

5 Communities, the Web and Multimedia

5.1 Evolution of the Web

5.2 Social Networks and Social Media

5.3 Web Content Aggregation and Integration

5.4 Virtual Worlds in the Web

5.5 Web of Data and Things

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)

Meet Sir Timothy John Berners-Lee



https://www.youtube.com/watch?v=OM6XIIcm_qo

2009

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.”
- Discussions 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)

What is the Meaning of "Web 2.0" ?

The relationship of Web 1.0 to the Web of tomorrow is roughly the equivalence of Pong to *The Matrix*.

The first glimmerings of Web 2.0 are beginning to appear, and we are just starting to see how that embryo might develop.

Darcy DiNucci: Fragmented Future. *Print* 53 (4): 32, April 1999

- 1999 – 2003: Occasional usage of "Web 2.0", inconsistent meaning
- 2004: First O'Reilly "Web 2.0" conference
 - Tim O'Reilly, Dale Dougherty, John Battelle
 - After the burst of the dot-com bubble: Collecting surviving ideas
- September 2005:
Tim O'Reilly: What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software
- Web 2.0 is a buzzword, ***not a technology!***
 - Still used in varying meanings nowadays

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

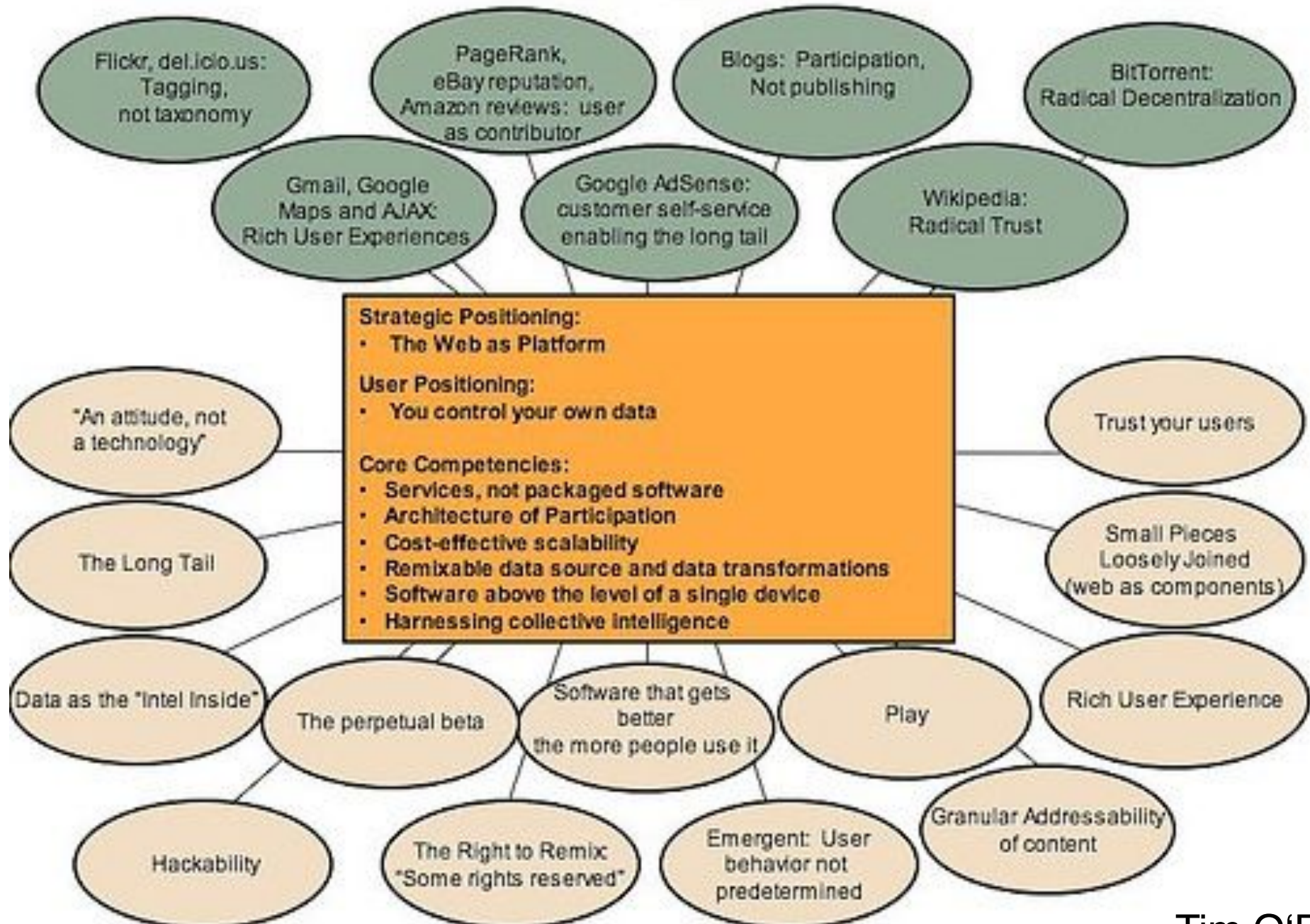


Tim O'Reilly

Picture: Brian Solis
Source: Wikimedia

**Web 0.5, 1.0, 1.5
are *retronyms*!**

Web 2.0 Meme Map



Tim O'Reilly

Two Aspects of Web 2.0

- Social Aspect
 - Collaboration
 - User-Generated Content



- Technical Aspect
 - Rich Internet Applications (multimedia)
 - Web browser as application platform
 - Increasing interactivity in the browser

