

# 4 Communities, the Web and Multimedia

## 4.1 Evolution of the Web

## 4.2 Social Networks and Social Media

## 4.3 Web Content Aggregation and Integration

## 4.4 Virtual Worlds in the Web

## 4.5 Embedded Social Media

### Literature:

T. Berners-Lee: Weaving the Web. Texere 2000

T. O'Reilly: What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software.

*Communications & Strategies*, No. 1, p. 17, 2007.

(<http://oreilly.com/web2/archive/what-is-web-20.html> – 2005)

# The Key Idea of the Web

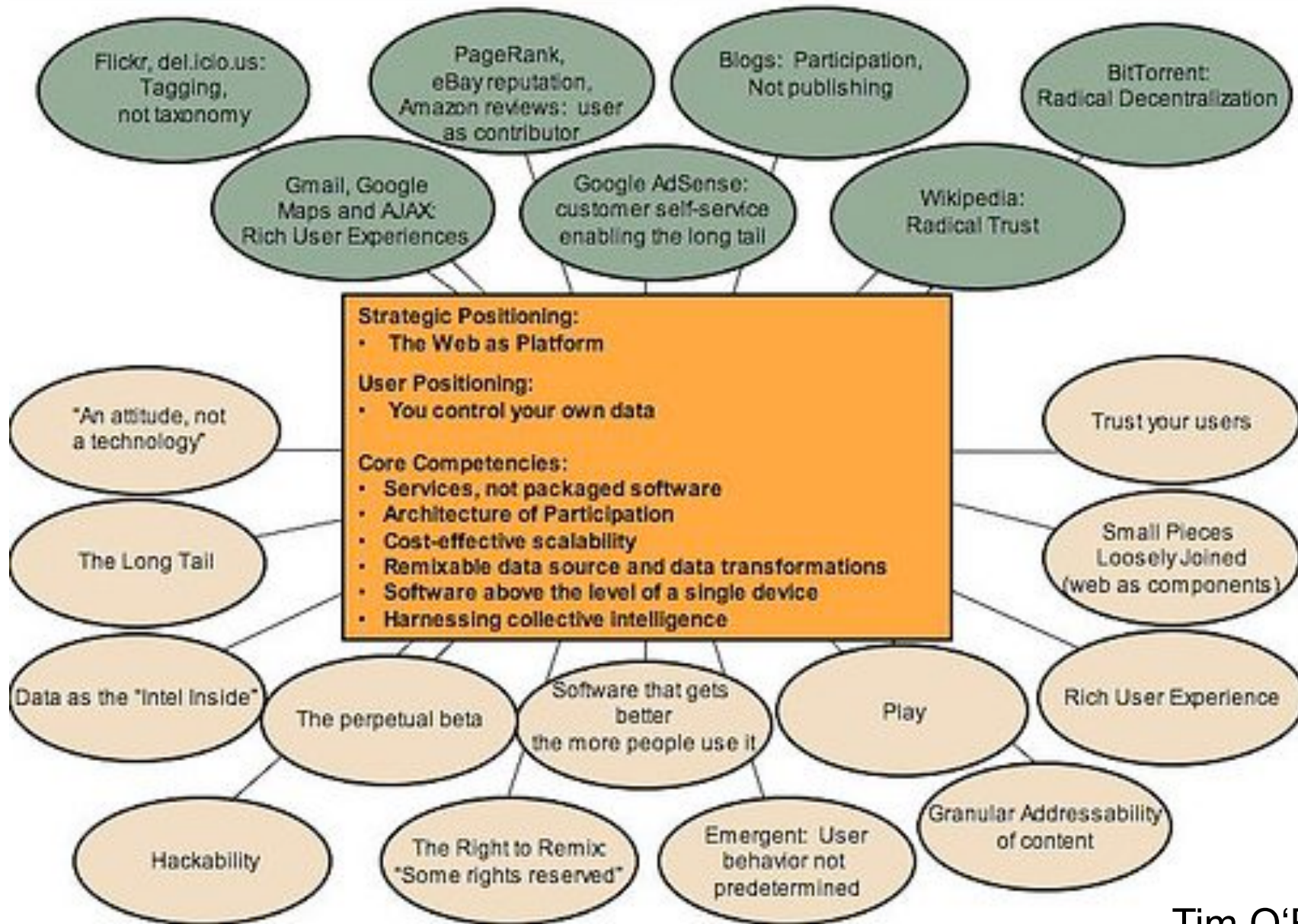
- T. Berners-Lee: “Information Management: A Proposal”.  
CERN March 1989  
“CERN is a model in miniature of the rest of the world in a few years time.”
- Disussions on Mosaic browser, 1993:  
“I ... made my now-standard case for making the Mosaic browser an editor, too. Marc [Andreessen] and Eric [Bina] explained that they had looked at that option and concluded that it was just impossible.”  
(Weaving the Web p. 77)
- Tim Berners-Lee on the future of the Web:  
“My hope and faith that we are headed somewhere stem in part from the repeatedly proven observation that people seem to be naturally built to interact with others as part of a greater system.”  
(Weaving the Web p. 223)

# Generations of the Web

- Web 0.5
  - 1988-1995
  - Only predecessors of WWW exist
- Web 1.0
  - 1996
  - Static HTML pages, few publishers - many readers
- Web 1.5
  - 1996-2001
  - Dynamic Web pages, E-Commerce
- Web 2.0
  - 2005?
  - Collaboration, communities
  - Openness, standardization, liberty

Tim O'Reilly

## Web 2.0 Meme Map



Tim O'Reilly

# What is the Meaning of „Web 2.0“ ?

- O'Reilly Conferences 2004/2005/2006
  - Tim O'Reilly, Dale Dougherty
  - Similar conference titles exist, e.g.: “Where 2.0” (geospatial web)
- Basic question for the conference:
  - Which ideas have survived the burst of the dot-com bubble?
  - Creating the next wave out of the remains of the last
- “Web 2.0” has become a “buzzword”
  - Extremely rapidly...
  - There is no agreed definition
- The conference lives on – or not?
  - Web 2.0 Summit (<http://www.web2summit.com>)



John Battelle:

Truth is, we're not going to do the Web 2 Summit [in 2012], and I'm writing this post to explain why. For the most part, it has to do with my book...

WHAT WE HATH WROUGHT will give us a forecast of the interconnected world in 2040, then work backwards to explain how the personal, economic, political, and technological strands of this human narrative have evolved from the pivotal moment in which we find ourselves now.

# Two Aspects of Web 2.0

- Social Aspect
  - Collaboration
  - User-Generated Content



- Technical Aspect
  - Huge bandwidth, therefore graphics, audio, pictures, videos...
  - Web browser as a universal platform for application software
  - Increasing interactivity in the browser
    - » Presentation based on server-side data (e.g. PHP, JSP, JSF)
    - » Direct response to user reactions (JavaScript, Flash, Silverlight, ...)
    - » Asynchronous interaction (Ajax)
    - » Real-time data (Reverse Ajax, Comet)

# Comparison by Examples

## Web 1.0

- DoubleClick
- Ofoto
- Akamai
- mp3.com
- Britannica Online
- Personal homepage
- Personal bookmarks
- Content management
- Taxonomy



## Web 2.0

- Google AdSense
- Flickr
- BitTorrent
- Napster
- Wikipedia
- Blogging
- Del.icio.us
- Wikis
- Folksonomy

# Web 2.0 Principles

- Web 2.0 is about harnessing collective intelligence!
- Reach out to the entire Web, to the edges and not just the center, to the long tail and not just the head.
- The service automatically gets better the more people use it.
- Network effects from user contributions are the key to market domination in the Web 2.0 era.
- Web 2.0 companies build value as a side-effect of the ordinary use of their application.
- The race is on to own certain classes of core data (e.g. location, identity, calendaring, product identifiers)
- Consequences for software development:
  - Software will cease to perform unless it is maintained on a daily basis
  - Users must be treated as co-developers
  - Lightweight programming models and loose coupling are needed
  - Design for remixability



