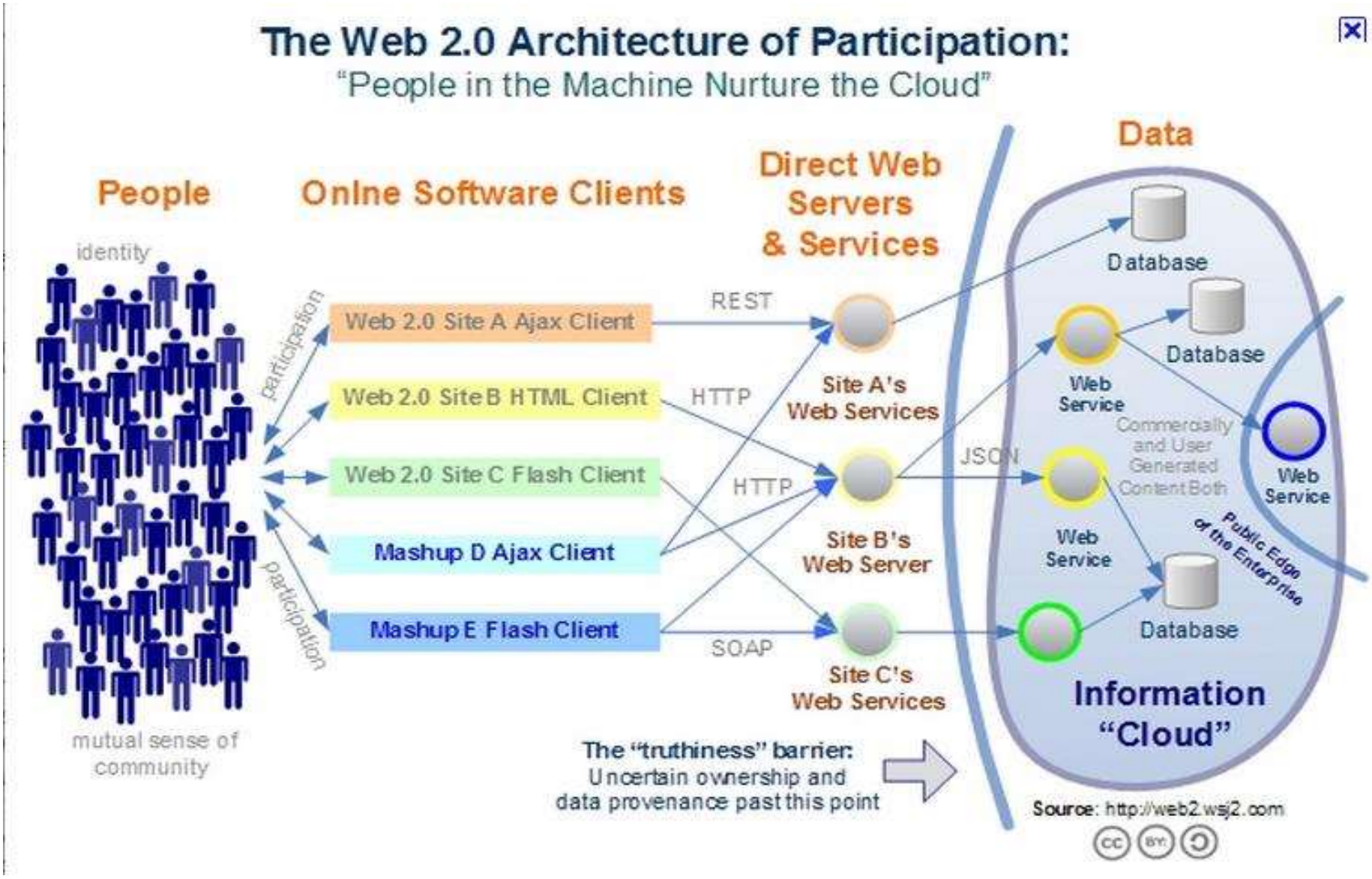
Key Characteristics

- User-centered design
  - iGoogle, Yahoo, ibm w3
- User generated content
  - YouTube, Flickr
- Architecture of Participation
  - Wikis, social networks
- Rich user Experience
  - Google Maps
- End of Software Release cycle
- Wisdom of the crowd/collective intelligence
- Network effect, the Long tail

Source: Anderson, Paul (2007). "What is Web 2.0? Ideas, technologies and implications for education". *JISC Technology and Standards Watch*.