Comparison by Examples

Web 1.0

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



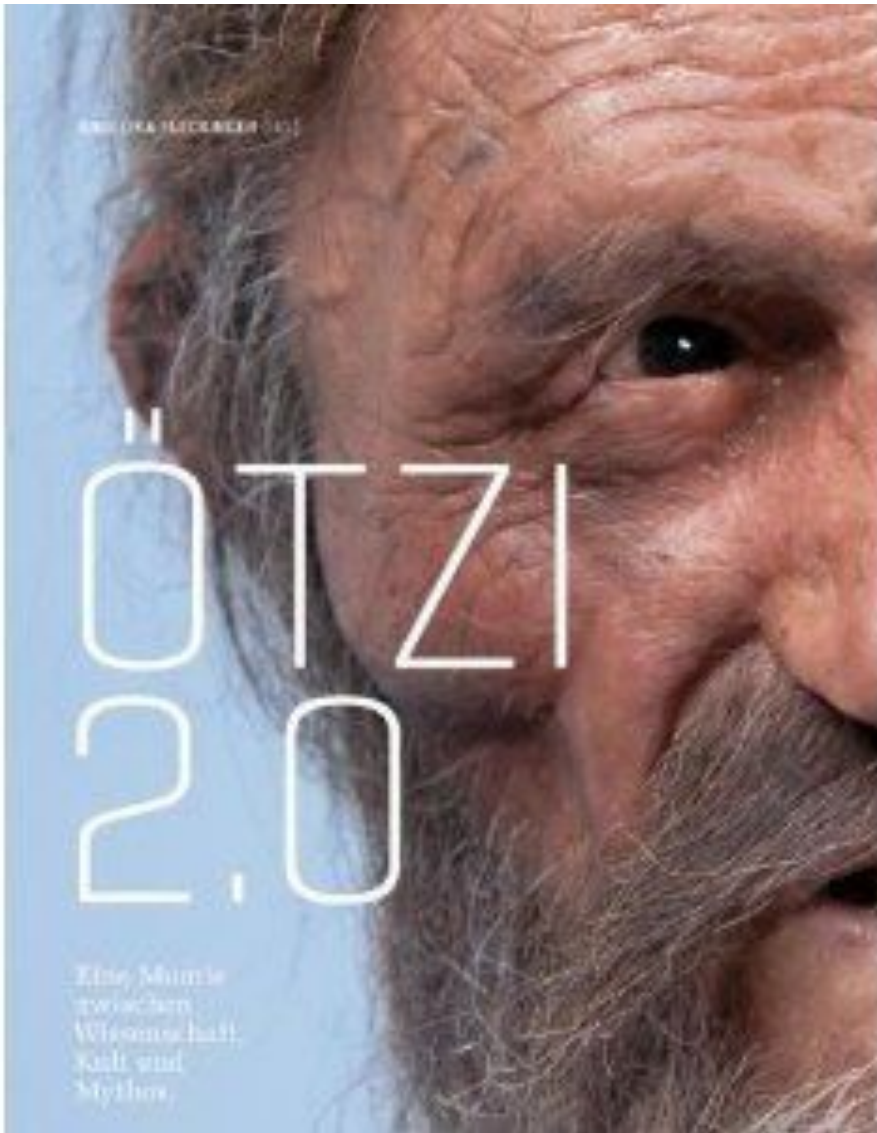
Web 2.0

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

Web 2.0 Principles

- ***Harnessing collective intelligence!***
- Reach out to the entire Web (including edges)
- Service ***automatically gets better*** by more people using it
- Build ***value as a side-effect*** of the ordinary use of their application.
- Race ***to own certain classes of core data*** (e.g. location, identity, calendaring, product identifiers)
- Consequences for software development:
 - "***Perpetual beta***"
 - Users as co-developers
 - Design for ***remix-ability***

2.0 Everywhere!



Buch von Angelika Fleckinger 2011

Internet-Protest
gegen Online-Überwachung



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:
 - Create large revenue out of low individual sales for many niche products
 - Driven by low production and distribution costs



- Theory:
 - Zipf/Pareto style of distribution
 - Traditional Pareto principle: 20% of products give 80% of sales volume
 - Different ratios in online business?

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Brian Solis: The Essential Guide to Social Media

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

Hana S. Noor Al-Deen, John Allen Hendricks (eds.):

Social Media -Usage and Impact, Lexington Books 2012

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. Original 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

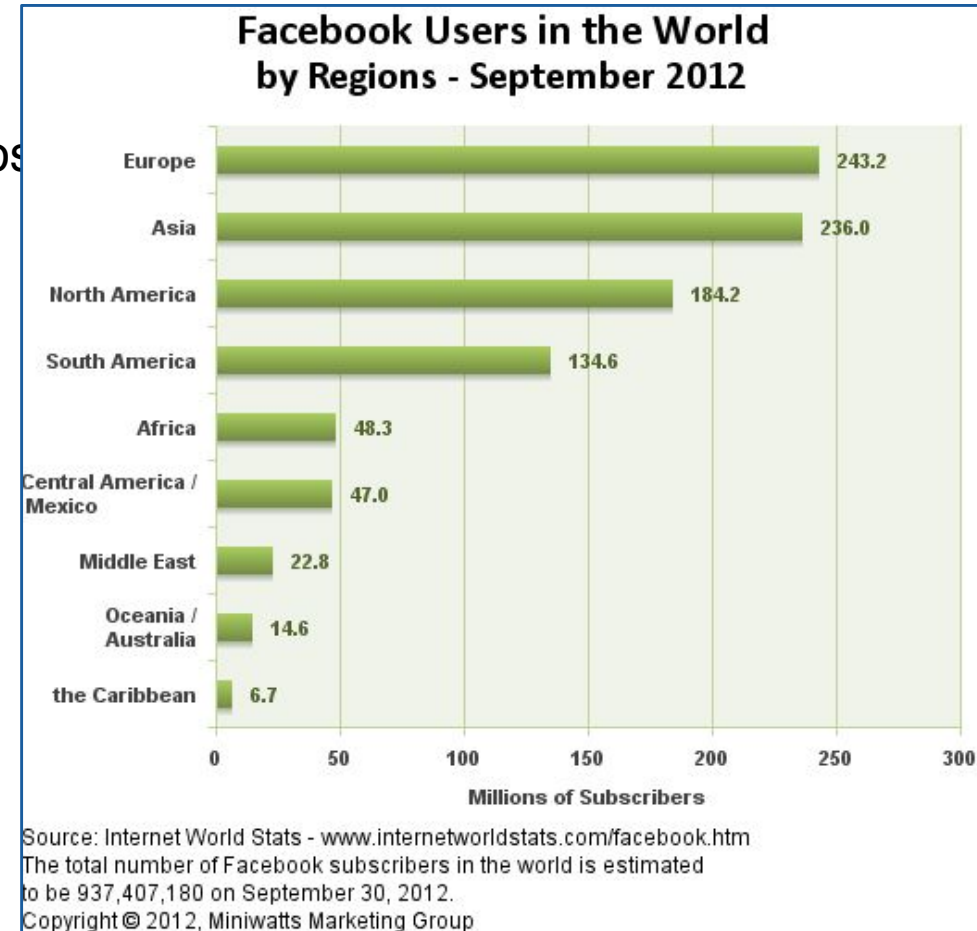
Holtzbrinck beerdigt VZ-Netzwerke



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 universities, colleges and high schools
 - Sept, 2006: Open to everybody of age 13 and up
- Popularity:
 - Alexa.com: Number 2 globally
 - » Sept. 2006: Traffic rank 60
 - » 2012 rank 1 in six countries
 - Future growth unclear
 - » Fake account removal
 - » Princeton study: Will lose 80% of peak user base between 2015 and 2017



Cannarella, John, and Joshua A. Spechler. "Epidemiological modeling of online social network dynamics." *arXiv preprint arXiv:1401.4208* (2014).