## 2.0 Everywhere!



Buch von Angelika Fleckinger 2011

Internet-Protest  
gegen Online-Überwachung

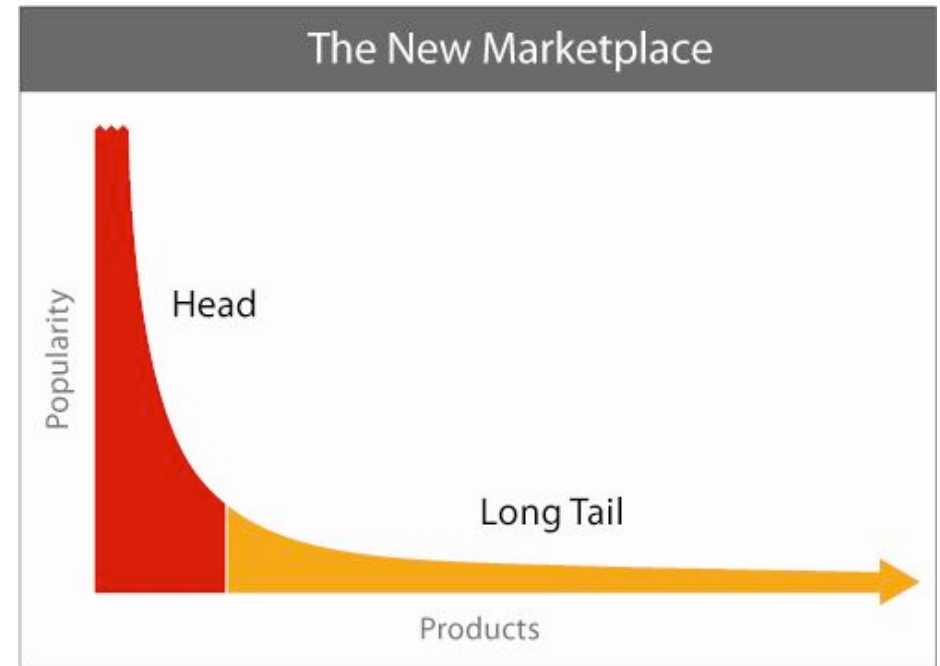


Deutschland 2.0

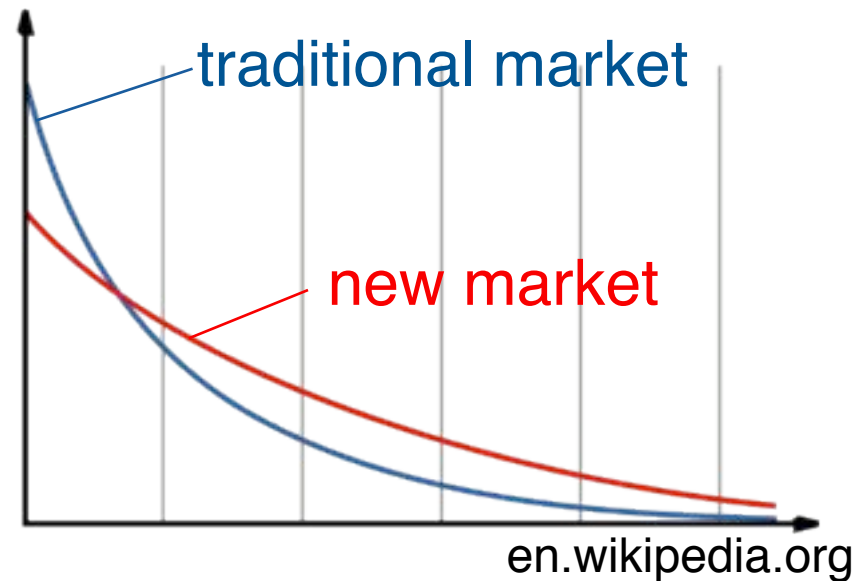
Buchtitel 2010

# The Long Tail

- Clay Shirky 2003, Chris Anderson 2004:
  - “The future of entertainment is in the millions of niche markets at the shallow end of the bitstream” (Anderson)
- Business models for online sales:
  - Can create large revenue out of low individual sales for many niche products
  - Driven by low production and distribution costs
- Theory under discussion
  - Alternative: Pareto distribution  
20% of products give 80% of sales volume



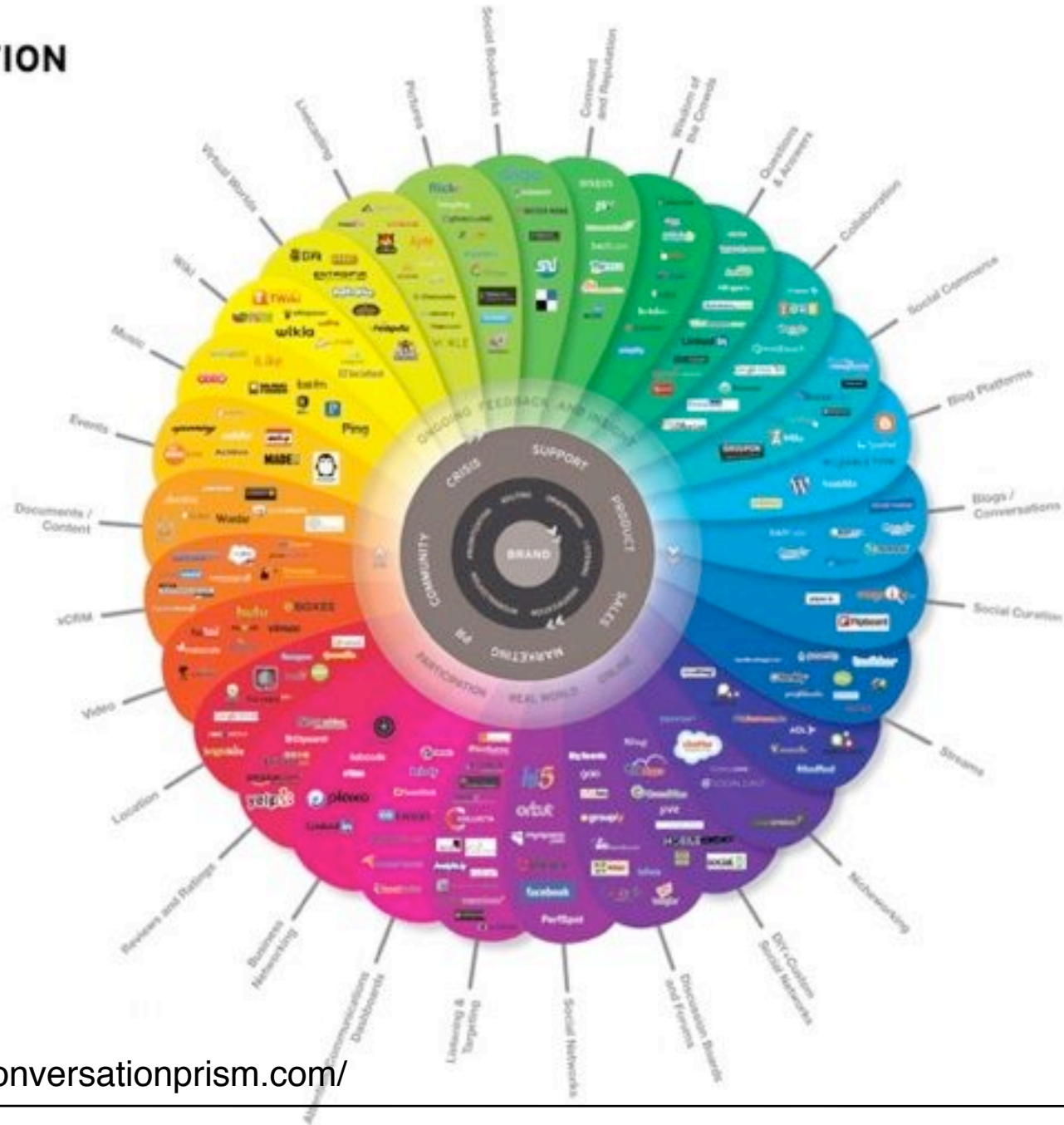
longtail.com



# THE CONVERSATION PRISM

Brought to you by Brian Solis & JESS3

Brian Solis



<http://www.theconversationprism.com/>

For more information  
check out [theconversationprism.com](http://theconversationprism.com)

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Eigner/Leitner/Nausner/Schneider: Online-Communities, Weblogs  
und die soziale Rückeroberung des Netzes,  
Nausner & Nausner 2003

C. Stöcker: Die Zeit der Kopfjäger,  
Spiegel-online.de, 1. August 2006

Brian Solis: The Essential Guide to Social Media

<http://www.briansolis.com/2008/06/essential-guide-to-social-media-free/>

# Social Networks, First Generation



Hauptmenü

Anmeldung

Log in

- College traditions:
  - Class listings, alumni listings, freshman listings
  - Personal profiles
  - Keeping in touch (classmate reunions)
- 1995: Classmates.com
  - German version: stayfriends.de
- Many similar platforms
  - E.g. facebook.com

Leistungen	Basis	Gold
Klassenfoto einstellen und Mitschüler markieren	✓	✓
Aktives Auffinden selbst festlegen	✓	✓
Klassentreffen melden	✓	✓
Alle Klassentreffeninformationen einsehen		✓
Mit dem Organisator des Klassentreffens in Kontakt treten		✓
Mailingliste für Klassentreffen verwalten		✓
»Eigene Seite« anlegen und Profil erstellen	✓	✓
Fotos auf »Eigene Seite« hochladen	✓	✓
»Eigene Seite« von anderen komplett einsehen		✓
Fotos ansehen		✓
Nachrichten hinterlegen	✓	✓
Nachrichten lesen und beantworten		✓
Kontaktliste anlegen	✓	✓
Ein Poesiealbum führen	✓	✓
Jedes Poesiealbum lesen		✓