Source: Geek and Poke. http://geekandpoke.typepad.com/geekandpoke/

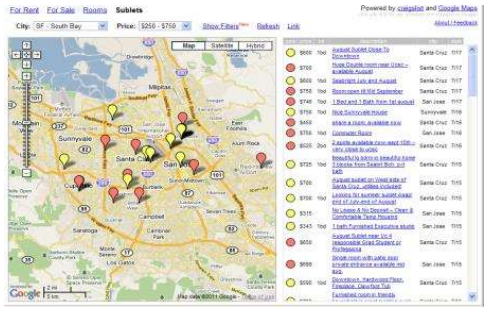


Source: http://www.2leep.info/web_2.html

Web 2.0 services

Podcast

RSS and Syndication



Data Mashup

Wikis and Blogging

Multimedia Sharing

Social Networks

Social Gaming

Social Bookmarking

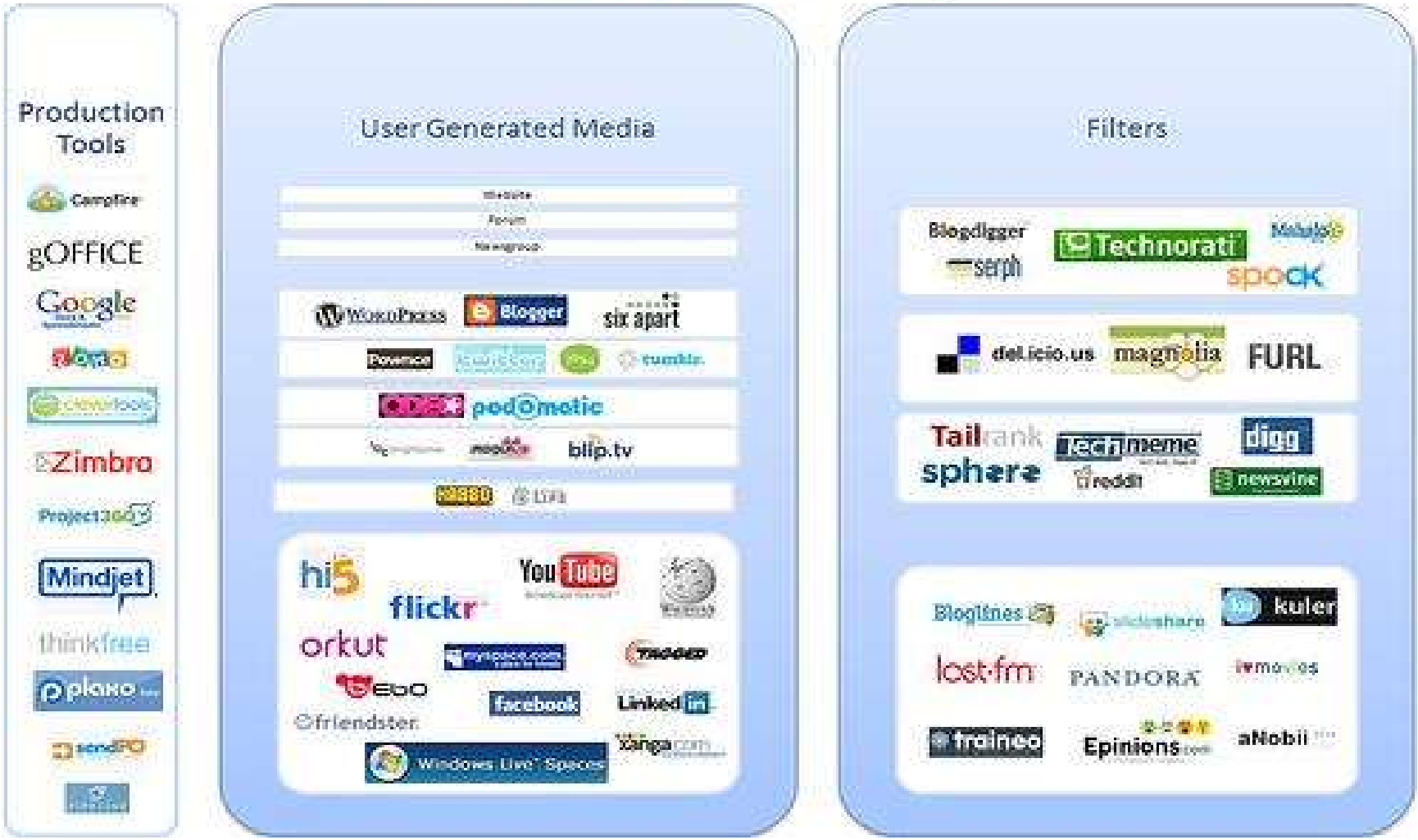
The changing web

Web 1.0		Web 2.0
DoubleClick	-->	Google AdSense
Ofoto	-->	Flickr
Akamai	-->	BitTorrent
mp3.com	-->	Napster
Britannica Online	-->	Wikipedia
personal websites	-->	blogging
evite	-->	upcoming.org and EVDB
domain name speculation	-->	search engine optimization
page views	-->	cost per click
screen scraping	-->	web services
publishing	-->	participation
content management systems	-->	wikis
directories (taxonomy)	-->	tagging ("folksonomy")
stickiness	-->	syndication

Source: http://oreilly.com/web2/archive/what-is-web-20.html

Source: Geek and Poke. http://geekandpoke.typepad.com/geekandpoke/

Web 2.0 Landscape



Source: http://www.flickr.com/photos/vincos/1392311603/

Web 2.0 Technologies

- Client-side (Browser) technologies
  - Ajax
  - Flash / Flex
  - HTML5
  - CSS3
- Data transmission technologies
  - XML and JSON
  - REST and SOAP
- Server-side technologies
  - Java, PHP, Perl, Python, JSP, …
- Ajax Frameworks and Toolkits
  - Dojo, jQuery, Google Web Toolkit...