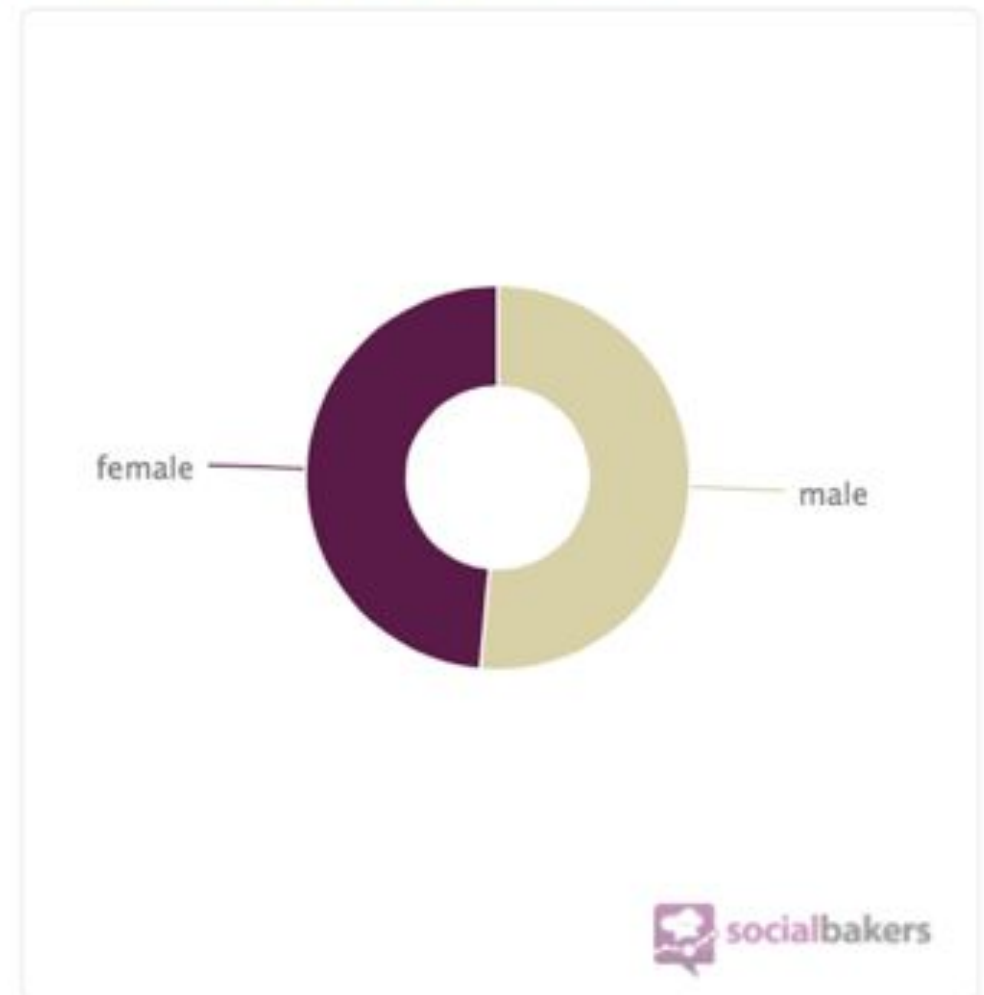
Example: facebook.com (2)

User demographics for Germany 2013 (socialbakers.com)

User age distribution



Male/Female User Ratio



Example: facebook.com (3)