# Social Networks, Second Generation

- From documentation of existing relationships to creation of new relationships
- General platform for self presentation
  - Easy way to personal homepage
- Examples:
  - MySpace.com
  - Friendster.com
  - StudiVZ.de
  - Xing.com (OpenBC)
- Establishment of “friend” link by mutual agreement
- Tracing of social network
  - 2nd degree contacts
  - Former colleagues



## Einzigartige Suchfunktionen

- Finden Sie neue Vertriebskanäle, Mitarbeiter und Jobs
- Finden Sie schnell die richtigen Entscheidungsträger
- Erreichen Sie Ansprechpartner tausender Unternehmen

Xing.com

Holtzbrinck zahlt Millionenpreis für StudiVZ  
03. Jan 2007 17:52, ergänzt 18:54



Der Verlagskonzern  
Holtzbrinck hat das

Holtzbrinck beerdigt VZ-Netzwerke

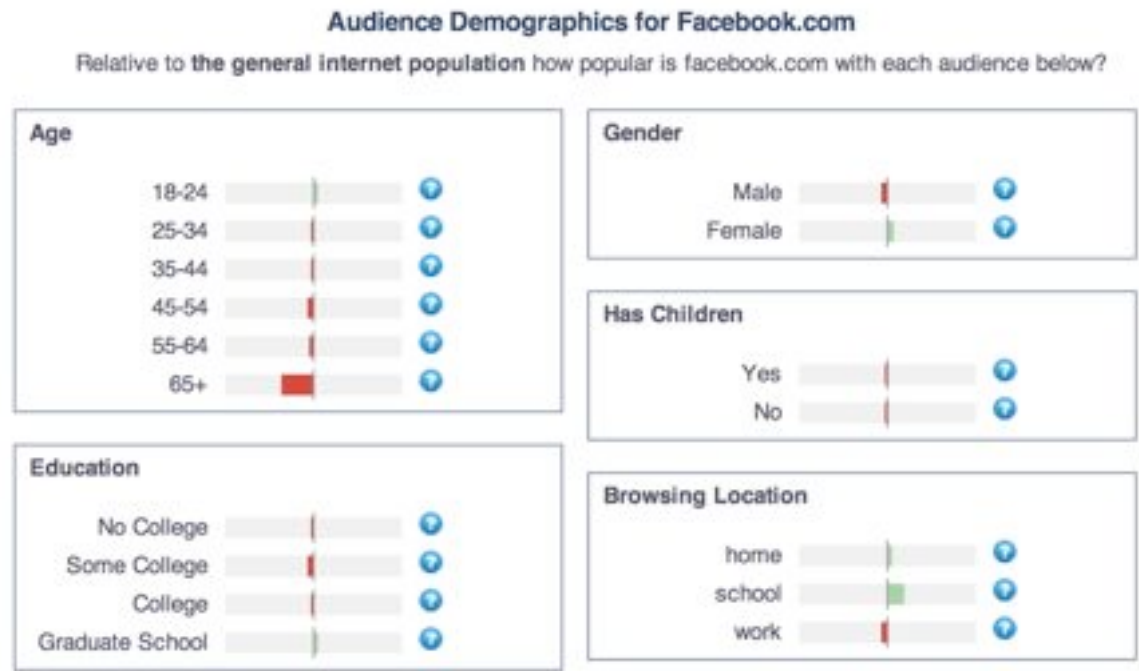
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nen.  
n



spiegel.de, 11.06.2012

# Example: facebook.com (1)

- History:
  - Mark Zuckerberg and friends, Harvard, October 2003:
    - » Facemash: Comparing student photos
  - Mark Zuckerberg, February 2004: "The Facebook" for Harvard students
  - Stepwise expansion to other colleges and high schools
  - Sept, 2006: Open to everybody of age 13 and up
- Popularity:
  - Over 800 million active user (November 2011)
  - Alexa.com traffic rank:
    - » Sept. 2006: Traffic rank
    - » Nov. 2012: Traffic rank (rank 2 in Germany, rank 1 in 16 countries)
  - Still high user growth



alexacom

# Example: facebook.com (2)

- One billion monthly active users as of October 2012.
- 584 million daily active users on average in September 2012.
- 604 million monthly active users who used Facebook **mobile** products as of September 30, 2012.
- Financial side:
  - 2007: Microsoft buys 1.6% share for \$240 million
  - September 2009: First time positive cash flow
  - Value estimate 2010: \$41 billion, 2011: \$100 billion
  - IPO: May 2012, market capitalization \$104 billion
  - Offering price per share was \$38.00
  - Current price (Nov 12): around \$26 (nasdaq.com)
- Open question: Business model



<http://newsroom.fb.com/Key-Facts>

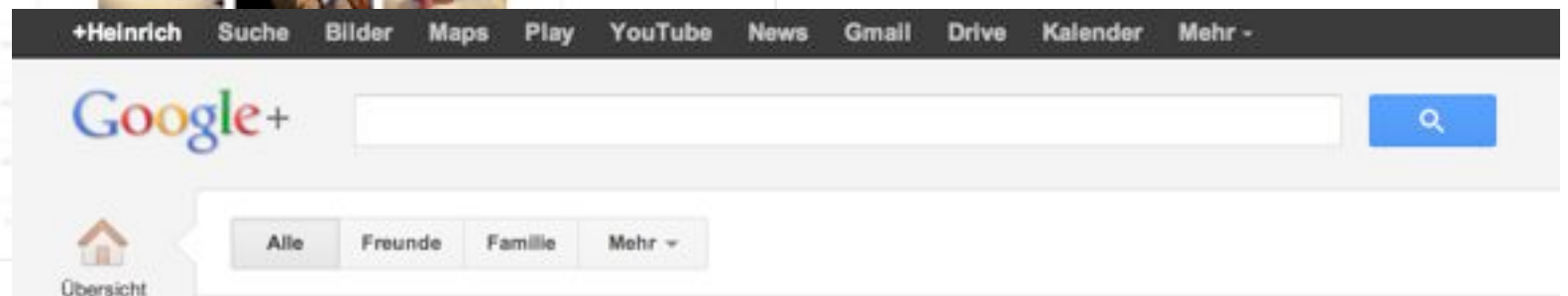


# Social Networks, Third Generation

- Battle for market share
  - Currently clearly led by facebook
- Integration of all communication services onto a single platform
  - Logical layer above email, chat, SMS etc.



Facebook Messages



Google Plus

# Social Media

- Media consisting of user-generated (multimedia) content
- Classics: Flickr.com (photo), YouTube.com (video)
- Tagging
  - By originator
  - By others
  - Folksonomy
  - Tag clouds
- Comments
  - Discussion
  - Feedback
- Ratings
- Automation
  - Most recent, most popular

## All time most popular tags

amsterdam animal animals april architecture art australia baby barcelona  
beach berlin bird birthday black blackandwhite blue boston bridge building bw  
california cameraphone camping canada car cat cats chicago  
china christmas church city clouds color colorado concert day dc dog dogs england  
europe family festival fireworks florida flower flowers food france  
friends fun garden geotagged germany girl graduation graffiti green hawaii  
holiday home honeymoon house india ireland italy japan july june kids lake  
landscape light london losangeles macro march may me mexico moblog  
mountains museum music nature new newyork newyorkcity newzealand night  
nyc ocean orange oregon paris park party people phone photo pink portrait  
red reflection river roadtrip rock rome sanfrancisco school scotland sea seattle sign  
sky snow spain spring street summer sun sunset taiwan texas thailand  
tokyo toronto travel tree trees trip uk unfound urban usa vacation  
vancouver washington water wedding white winter yellow zoo

Tag cloud from Flickr

# Social Bookmarks

- Organizing Web content:
  - Hierarchical directories, taxonomy:
    - » Gopher, Yahoo
  - Personal bookmarks
    - » Retrieval problem, metadata
  - Sharing platform for links to information in the Web
  - Classics: Del.icio.us, digg.com, spurl.net, furl.net (with archive)
- Tagging:
  - Adds a semantic dimension to Web search
- Browser extensions for keeping personal bookmarks on server
- Digg effect:
  - Small web sites becoming quickly popular – overload situations
- Overview paper (found via del.icio.us...):
  - <http://www.dlib.org/dlib/april05/hammond/04hammond.html>

# Weblog, Blog

*Definition:* A collection of chronologically (backwards) ordered, regularly added contributions to an umbrella topic.  
(adapted from Ebner/Baumann/Krcmar)



- Technical view:
  - Simple content management system, often push notifications (RSS feed)
- History:
  - First online diary by Simon Gisler 1994 (according to Wikipedia)
  - John Barger 1997: Term “Weblog”; Term “Blog” since 1999 (Peter Merholz)
  - Huge popularity since 2002
- Platforms: e.g. wordpress.org, blogger.com
  - Links point to individual contribution and are permanent (“permalinks”)
- Variants by media type:
  - Vlog, linklog, photoblog, moblog
- Problematic issues:
  - Borderline between advertisement, propaganda, free speech
  - Law violations, offensive statements