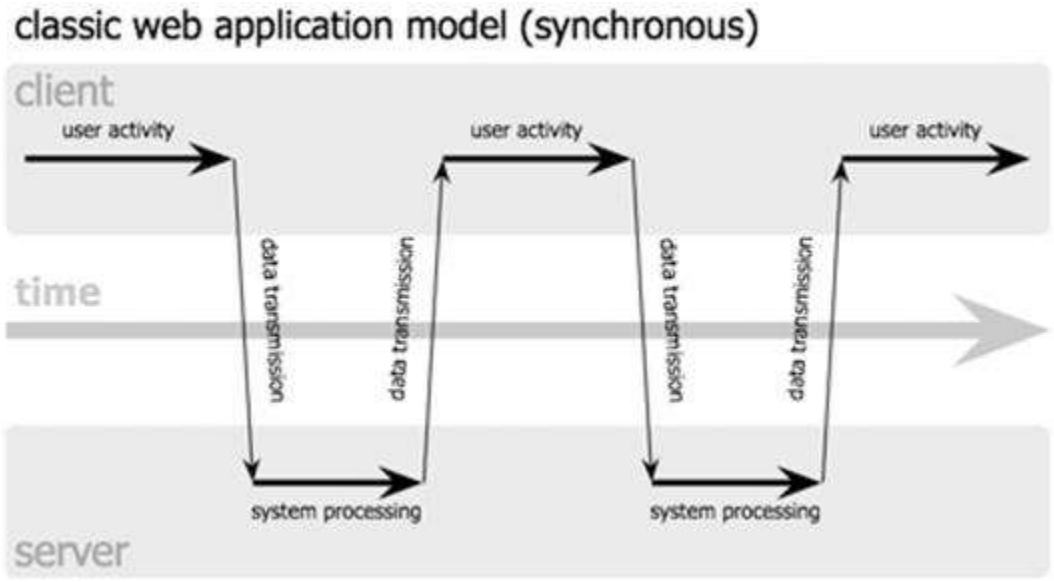
Ajax

- Ajax = Asynchronous JavaScript and XML
  - Term coined by Jesse Garret (Adaptive Path), 2005
- Not a single product or technology, but a combination of technologies and techniques:
  - HTML and CSS
  - DOM
  - XML (and XSLT) or JSON
  - XMLHttpRequest
  - JavaScript

Source: "Ajax: A New Approach to Web Applications", Jesse James Garrett, 02/18/2005

Why Ajax?

- The Web 1.0 problem: page refresh performance
  - Each user interaction and page change required that the entire page get transmitted from the server to the browser



- Ajax addresses this through some clever tricks...

Source: "Ajax: A New Approach to Web Applications", Jesse James Garrett, 2005

Ajax Technologies

- HTML and CSS
  - Describes information to display, with its styling
- DOM (Document Object Model)
  - Provides programmatic (in memory) representation of the displayed information
  - Allows parts of the displayed information to be updated while leaving other parts alone
- XML (with XSLT) or JSON
  - Encodes data transmitted between server and client

Source: "Ajax: A New Approach to Web Applications", Jesse James Garrett, 2005

Ajax Technologies (cont.)

- XMLHttpRequest
  - API for asynchronous communication between client and server
  - Originally from Microsoft, adopted by Mozilla and others, now W3C candidate recommendation
  - Built into all modern browsers (JavaScript object)
    - In older Microsoft browsers as ActiveX object
  - Methods:
    - open
    - setRequestHeader
    - send
    - getResponseHeader

Source: “Dynamic HTML and XML: The XMLHttpRequestObject”, Apple Developer, 2005

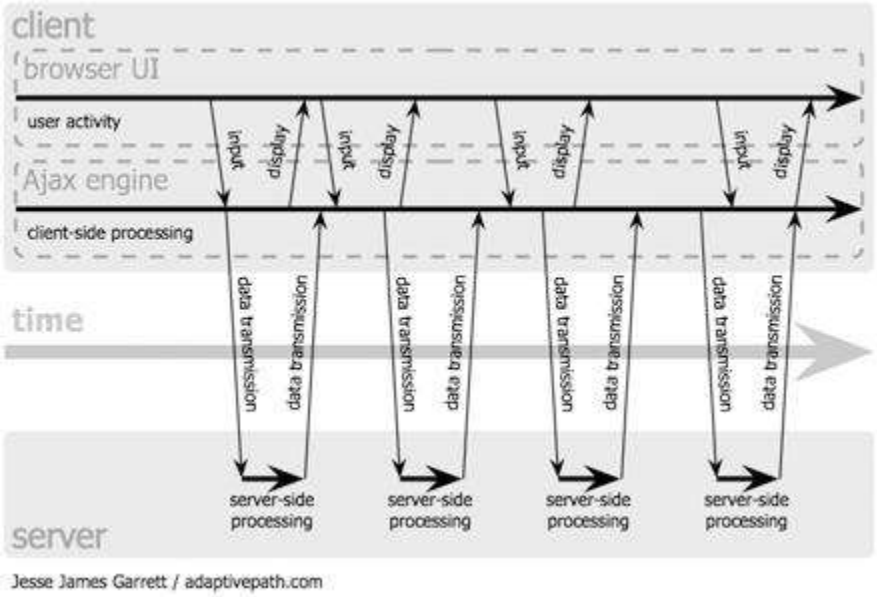
Ajax Technologies (cont.)