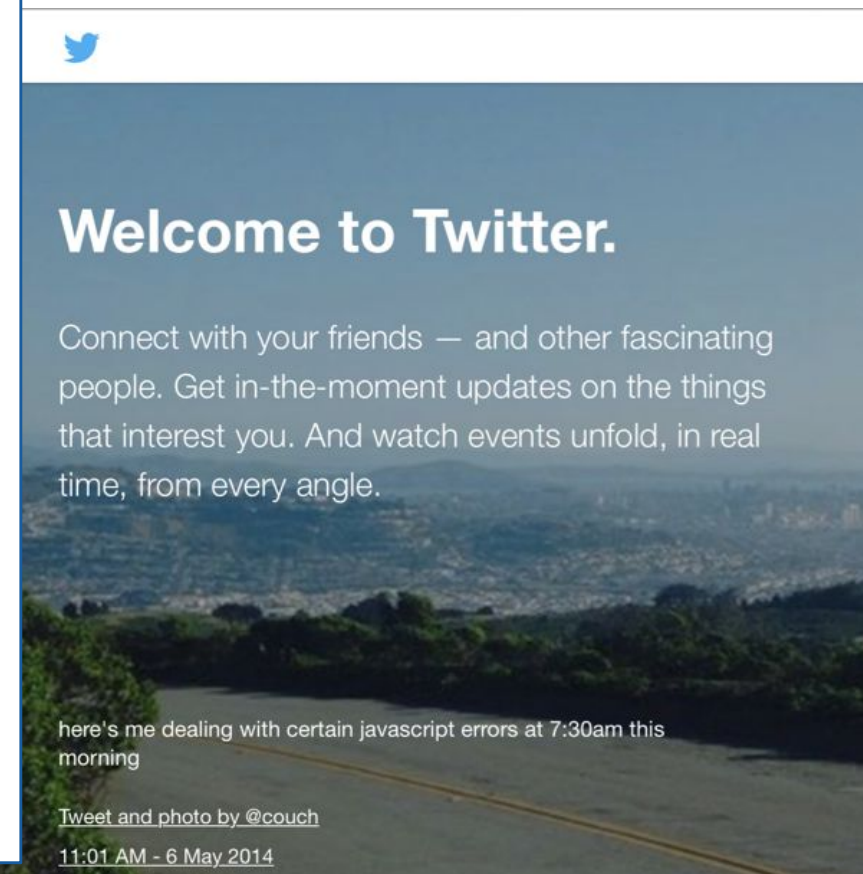
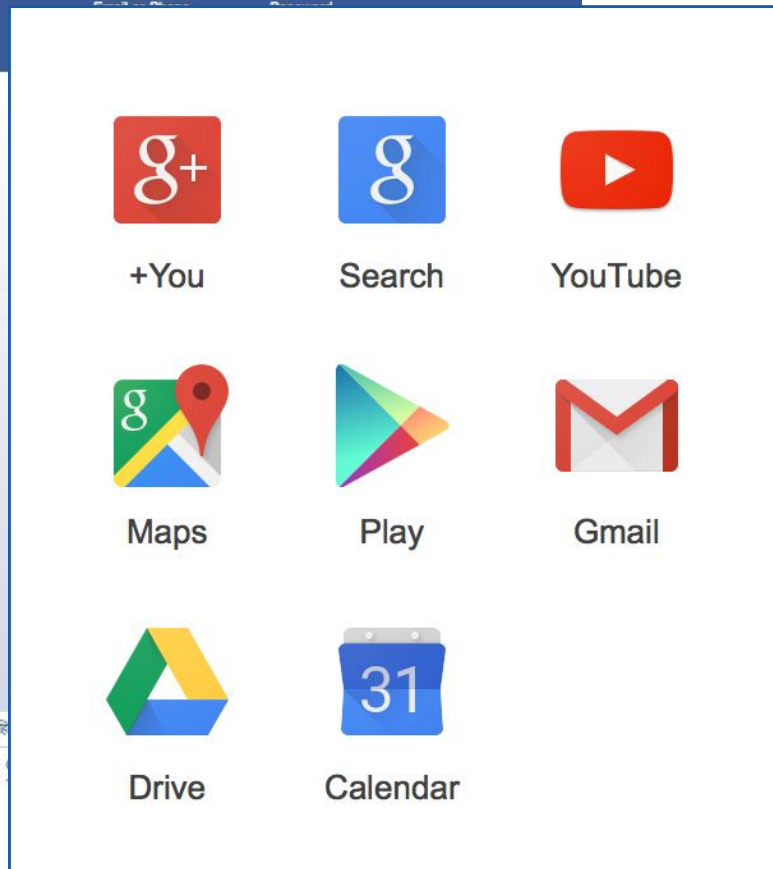
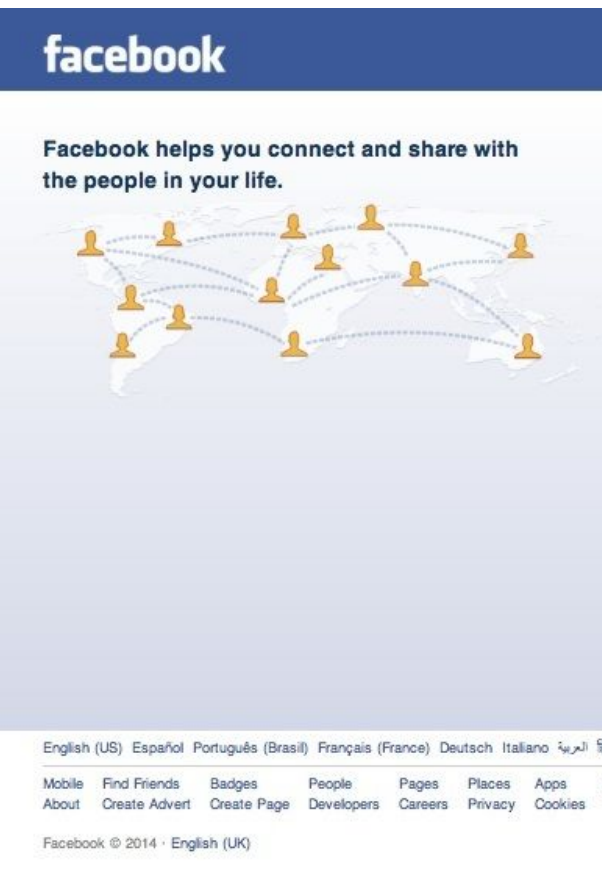
- 1.35 billion monthly active users as of September 2014 (was 1.19 billion one year ago)
- 1.12 billion mobile monthly active users as of September 30, 2014 (was 604 million in 2012, 874 million in 2013).
- Financial side:
 - 2007: Microsoft buys 1.6% share for \$240 million
 - September 2009: First time positive cash flow
 - IPO: May 2012, market capitalization \$104 billion
 - Offering price per share was \$38.00
 - Current price (Nov 14): around \$74.6 (nasdaq.com)
- Business model based on advertisement

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



Social Networks, Third Generation

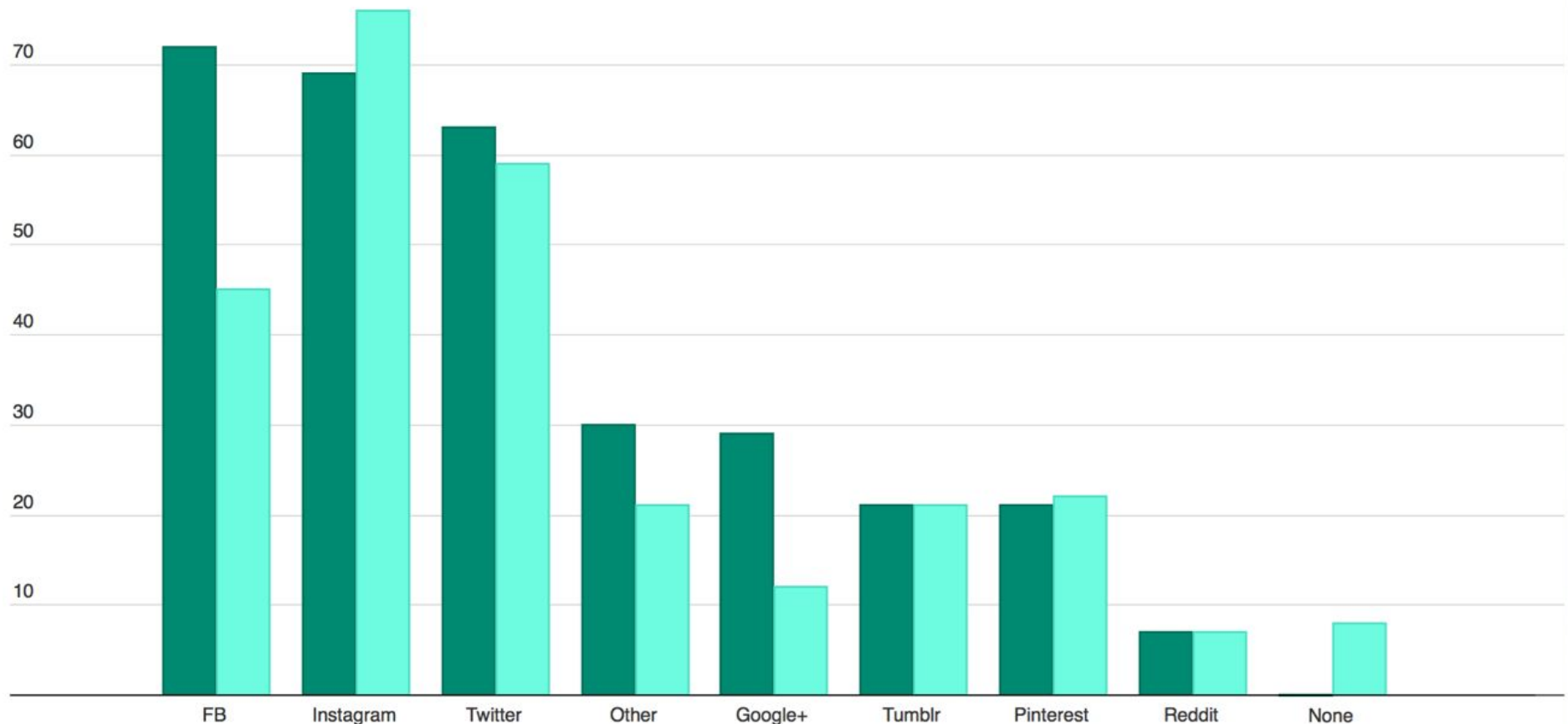
- Battle for market share
- Single universal platform vs. specialized platforms?
- Long-term archive vs. short-living information?