# Blog as an “Oscillation Medium”

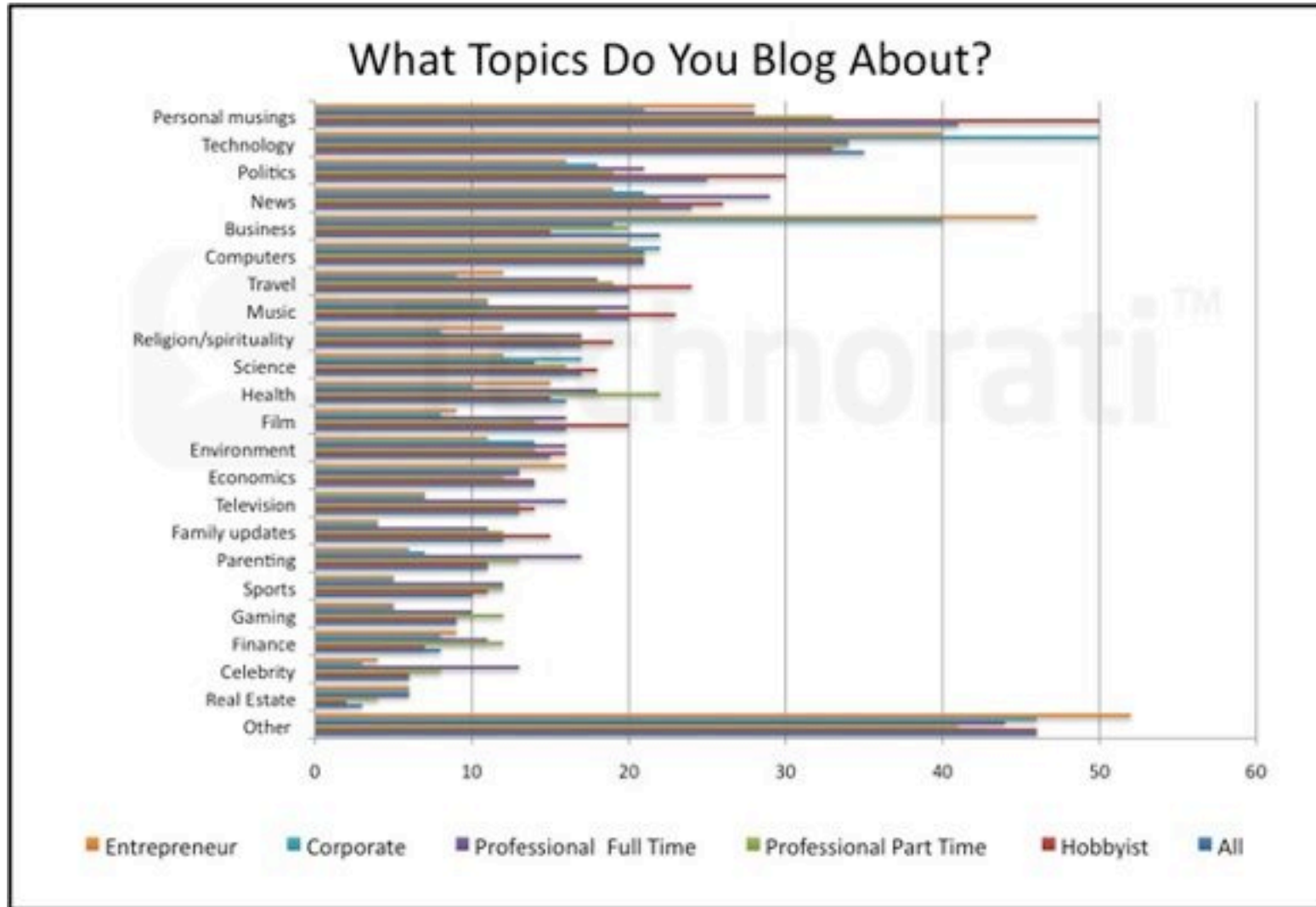
- Traditional web sites (including online versions of traditional media):
  - Closed content
  - Links mostly internal to web site
  - Plus a few “related links”
- Bookmark collections:
  - Completely open content
  - Only reference to outer location
- Oscillation media:
  - Both closed and open
  - Blog comments on a link and contains external links
  - Reader is “oscillating” between open and closed reading
    - » Shall I follow the link?
    - » Shall I read on?
  - Hypertextuality as a media creation force

From Eigner et al p. 119

# Reading and Writing, Talking and Listening

- Traditional cultural techniques: writing and reading
  - Mostly separated activities
- Blogging:
  - Writing as a continuation of reading (external trigger)
  - Reading as a continuation of writing (e.g. reading comments)
- A new cultural technique? (Eigner et al.)
  - Reading-writing-reading-writing-...
  
- Publishing in a blog is not speaking to an audience but spreading a message  
(Brian Solis)
  - Listening, participation
  - Dynamic creation of audiences (and influence)
  - Self-organizing cultures

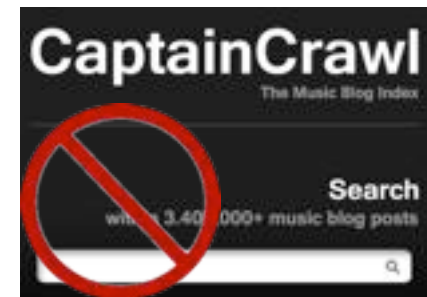
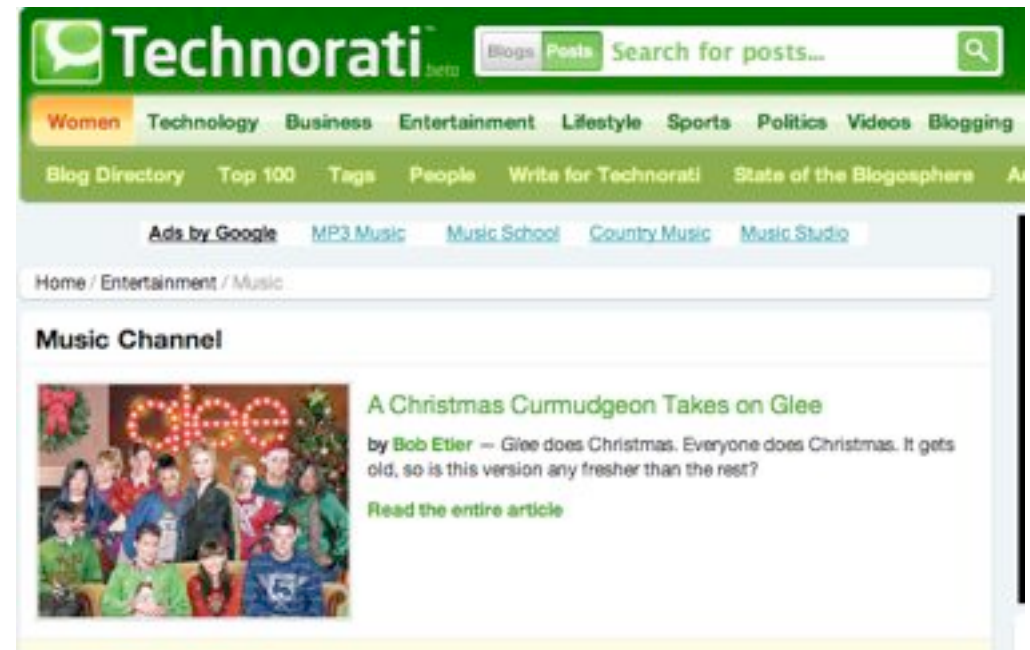
# Diversity of Blog Topics



Technorati.com State of the Blogosphere 2011

# Blog Search

- Blog search engine
  - Combining information from many blogs
  - Including tagging, rating etc.
  - Examples: Technorati.com, blogsearch.google.com
  - Being expanded towards multimedia
    - » Counting links from blogs to music albums, videos, movies etc.