- JavaScript (AKA ECMAScript)
  - Created in 1995 by Brendan Eich (Netscape)
    - Despite its name, has little to do with Java
  - Now universally available in browsers as a “scripting language”
    - Is actually a general-purpose language, also used outside the browser
  - Dynamically typed, object-oriented, functional features (closures, lambda-expressions)
    - Has C / Java-like syntax, but closer in spirit to Lisp, Scheme, Self
- In Ajax, JavaScript ties everything together

Source: “A re-introduction to JavaScript”, Simon Willison, 2006

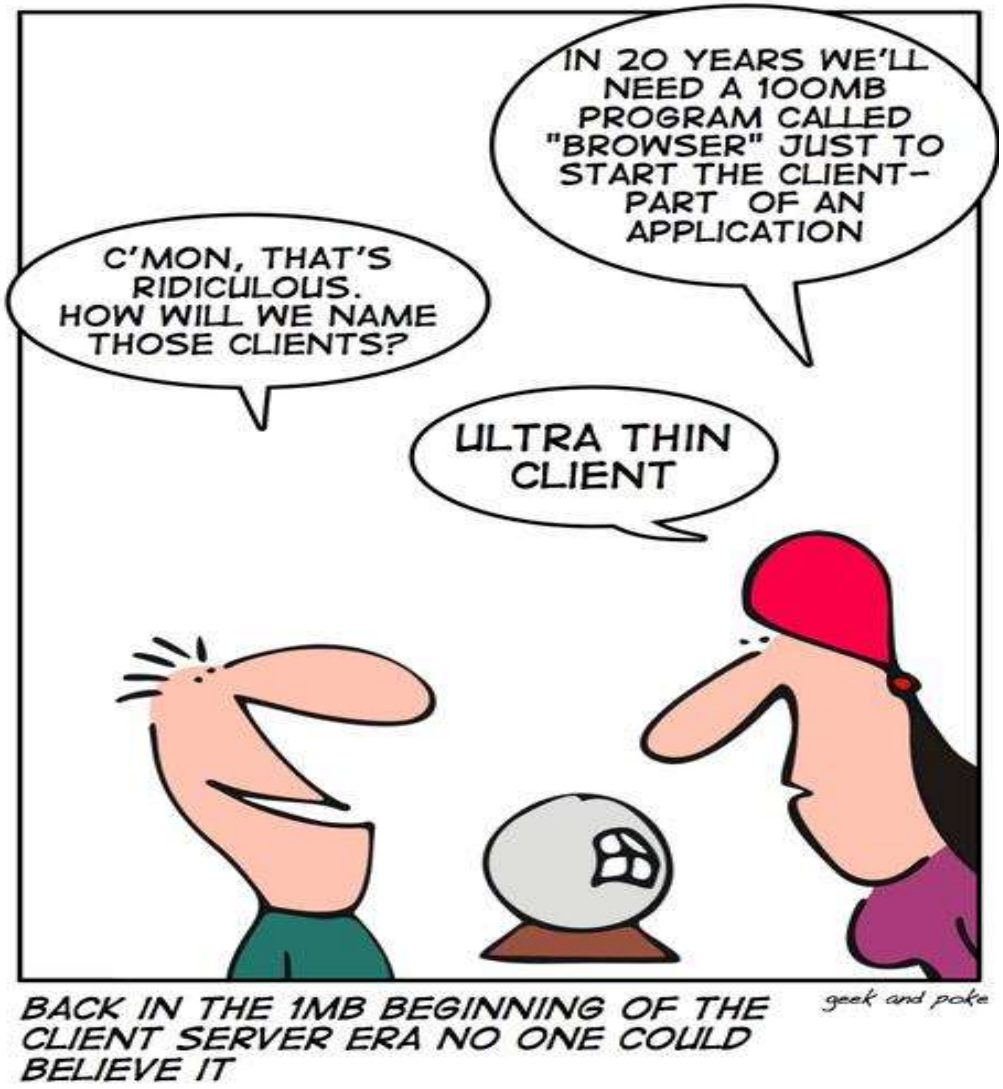
How Ajax works

- Before first page is loaded, the browser loads an “Ajax engine” (a JavaScript program)
  - Placed in hidden page frame
  - Handles both user interaction and server comm.



- Ajax engines are not easy to write and debug!

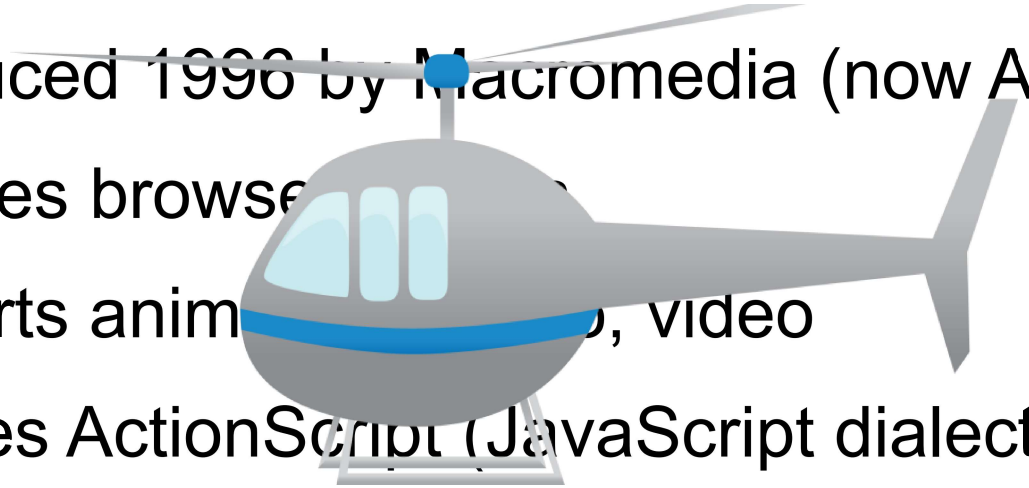
Source: "Ajax: A New Approach to Web Applications", Jesse James Garrett, 2005



Source: Geek and Poke. http://geekandpoke.typepad.com/geekandpoke/

Flash and Flex

- Flash
  - Most widely-used Web animation technology
  - Introduced 1996 by Macromedia (now Adobe)
  - Requires browse
  - Supports anim , video
  - Includes ActionScript (JavaScript dialect)
  - Stable, well supported by dev tools (ie, Adobe CS4)
  - Shows up on websites everywhere
  - Partly open, partly closed
  - Not supported on iPhone, iPad (iOS)



Flash and Flex (cont.)