Usage of Social Networks by US Teens

What social networks teens use (%)

■ Spring 2014 ■ Fall 2014



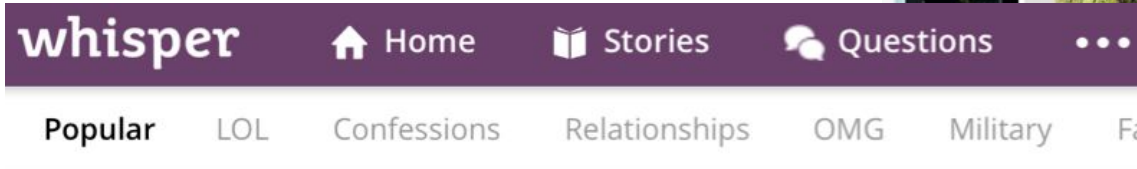
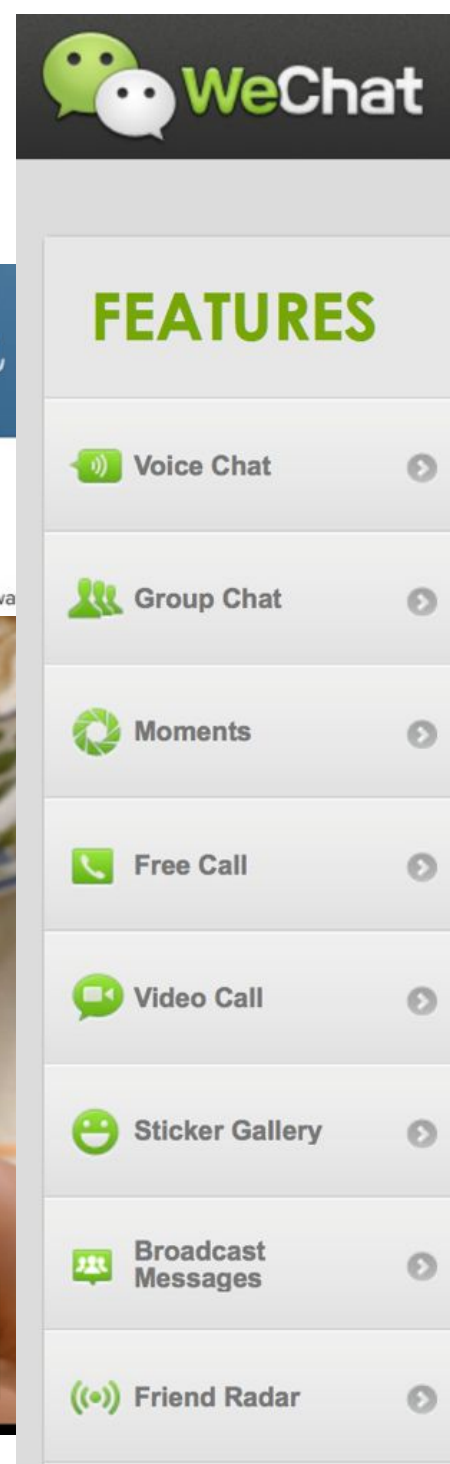
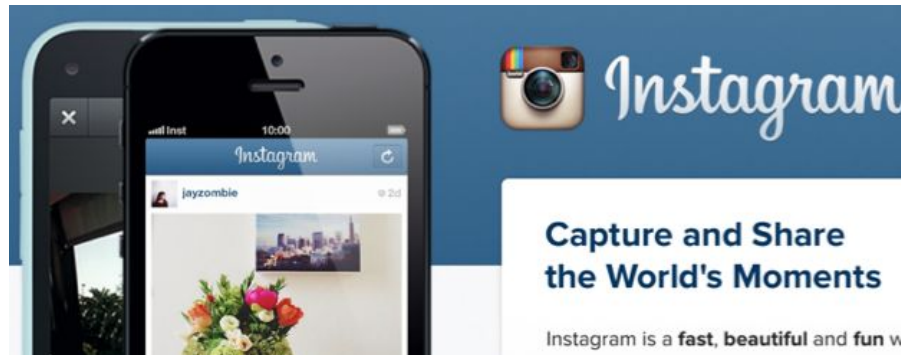
Source: [Piper Jaffray](#)