# Microblogging

Anarchaia

Experimental, impressionistic sub-paragraph  
tumblin' (think obstsalat)

April 2005: Term "tumblelog"

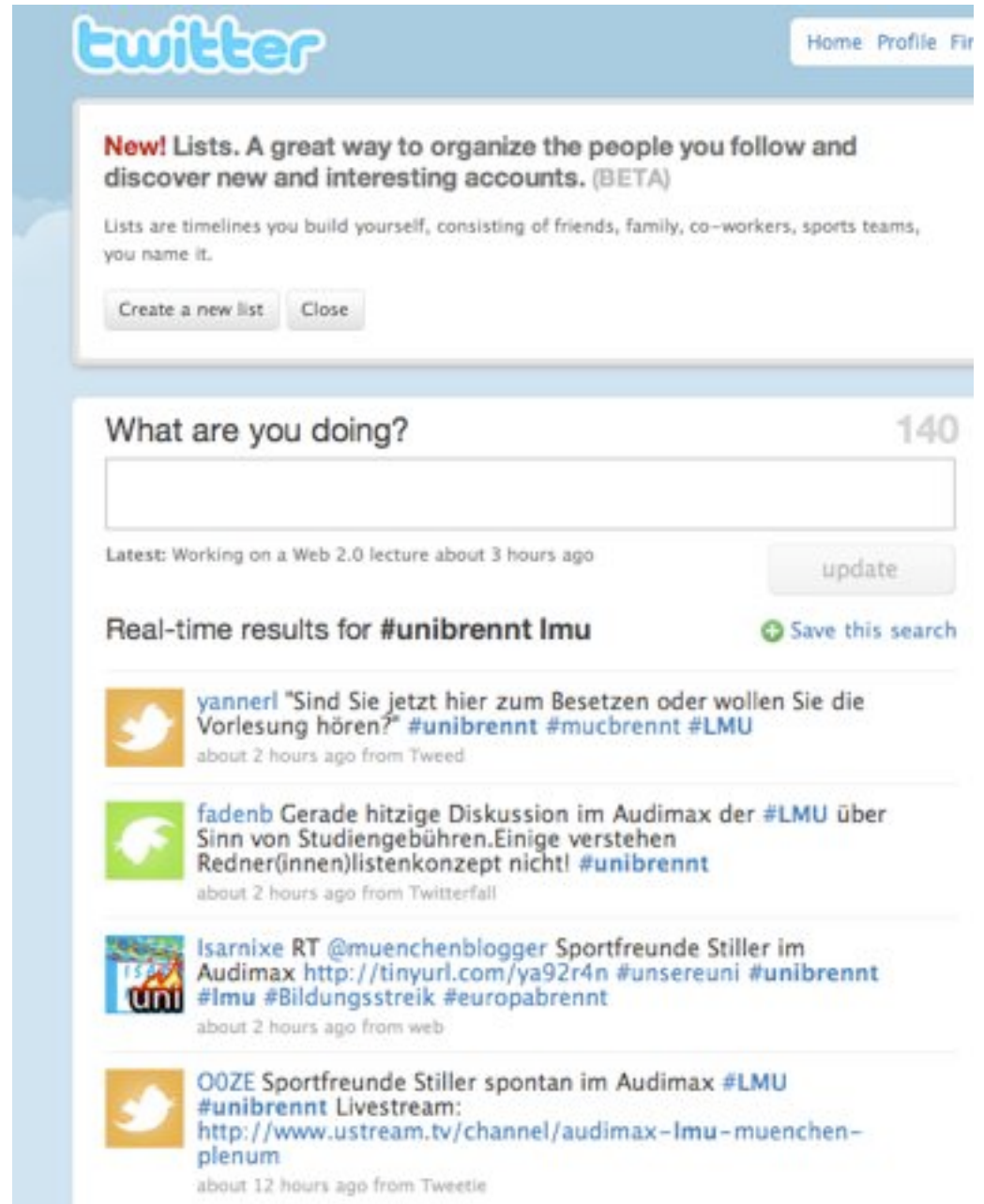
- Tumblelog:
  - Relatively unstructured "stream of consciousness"
  - Small bits of information and media
- Simplified blogging platforms
  - Tumblr (2006)
  - Twitter (2006/2007)
- Microblog:
  - Brief updates (text or small media units), published on the Web
  - Submitted through various means, also from mobile devices
- Microblogs built into social Web platforms
  - "Status Update" on Facebook



tumblr.com

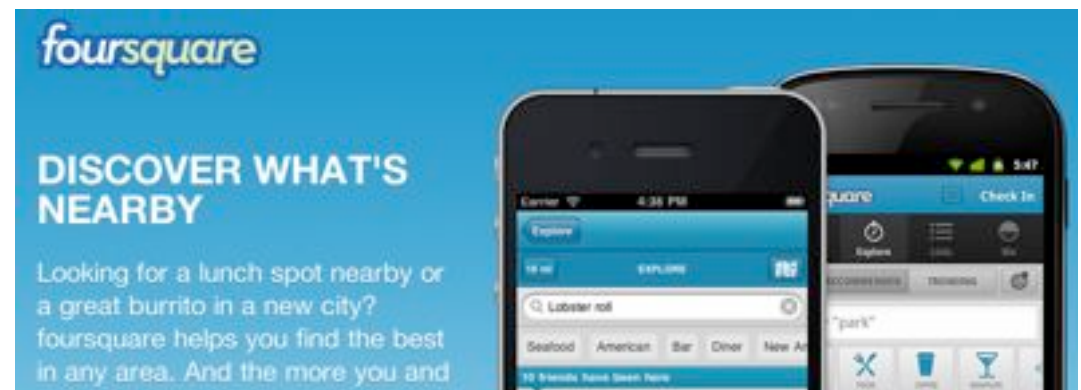
# Real Time Media

- Current main example: Twitter
  - Search, analytics and social networks built around real-time communication
  - Triggering of innovations:
    - » Example:  
Shorthand URLs
- ***Everything in the world is now real time.***
  - Technically, it is no problem notifying the manufacturer *immediately* if a certain type of shoe is not selling at a certain shop.
  - "Houdini" system used by Obama campaigners



# Location-Based Services and Communities

- Driven by mobile networked devices like Smartphones
  - Geographical location through satellite navigation, cellular network, WLAN identification, ...
- Long-term research topic (“restaurant finder” example)
  - Trend: Game-like elements to enable crowd-sourced information collection



Add a location to your posts **facebook**

- Remember where you were in your favorite photos.
- Let friends know where you are so they can meet you there.
- Share where you're going to get tips and advice from friends who've been.

Suggestions for Top Picks

TOP PICKS

Show me places ...

- I haven't been to
- My friends have been to
- I have been to before
- With Foursquare specials

**Pommes Boutique**  
 1 **8.6** Amalienstraße 46  
 Fast Food



Die Pommes sind wirklich extrem lecker. Sehr interessant sind zudem die reiche Auswahl an verschiedenen dip-möglichkeiten. Gerne wieder - hmm lecker! - Joachim B.

You and 8 friends have been here

Save Like

**Cafe Flower**  
 2 Amalienstraße 33  
 Other - Food



Der Koch/Besitzer des Soul Kitchen ist nun hier zu finden. Wer es schon vermisst hat, nichts wie ab ins Cafe Flower! - Alexander D.

A new spot in the neighborhood

Save Like

**Zum Koreaner**  
 3 **7.7** Amalienstr. 51  
 Korean · 1 here now



# Podcasting

The screenshot shows the website 'Die Bundeskanzlerin' with a search bar and navigation menu. The 'PODCASTS' section is active, displaying a list of entries. The first entry is dated 17.10.2009 and titled 'Investitionen in Kultur sind Investitionen in die Zukunft'. The second entry is dated 10.10.2009 and titled 'Buchmesse unter wunderbaren Vorzeichen'.

Datum	Titel
17.10.2009	Investitionen in Kultur sind Investitionen in die Zukunft
10.10.2009	Buchmesse unter wunderbaren Vorzeichen

- “History”:
  - Discussed since 2000, massive use since 2003
  - iPod & Broadcasting
  - Word of the year of the New Oxford American Dictionary 2005
- Media file distributed by subscription (paid or unpaid)
  - Playback on computers or mobile devices
  - Mainly audio, partly video information, may be any file technically
  - Automation of download by “feeds” (RSS or Atom)
- Often **User-Generated Content (UGC)**:
  - Amateur podcasts
  - Production of audio podcasts has minimal hardware/software requirements

# Corporate Blogs and Podcasting

- Companies use blogs and podcasts for:
  - General information on company
  - Brand formation, general public relations
  - Topic blogs, campaign blogs
  - Knowledge distribution and customer service
  - Internal information channels (intranet blogs)
    - » Executive blog, team blog
- Problematic issues (for the company):
  - Negative image campaigns (e.g. attac)
  - Confidential or problematic issues discussed openly in internal blogs (e.g. cases of mobbing)
  - Danger of emotional escalations
- Future of communications for marketing (Brian Solis):
  - Listening is marketing. Participation is marketing. Conversations are marketing. [...]