- Flex
  - Free, open-source framework for building “rich internet applications” (RIAs)
    - Complete web applications, not just animations
  - Runs in Adobe Flash Player (in browsers) and Adobe AIR application (mobile and desktop)
  - Developed and controlled by Adobe
  - Includes MXML language for UI layout specs
  - Includes ActionScript for logic
  - Has Eclipse-based IDE

Source: “Flex Overview”, Adobe Systems Incorporated, 2011.

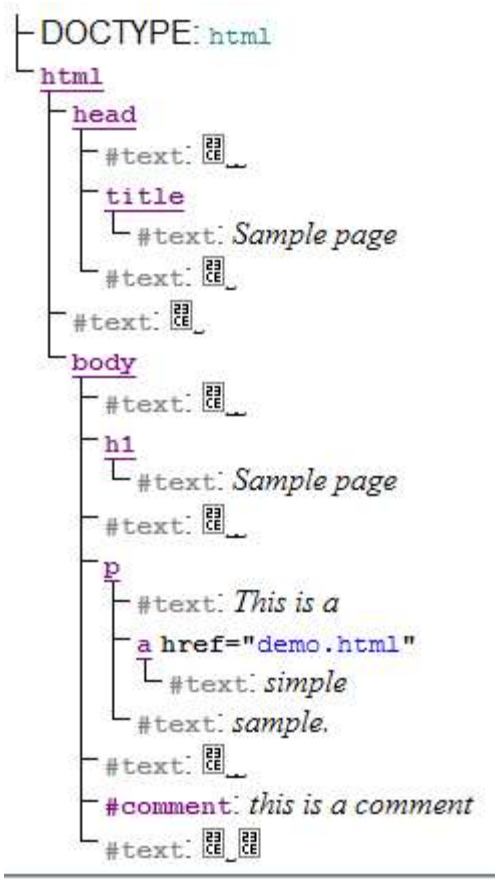
HTML5

- Successor to HTML4 (1998)
  - Effort started by Mozilla and Opera in 2004
- Compatible with both HTML4 and XHTML 1.1
- Incorporates previously separate standards
  - DOM, JavaScript, MathML, SVG...
- Includes many new features
  - canvas, audio, video ...
- Currently a W3C Draft Recommendation
  - Not considered final until two complete independent implementations exist
  - However many features are already available in popular browsers (Firefox, Chrome, Opera)
  - Internet Explorer support coming in IE 9

Source: “HTML5”, WC3, 2011

HTML5 Markup and DOM


```
<!DOCTYPE html>
<html>
 <head>
  <title>Sample page</title>
 </head>
 <body>
  <h1>Sample page</h1>
  <p>This is a <a href="demo.html">simple
</a> sample.</p>
  <!-- this is a comment -->
 </body>
</html>
```



Source: “HTML5”, WC3, 2011

HTML5 New Features

- Document structure
  - nav, section, article, aside, hgroup, header, footer
- Graphics
  - canvas
- Multimedia content
  - audio, video
- Misc.
  - command, meter, progress, details, datalist...

Source: “HTML5 differences from HTML4”, WC3, 2011

CSS3

- CSS = Cascading Style Sheets
  - Separates content from visual presentation (font, color, alignment...)
  - “Cascading” because a style sheet can inherit from others
  - CSS started 1994, CSS3 started 1998
  - Standard defined by W3C, not finalized
- CSS3 new features
  - Rounded corners, background decorations, colors, text effects
- Example:

Source: “What's New in CSS3”, Malin De Silva, 2010. “CSS3 Previews”, CSS3.info, 2009

JSON

- JSON = JavaScript Object Notation
- Designed as light-weight alternative to XML
- First proposed by Douglas Crockford in 2002
  - Derived from JavaScript's object representation
- Easy to parse and implement
- Now supported by every popular programming language
  - Since derived from a programming language, has low impedance with other languages

Source: “JSON: The Fat-Free Alternative to XML”, Douglas Crockford, 2006

JSON and XML

JSON

```
{"menu": {
  "id": "file",
  "value": "File",
  "popup": {
    "menuitem": [
      {"value": "New", "onclick": "CreateNewDoc()"},
      {"value": "Open", "onclick": "OpenDoc()"},
      {"value": "Close", "onclick": "CloseDoc()"}
    ]
  }
}}
```

XML

```
<menu id="file" value="File">
  <popup>
    <menuitem value="New" onclick="CreateNewDoc()" />
    <menuitem value="Open" onclick="OpenDoc()" />
    <menuitem value="Close" onclick="CloseDoc()" />
  </popup>
</menu>
```

Source: “JSON Example”, json.org

Ajax Frameworks and Toolkits

- Dojo
  - Free, open source
  - Active community and well documented
  - IBM's web toolkit of choice
- jQuery
  - Small, light-weight JavaScript library
- Google Web Toolkit (GWT)
  - Java APIs and widgets
- Yahoo User Interface Library (YUI)
  - CSS and JavaScript
- And more
  - Prototype, Moo Tools, Mochikit...