The Washington Post

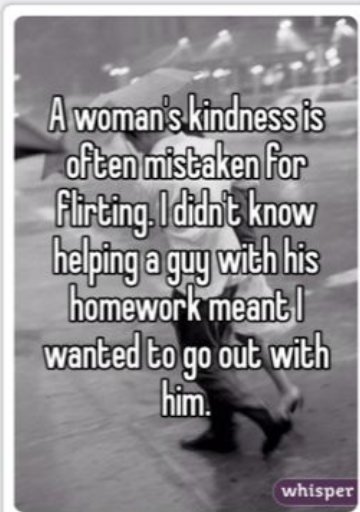
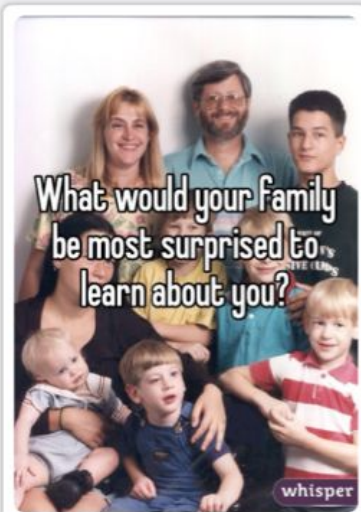
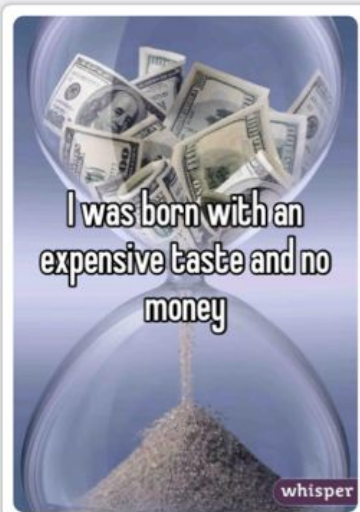
Piper Jaffray research: 7,200 US students

Social Networks, Fourth Generation?

- Mobile device centered
- Real-time
- Media-Rich
- Anonymous

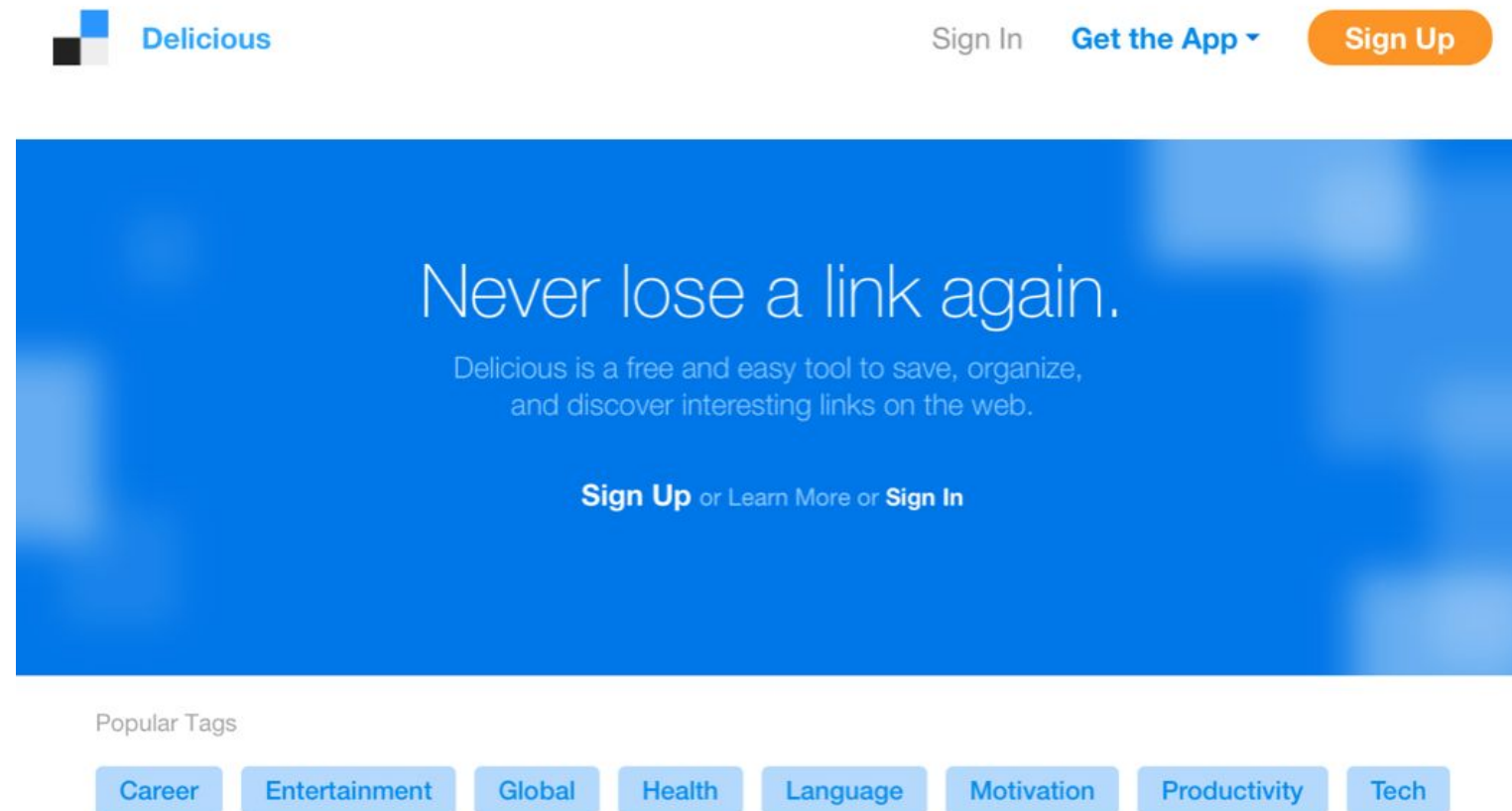


Popular Whispers



Social Bookmarks

- Sharing platform for links to information in the Web
 - Examples: Delicious, diigo.com, digg.com, reddit.com
- Tagging (folksonomy):
 - Adds a semantic dimension to Web search



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.com, 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

Blog as an “Oscillation Medium”

- Traditional web sites (including online versions of traditional media):
 - Closed content, mostly internal links
- Bookmark collections:
 - Completely open content, mostly outward links
- **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
 - Invites creation of **User-Generated Content**

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

Blog Search

- Blog search engine
 - Combining information from many blogs
 - Including tagging, rating etc.
 - (Historic) examples: Technorati.com, blogsearch.google.com
 - Variant: Media rating (e.g. Hype Machine)