Peter Wolff: Die Macht der Blogs, Datakontext 2006

# Context-Sensitive Advertisement

- Important source of revenue in Web 2.0 sites
  - Advertisement precisely targeted at customer
- Market leader: Google AdSense
  - Ad server operated by Google
  - Websites register with Google
    - » Advertisement placed based on analysis of content of page to be shown (Javascript)
    - » Generate revenue per click or per thousand impressions
  - Selection among relevant ads and order of ads by real-time auction
    - » Ads creating highest revenue are shown
    - » Using bid price of advertised and quality score of the ad (e.g. Click-Through-Rate)
    - » Paid price may be lower than the bid (minimal price to keep position on the list)
  - Advertisers arrange fixed budgets in advance
- See: <http://www.google.com/adwords/displaynetwork/control-your-costs/pricing.html>

# Improper Placement of Advertisement



<http://img34.imageshack.us/img34/7545/bilddefail.jpg>



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R. Yee: Pro Web 2.0 Mashups, Remixing Data and Web Services,  
Apress 2008

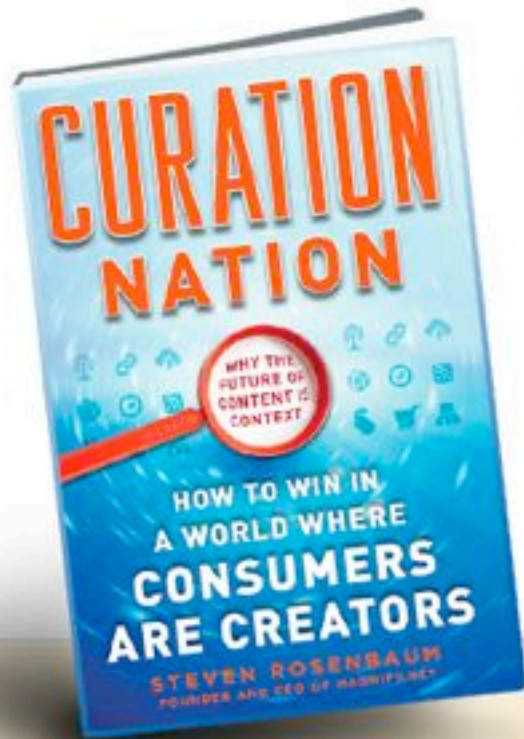
# Content Aggregation, Indexing, Curation

- Content aggregation:
  - Combination of content on specific topics from various sources
  - Essential steps:  
Finding content (indexing), filtering content, publishing combined content
- Indexing:
  - May address different types of source (web, blogs, local sources)
- Filtering:
  - Automatic filtering
  - Careful manual selection of content: *Curation*
  - Community-based automatic filtering (voting, tagging, counts)
- Publishing
  - User-configurable content (personal news)
  - Syndication to other online media
  - Basis for non-online media (e.g. print media)

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<http://emediavitals.com/article/1005/how-publishers-curate-world-content>

# Curation



## Steven Rosenbaum's Curation Nation

**“With the explosion of content, curation is the next great frontier.”**

“Curation Nation is a must-read to succeed in this hyper-connected age where community and contribution is of utmost important to creating value and relevancy.”



**-Shira Lazar,**  
Creator / Host "What's Trending" CBS News

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amazon.com

soocoread

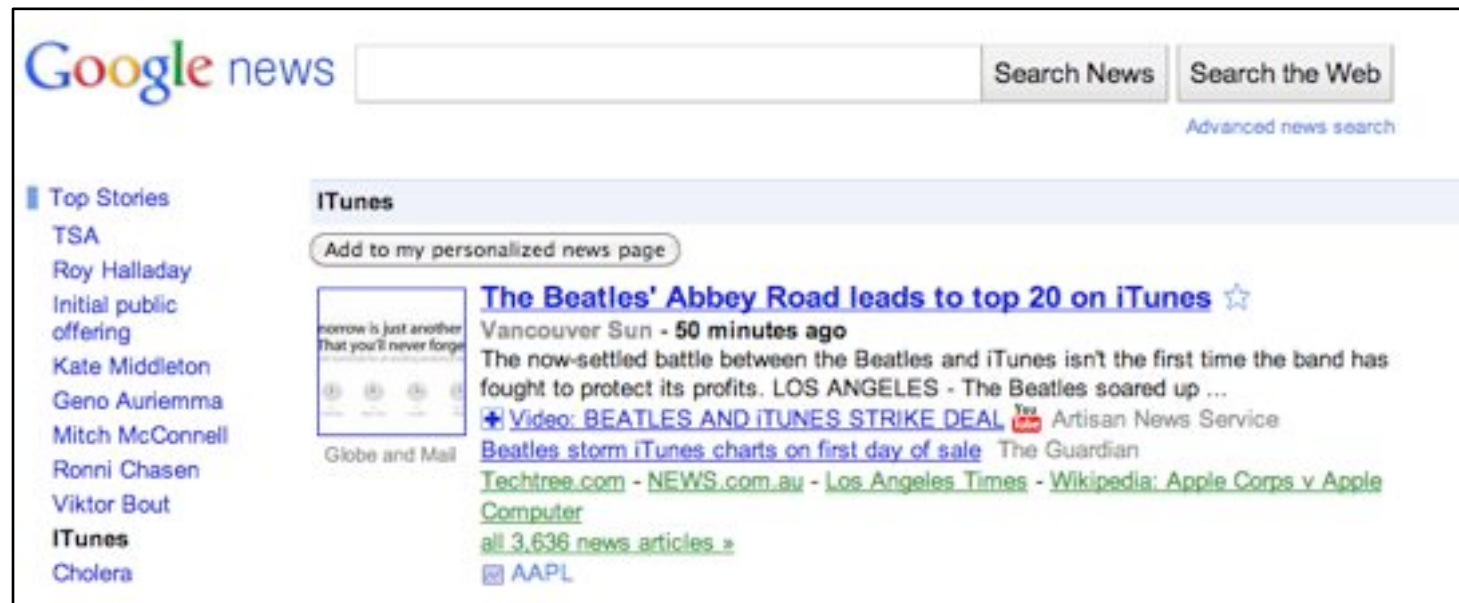
BORDERS.

BARNES & NOBLE  
BOOKSELLERS

BUY IN BULK

[curationnation.org](http://curationnation.org)

# Content Indexing + Automatic Filtering: Examples



The screenshot shows the Google News interface. At the top, there is the "Google news" logo, a search bar, and buttons for "Search News" and "Search the Web". Below the search bar, there is a link for "Advanced news search". On the left side, there is a "Top Stories" section with a list of topics: TSA, Roy Halladay, Initial public offering, Kate Middleton, Geno Auriemma, Mitch McConnell, Ronni Chasen, Viktor Bout, iTunes, and Cholera. The main content area features a news article titled "The Beatles' Abbey Road leads to top 20 on iTunes" with a star icon. The article is from the Vancouver Sun, dated 50 minutes ago. The text of the article discusses the Beatles' battle to protect their profits. Below the main text, there are several links to related news articles from various sources, including Artisan News Service, The Guardian, Techtree.com, NEWS.com.au, Los Angeles Times, and Wikipedia. There is also a link to "all 3,636 news articles" and a link to AAPL.



The screenshot shows the banner for the HPANA website. The banner features the text "THE HARRY POTTER AUTOMATIC NEWS AGGREGATOR" at the top. Below this, there is a large image of the Harry Potter characters, with the word "HPANA" written in large, golden letters across the center. At the bottom of the banner, there are social media icons for Google+, MySpace, and RSS. To the right of the icons, there is a link to "Translate to: Español · Français · Português · Italiano · Deutsch". Below the banner, there is a navigation menu with links for "Home", "News Browser", "Community", "Shopping", "Members", and "About". At the bottom of the navigation menu, there are links for "Front Page", "HP Fan Trips", and "MugglePost.com".

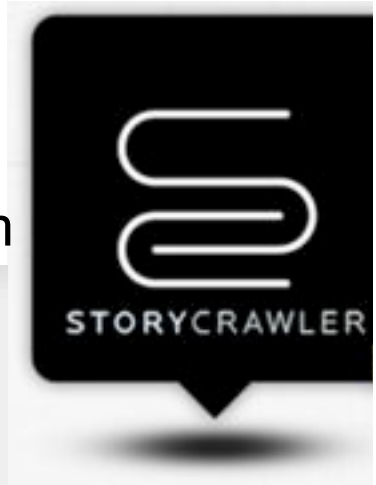
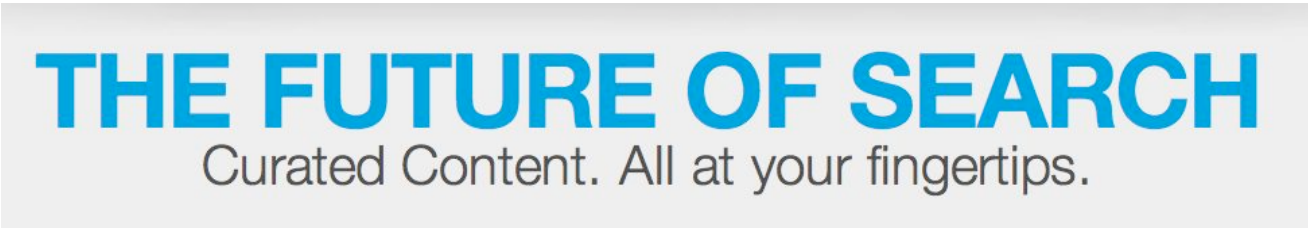
hpana.com

# News Curation Tools and Services: Examples



[newscred.com](http://newscred.com)

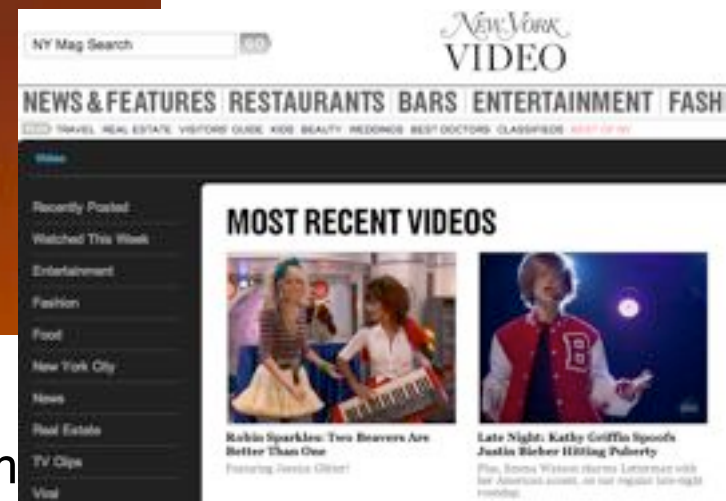
[storycrawler.com](http://storycrawler.com)