Google Web Toolkit

Source: “AJAX Toolkits Reviewed”,Web Development Tools and Articles, 2010

Mashup

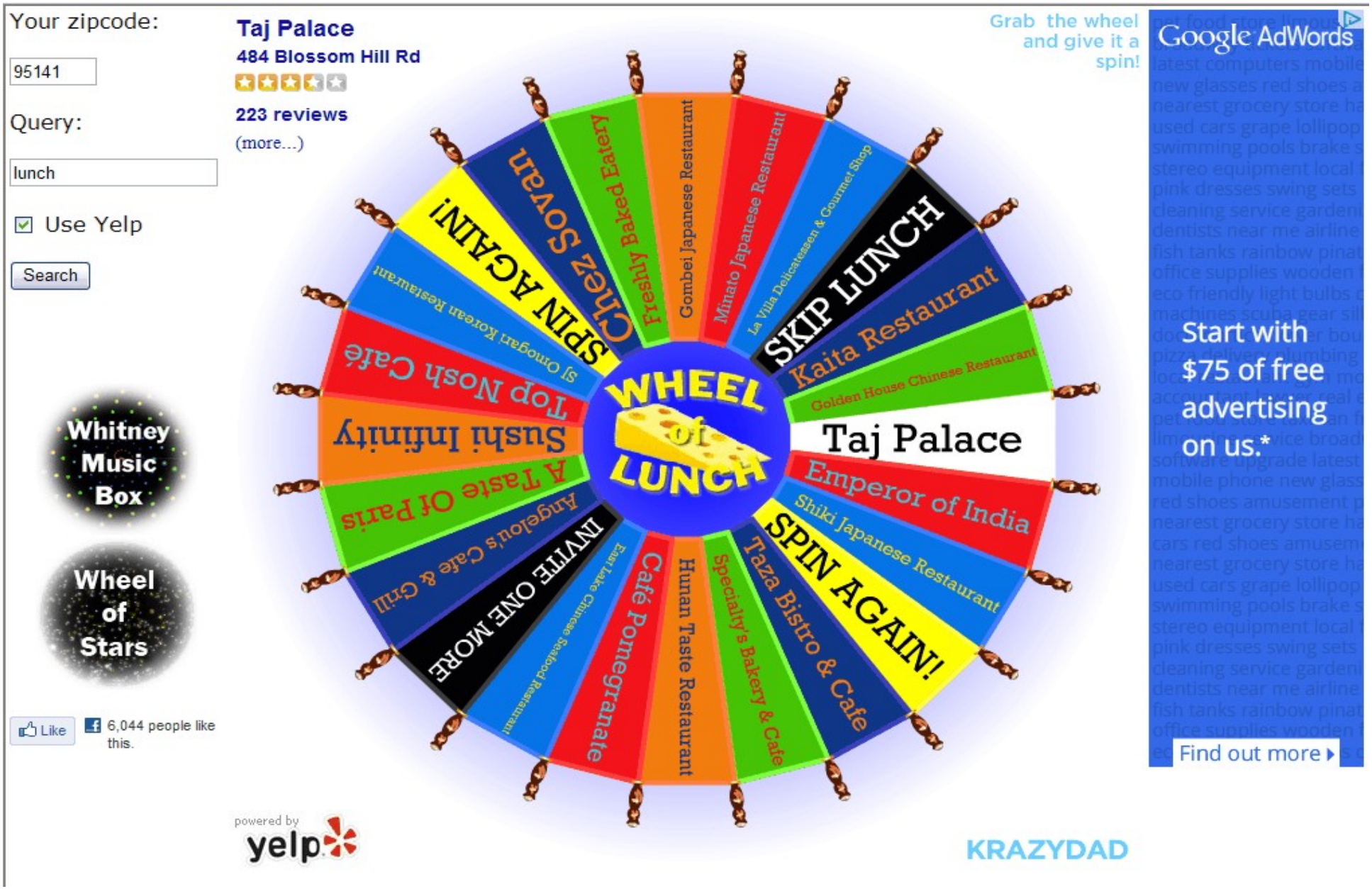
- “A mashup is a website or web application that seamlessly combines content from more than one source into an integrated experience.”
- Think of a mashup not only as a specific application, but also as a “logical container” that can retrieve information from virtually any where on the internet.

Source: http://en.wikipedia.org/wiki/Mashup_(web_application_hybrid)
O. Campesato, K. Nilson, 2011, Web2.0 Fundamentals: With Ajax, Development Tools, and Mobile Platforms