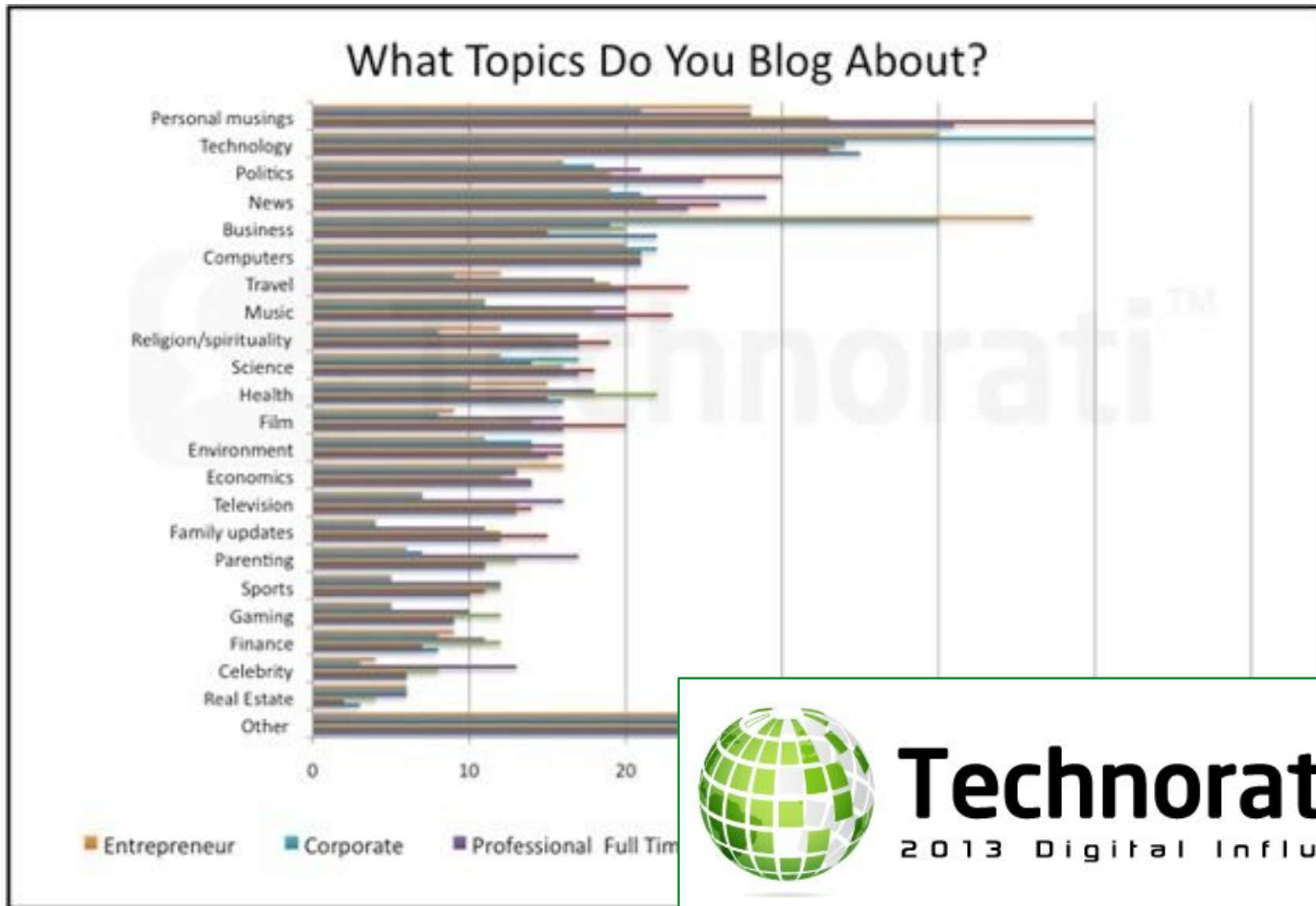


Technorati 2014

We use technology and real-time market insights to optimize digital advertising interactions across an expanding high-quality publisher network.



Diversity of Blog Topics



Technorati.com State of the Blogosphere 2011 (last edn.)

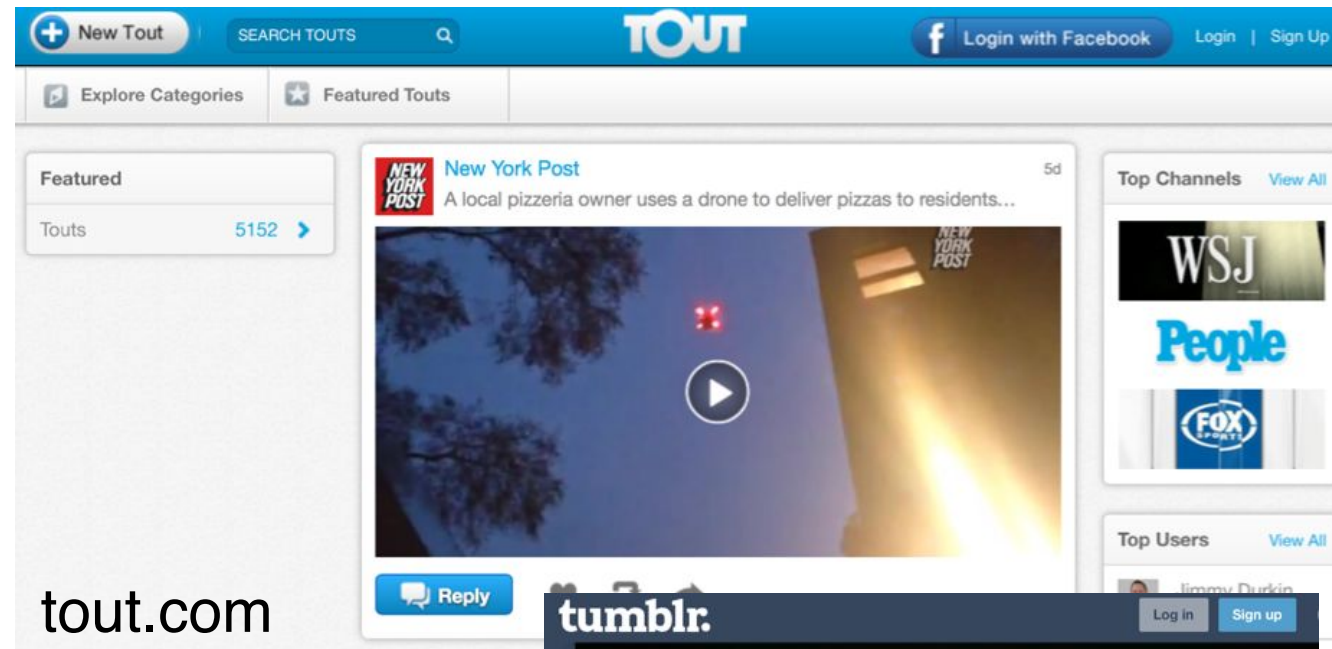
Microblogging

- Tumblelog:
 - Relatively unstructured "stream of consciousness"
- Simplified blogging platforms
 - Tumblr (2006)
 - Twitter (2006/2007)
- Microblog:
 - Short text or small media units
 - Often submitted from mobile devices
- Trend towards pictures, video