# Video Curation and Aggregation: Example



magnifyfy.net



video.nymag.com

# Print Media from Curated Online Content



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*In May 2010, we conducted a two-day media experiment. 8,000 people signed up, 1,500 submissions came in, 35 editors selected 70 pieces to fill a 60-page magazine.*

*People liked it. We broke our distributor's sales records, received positive reviews in The New York Times, PBS, and the Village Voice, and won a Knight-Batten Award for Innovation in Journalism. Here, we present selected work from the print edition of Issue Zero.*

[48hrmag.com](http://48hrmag.com)

# Content Sources

- Data feeds (XML files)
  - RSS (Really simple syndication)
    - » Channels and items
  - Atom, Atom Syndication Format (ASF)
    - » Successor for RSS
    - » IETF Standard
  - Proprietary file formats
- Database access
  - Often databases specific for application domain (e.g. in a company)
- Public Web Services
  - Access to information provided by large Web sites
  - E.g. Amazon, Google Maps
  - See later for details



# Mashup

- Application integrating diverse Web content seamlessly
- Presentation screen and layout:
  - May be based on existing Web site
  - May be created specifically
- General architectural principle:
  - Web sites provide program access (API) over the Internet (Web Services)
  - Several Web Services are contacted and results are evaluated
- Basic alternatives:
  - Client-side mashup
  - Server-side mashup (more frequent)
- Various technologies for transmission/invocation:
  - REST
  - SOAP
  - XML-RPC

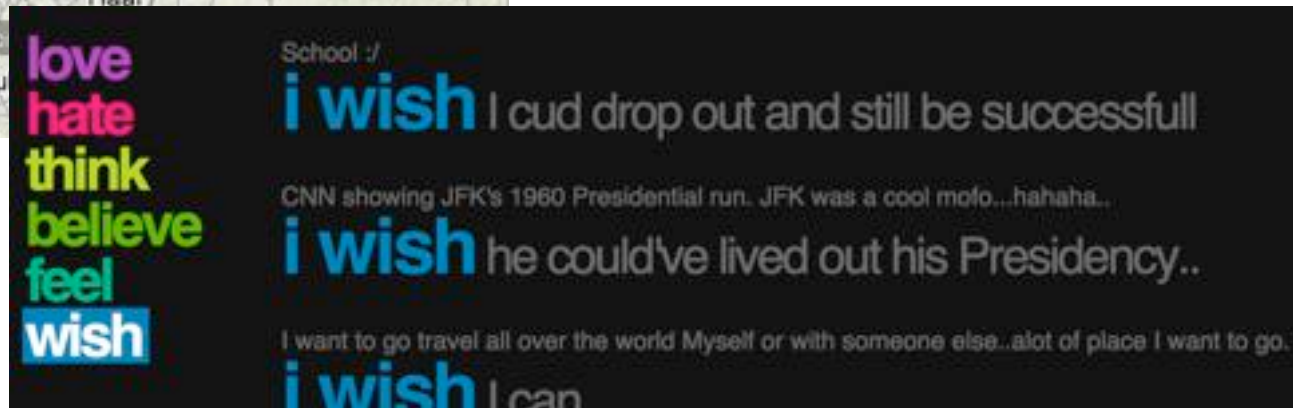
# Mashup Examples



See [programmableweb.com](http://programmableweb.com)

[twistori.com](http://twistori.com)

[trendsmap.com](http://trendsmap.com)



## Towns of the World

The latest information, news, views and video from every town, city and country

[townsoftheworld.com](http://townsoftheworld.com)



# Web Service APIs

- Example: Flickr API
- Existing methods are grouped in packages
- For each method, allowed parameters are defined
- Often a registration key is required which has to be obtained from Web service provider

## flickr.photos.getInfo

Get information about a photo. The calling user must have permission to view the photo.

### Authentication

This method does not require authentication.

### Arguments

**api\_key** (Required)

Your API application key. [See here](#) for more details.

**photo\_id** (Required)

The id of the photo to get information for.

**secret** (Optional)

The secret for the photo. If the correct secret is passed then permissions checking is skipped. This enables the 'sharing' of individual photos by passing around the id and secret.

## people

- [flickr.people.findByEmail](#)
- [flickr.people.findByUsername](#)
- [flickr.people.getInfo](#)
- [flickr.people.getPublicGroups](#)
- [flickr.people.getPublicPhotos](#)
- [flickr.people.getUploadStatus](#)

## photos

- [flickr.photos.addTags](#)
- [flickr.photos.delete](#)
- [flickr.photos.getAllContexts](#)
- [flickr.photos.getContactsPhotos](#)
- [flickr.photos.getContactsPublicPhotos](#)
- [flickr.photos.getContext](#)
- [flickr.photos.getCounts](#)
- [flickr.photos.getExif](#)
- [flickr.photos.getFavorites](#)
- [flickr.photos.getInfo](#)
- [flickr.photos.getNotInSet](#)
- [flickr.photos.getPerms](#)
- [flickr.photos.getRecent](#)
- [flickr.photos.getSizes](#)
- [flickr.photos.getUntagged](#)
- [flickr.photos.getWithGeoData](#)
- [flickr.photos.getWithoutGeoData](#)
- [flickr.photos.recentlyUpdated](#)
- [flickr.photos.removeTag](#)
- [flickr.photos.search](#)
- [flickr.photos.setContentType](#)
- [flickr.photos.setDates](#)
- [flickr.photos.setMeta](#)
- [flickr.photos.setPerms](#) (excerpt)

# REST (Representational State Transfer)

- REST is one of many possible methods to call a Web Service API
- History:
  - Roy Fielding 2000, Ph.D. thesis
    - » Analyzes and generalizes architecture of the Web
- Main features which made the Web architecture successful:
  - Identification of resources (in most cases by URIs)
  - Manipulation of resources through these representations
  - Stateless operation of server (regarding application state)
  - Hypermedia as base engine
- Applying REST to Web Services:
  - All resources on the server are identified by URI strings
    - » API method plus parameters coded in URI
  - Client uses only standard HTTP methods, mainly GET
  - Response contains clear metadata about the used language and an information body containing hyperlinks (to further resources)
- Atom feeds also provide a REST-based API

# Example: REST Request/XML Response

- Request:

```
http://api.flickr.com/services/rest/  
?method=flickr.photos.search&api_key=8c...93  
&tags=puppy&per_page=3
```

- Response:

```
<?xml version="1.0" encoding="utf-8" ?>  
<rsp stat="ok">  
<photos page="1" pages="276125" perpage="3"  
total="828375">  
  <photo id="41150XXXX20" owner="41905YYY@N03"  
    secret="13a...1c" server="2638" farm="3"  
    title="MY PHOTO TITLE!" ispublic="1"  
    isfriend="0" isfamily="0" />  
  <photo id="4116JJJ47" owner="225GGG@N08"  
    ... />  
  <photo id="4176GGG653" owner="45HHHH06@N00"  
    ... />  
</photos>  
</rsp>
```

# SOAP and XML-RPC

- Remote procedure call (RPC):
  - Technology to execute a procedure (method) with certain parameter values on a different (remote) computer
  - Various technologies exist (e.g. CORBA, DCOM) outside the Web area
- Web Service Invocation:
  - Invoking a Web Service using Web standards
- SOAP (earlier acronym: Simple Object Access Protocol)
  - XML-based syntax for messaging between applications
  - Independent of transport protocol
  - Web Services are a special application of SOAP
  - W3C standard
- XML-RPC:
  - Similar to SOAP (somehow its predecessor)
  - Transport protocol is HTTP
  - Simpler but limited in functionality

# SOAP Example

- From Flickr.com:

```
<s:Envelope
  xmlns:s=http://www.w3.org/2003/05/soap-envelope
  xmlns:xsi=http://www.w3.org/1999/XMLSchema-instance
  xmlns:xsd="http://www.w3.org/1999/XMLSchema">
  <s:Body>
    <x:FlickrRequest xmlns:x="urn:flickr">
      <method>flickr.test.echo</method>
      <name>value</name>
    </x:FlickrRequest>
  </s:Body>
</s:Envelope>
```

- SOAP makes use of XML namespaces
- Relatively high organizational overhead
- Compare equivalent REST request format

```
http://api.flickr.com/services/rest/
?method=flickr.test.echo&name=value
```