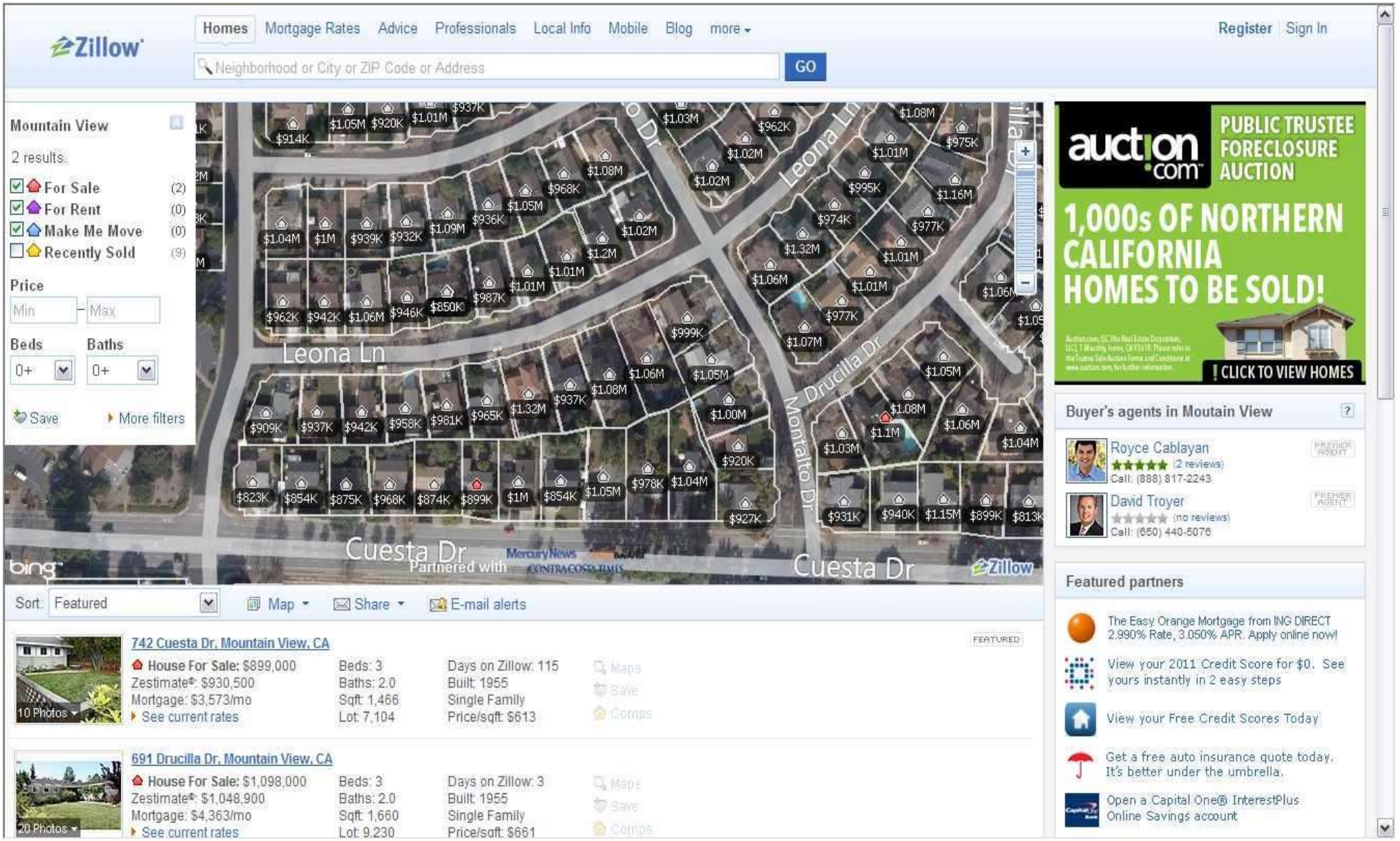
Characteristics of Mashups

- **Combination**
  - Use multiple data sources
  - Join across dimensions
  - Subject + Time/Place + …
- **Visualization**
- **Aggregation**
  - Group your data and take a measure
  - Sum, Ave, Min, Max
  - Create information from the data
  - Which becomes new data itself
  - Use algorithms as a substitute for creativity
  - Classification, prediction, clustering, NLP
  - Uncover hidden aspects of your data

Source: http://en.wikipedia.org/wiki/Mashup_(web_application_hybrid)
http://www.slideshare.net/jhherren/mashup-university-4-intro-to-mashups



Source: http://wheelof.com/lunch/



Source: http://www.zillow.com

Mashups versus Portals

	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
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 behavior 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 such as EMML are emerging.

Source: http://en.wikipedia.org/wiki/Mashup_(web_application_hybrid)