# XML-RPC Example

- From Flickr.com:

```
<methodCall>
  <methodName>flickr.test.echo</methodName>
  <params>
    <param>
      <value>
        <struct>
          <member>
            <name>name</name>
            <value><string>value</string></value>
          </member>
        </struct>
      </value>
    </param>
  </params>
</methodCall>
```

- Simple structure, deep nesting, also large overhead



# Conceptual Difference REST vs. SOAP/XML-RPC

- Tradeoff between
  - diversity of method names and
  - complexity of parameter structure
- Simple classical example
  - Special method name: fib
    - » Call: fib(13)
    - » SOAP style
  - Universal method name: exec
    - » Call: exec(fib, 13)
    - » REST style (GET is universal method name)
- Programs as data structures
  - Universal interpreter (compare Turing machine)
  - Basic idea of all current computer technology

# API Kits

- Requests are constructed and responses are evaluated in scripts
  - Mostly server-side scripts, e.g. PHP
  - Constructing a request in PHP:  
`$content = file_get_content($url);`
  - Evaluating the response:  
XML parsing is standard part of PHP since version 5
- Simplifying development for specific API:  
*API Kits*
  - Example: `phpflickr.com`
  - "Wrapper" around API functions and invocation
  - Direct PHP call to required functionality
  - Response processed and data array returned
    - » Example functions: `people_findByUsername()`, `getPhotos()`

Selected(!) API Kits  
for Flickr

- ActionScript**
  - [flickr api \(docs\)](#)
  - [Flashr](#)
  - [Flickr API Interfaces REST](#)
  - [as3 flickr lib](#)
- C**
  - [Flickcurl](#)
- Cold Fusion**
  - [CFlickr](#)
- Common Lisp**
  - [Clickr](#)
- cUrl**
  - [Curlr](#)
- Delphi**
  - [dFlickr](#)
- Java**
  - [flickrj](#)
  - [jickr](#)
- .NET**
  - [Flickr.NET](#)
- Objective-C**
  - [ObjectiveFlickr](#)
- Perl**
  - [Flickr::API 0.03](#)
  - [Flickr::Upload 1.06](#)
- PHP**
  - [PEAR::Flickr\\_API](#)
  - [phpFlickr](#)
- PHP5**
  - [Phlickr](#)
- Python**
  - [Beej's Python Flickr API](#)
  - [flickr.py](#)

# Yahoo Pipes

- Example of a tool (Web application itself) for *data mashup* development:
  - Interactive feed aggregator and manipulator
- Graphical environment to
  - Fetch data from source
  - Extract data
  - Apply filters
  - Apply simple programming tools

we make flickr not art\*

Layout Expand All Collapse All

Sources

User inputs

Operators

- For Each: Annotate
- For Each: Replace
- Count
- Filter
- Truncate
- Content Analysis
- Sort
- BabelFish
- Location Extractor
- Union
- Unique

Url

String

Date

My pipes

Fetch

URL

http://www.we-make-money

Union

Content Analysis

For Each: Replace

Replace each item in input feed with al

Flickr

Find 2

images of heise.de

[pipes.yahoo.com](http://pipes.yahoo.com)

# HTML5 Geolocation API

- Very simple high-level JavaScript API to deal with geolocation
- Implementation automatically uses best available information source
  - GPS for mobile devices if available
  - GSM/CDMA cell
  - WLAN/Bluetooth/IP data
- Getting a position:
  - `navigator.geolocation.getCurrentPosition(successCallback, errorCallback)`
- Reading out location:
  - ```
function showMap(position) {  
  // Show a map centered at  
  (position.coords.latitude, position.coords.longitude) .  
}
```
- Supports “one-shot” requests as well as continuous updates

# Screenscraping

- Technically the following is possible ("*Screenscraping*"):
  - Send HTTP request from server script to a Web site (even if it does not offer a Web Service API)
  - Analyze the returned HTML code
  - Proceed depending on the result
- The script simulates a human person using a Web browser
  - "Web Robot"
  - Frequently used by search engines
- Most Web site providers do not agree with automated access
  - Dangerous in particular in the area of authentication
  - Recommendation:  
Check Terms of Use carefully, or better refrain from Screenscraping

# 4 Communities, the Web and Multimedia

4.1 Evolution of the Web

4.2 Social Networks and Social Media

4.3 Web Content Aggregation and Integration

4.4 Virtual Worlds in the Web

4.5 Embedded Social Media

# Virtual Worlds

- Online communities and online games are merging
  - Example World of Warcraft
- Non-Game online communities with virtual world
  - Old idea, see
    - » Gibson: Neuromancer
    - » Stephenson: Snow Crash
  - Was tried several times, but this time a bit more successful...
- Secondlife.com
  - Created and run by Linden Labs
  - Sixteen million accounts (2009), twenty thousand concurrent users
  - Full virtual environment, avatars, extensive creative tools
- Many simpler virtual worlds
  - E.g. [www.habbo.de](http://www.habbo.de)
    - » Virtual hotel for kids

# Example: Habbo.de





# Second Life



Linden  
Gallery  
Of Resident Art

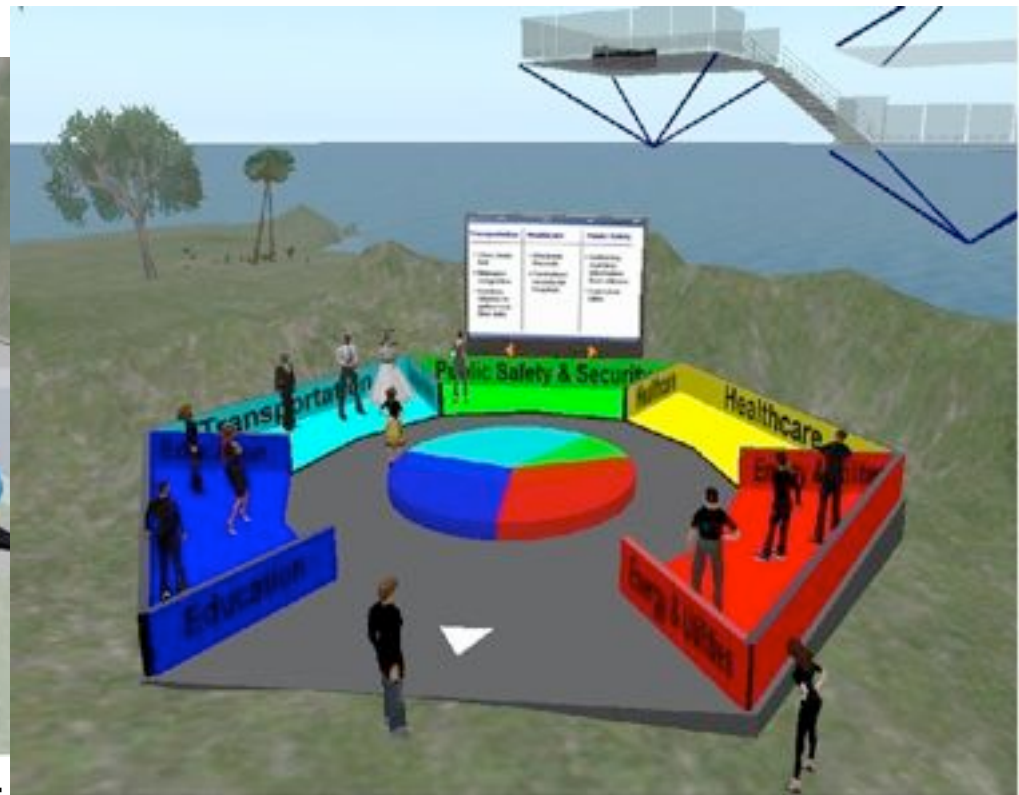
<http://video.google.com/videoplay?docid=-5182759758975402950>

# Second Life and Business

- Large companies are/were using Second Life
  - For meetings, conferences, customer care
  - As sales channel



IBM Conferences, using Opinionator



<https://www.ibm.com/developerworks/opensource/library/os-social-secondlife/>

# Infinite Images



- Shai Avidan,  
Adobe MAX 2008
- see YouTube  
[v=QxNx2OyeCHA](https://www.youtube.com/watch?v=QxNx2OyeCHA)

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Literature:

T. O'Reilly, J. Battelle: Web Squared: Web 2.0 Five Years On  
([www.web2summit.com/websquared](http://www.web2summit.com/websquared) – 2009)

# Web 2.0 Five Years On: Web Squared

- Smartphones and other recent/upcoming developments:
  - Collective intelligence increasingly being driven by sensors.
  - Talking to the Web becomes a reality
    - » Google Mobile App on iPhone, Siri
  - Information shadows, Internet of Things: Web meets World
  - Automatic geo-tagging of pictures (GPS built in cameras)
  - Face recognition built into photo archiving software
  - Object recognition via smartphone camera
- Key competency of the Web 2.0 era: Discovering *implied metadata*
- Systematic identities/primary keys:
  - Being replaced by clever recognition mechanisms (cf. CDDDB/Gracenote signature of CD)



Siri. Beta  
Your wish is  
its command.



Casio prototype of GPS camera  
(2010) [dpnow.com](http://dpnow.com)