Types of Mashup

Consumer Mashup

- Wheelsoflunch.com
- Trendsmap.com

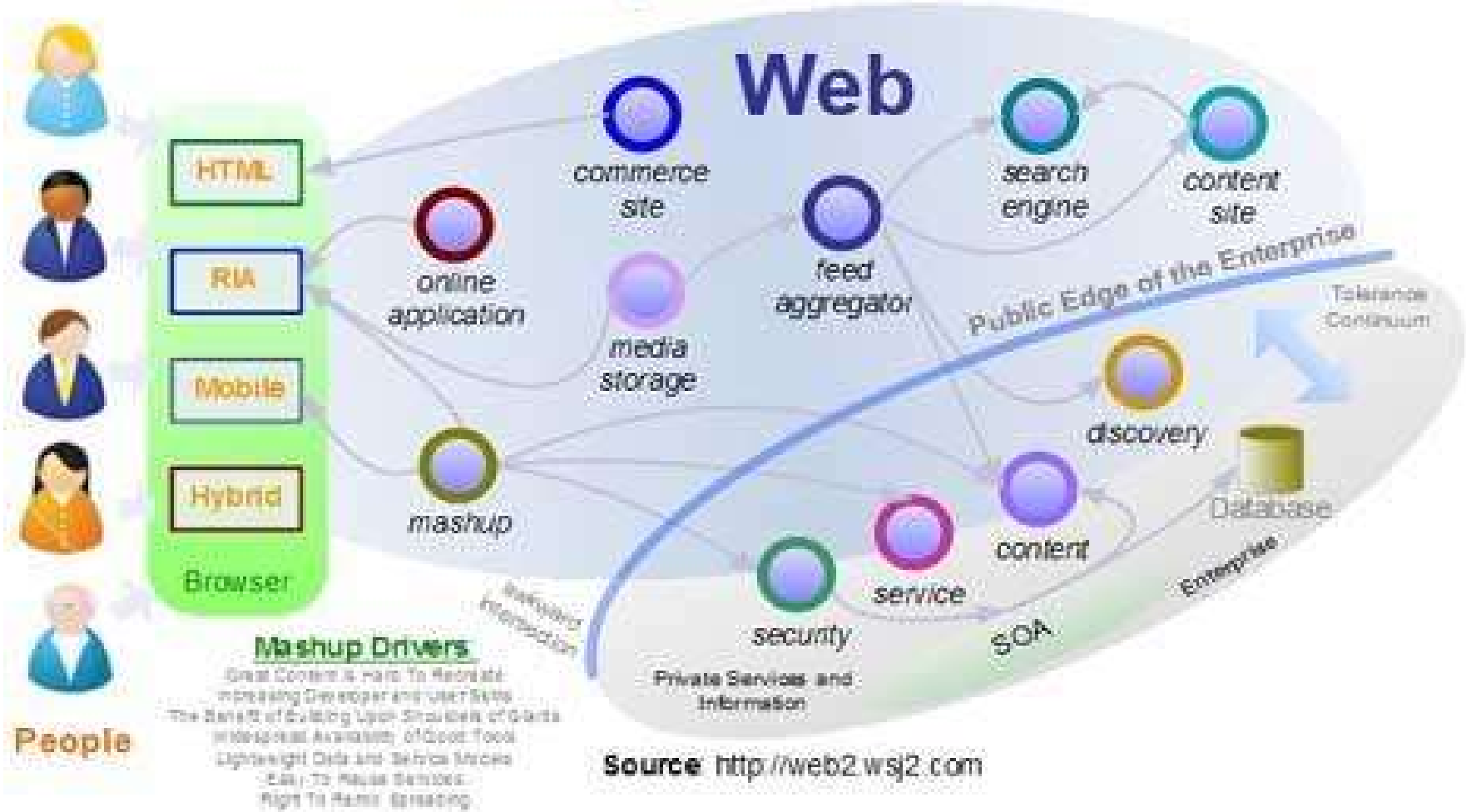
Enterprise Mashup

- Business Environment
- SOA features
- IBM Lotus Connections
- IBM Mashup Center
- IBM WebSphere sMash

Source: http://en.wikipedia.org/wiki/Mashup_(web_application_hybrid)

The Mashup Ecosystem:

Flourishing In An Increasingly Nurturing Environment



Benefits of Mashup

- Reuse and Recursion
- Visualization
- Increase innovation (1 + 1 = 4)
- Business logic less IT
- Increase standardization
- Increase productivity
- Perfect for prototyping
- Easy to learn
- ....

Source: http://www.slideshare.net/jhherren/mashup-university-4-intro-to-mashups

Syndication Feeds (RSS and Atom)

- A fundamental enabling technology for mashup
- Used to transfer frequent updated digital contents to users
- Typically packaged in XML

There is an entire ecology of web feeds

- syndicate, or publish, content by producing a feed to distribute it.
- subscribe to a feed by reading it and using it.
- aggregate feeds by combining feeds from multiple sources

Source: http://en.wikipedia.org/wiki/RSS .
R. Yee, 2008, Pro Web 2.0 Mashups: Remixing Data and Web Services

WEB APIs

- Facebook API
- Google Maps API and other Google APIs
- Ebay API
- Amazon API
- Flickr API
- Twitter API
- http://www.programmableweb.com/apis

Open API timeline

Source: http://blog.programmableweb.com/2011/01/03/api-growth-doubles-in-2010-social-and-mobile-are-trends/

Widgets

- Google Gadgets
- Yahoo! Widgets
- IBM Mashup Center

Build on web oriented architecture and protocol

- REST (Representational State Transfer)
- SOAP (Simple Object Access Protocol)
- XML-RPC (Remote Procedure Call)
- HTTP
- Ajax, RSS, XML, JSON

Mashup Platforms

- No server needed (hosting is provided)
- Graphic building tools
- Less coding
- Yahoo! Pipes
- Google App Engine and Google Web Toolkit
- Dapper
- Aol Boxely
- JackBe Presto
- IBM Mashup Center
- Microsoft SharePoint

Source: http://www.slideshare.net/jhherren/mashup-university-4-intro-to-mashups

Search Technology

- Real Time Search
- Semantic Web
- Natural Language Search
- Search Customization

Search Tools

- Google Custom Search Engine (CSE beta)
- Google Site Search (GSS)
- Yahoo BOSS (v2)

IBM and Web 2.0

- IBM Mashup Center
- IBM Customer Experience Suite
- IBM Lotus Connections
- IBM Lotus Live
- IBM Connections
- IBM Lotus Quickr
- WebSphere Portal
- WebSphere Application Server Feature Pack for Web 2.0 and Mobile

Current, Future... Web 3.0... Web 4.0...

- Web2.0
- More Enterprise Mashup

The Future ???

- Embodiment
- Massive Data, WW Database
- Linking everything
- Intelligent, Smarter web

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