Anarchaia

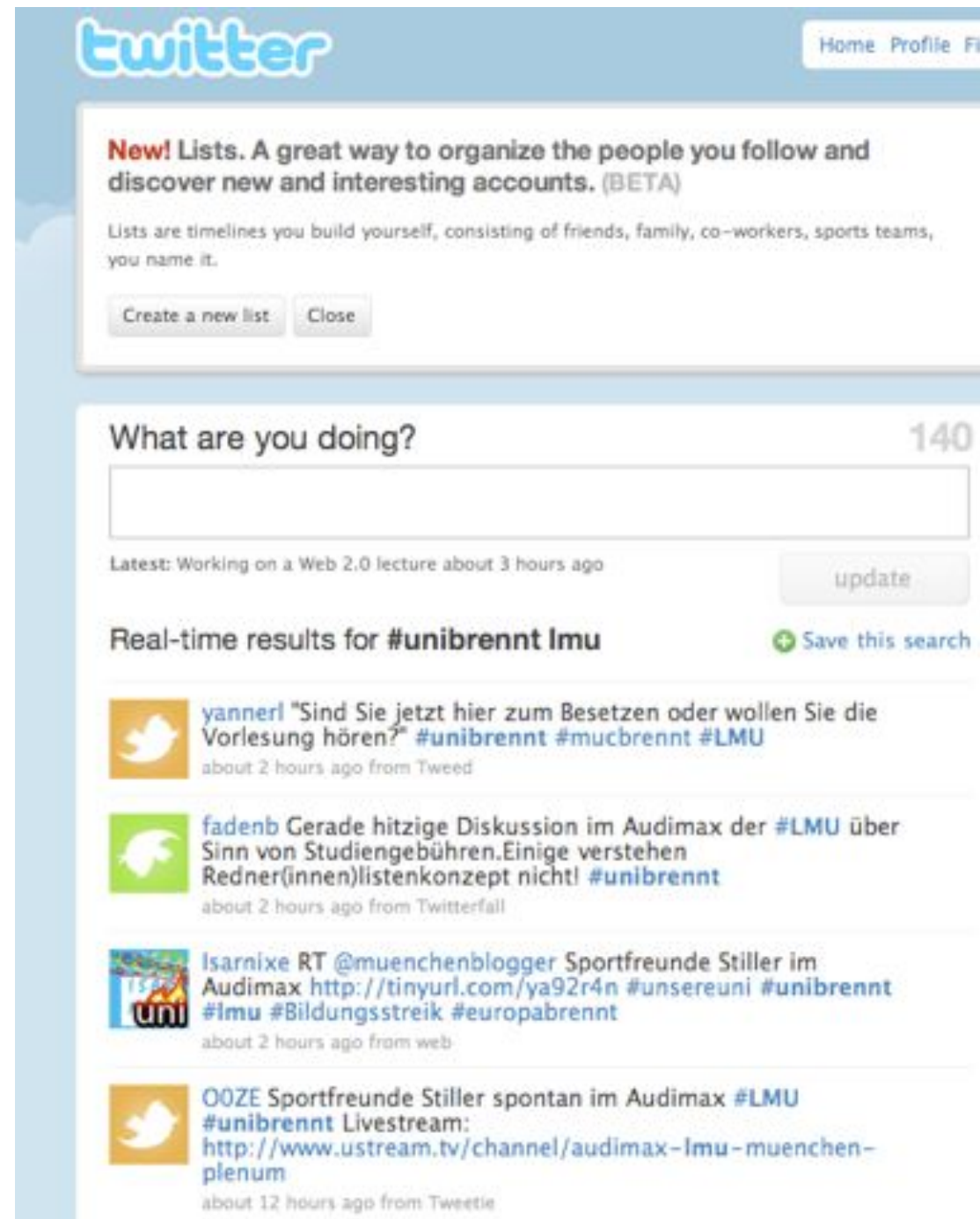
Experimental, impressionistic sub-paragraph
tumblyn' (think obstsalat)

April 2005: Term "tumblelog"



Real Time Media

- ***Everything in the world is now real time.***
- Current main example: Twitter
 - Social analytics built around real-time communication
 - Triggering innovations:
 - » Shorthand URLs
- Other applications
 - Notify manufacturer *immediately* if a certain product is not selling at a certain shop.
 - "Houdini" system used by Obama campaigners



The screenshot shows the Twitter website interface. At the top, the Twitter logo is visible on the left, and navigation links for "Home", "Profile", and "Friends" are on the right. A prominent announcement box reads: "New! Lists. A great way to organize the people you follow and discover new and interesting accounts. (BETA)". Below this, it explains that lists are timelines you build yourself, consisting of friends, family, co-workers, sports teams, etc. There are buttons for "Create a new list" and "Close".

The main content area features a "What are you doing?" text input field with a character count of "140". Below the input, it shows the latest tweet: "Latest: Working on a Web 2.0 lecture about 3 hours ago" with an "update" button. Below that, there are "Real-time results for #unibrennt Imu" with a "Save this search" link. The search results list four tweets:

- 1. User "yannerl" asks: "Sind Sie jetzt hier zum Besetzen oder wollen Sie die Vorlesung hören?" with hashtags #unibrennt #mucbrennt #LMU, posted about 2 hours ago from a tweet.
- 2. User "fadenb" discusses a heated discussion in the Audimax at LMU about the sense of tuition fees, mentioning a list concept, with hashtag #unibrennt, posted about 2 hours ago from a Twitterfall.
- 3. User "Isarnixe" retweets @muenchenblogger about sport friends being silent in the Audimax, with a link to a tinyurl and hashtags #unsereuni #unibrennt #Imu #Bildungsstreik #europabrennt, posted about 2 hours ago from the web.
- 4. User "OOZE" mentions sport friends being silent spontaneously in the Audimax at LMU, with hashtag #unibrennt and a link to a Ustream live stream: http://www.ustream.tv/channel/audimax-Imu-muenchen-plenum, posted about 12 hours ago from a tweet.

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)

The image is a collage of promotional graphics for various location-based services. At the top center is the **Pinterest** logo. Below it is a map snippet showing a road labeled '26' and a location named 'HUNG HOM'. To the right of the map is a **facebook** logo and the text 'Add a location to your posts', followed by three bullet points: 'Remember where you were in your favorite photos.', 'Let friends know where you are so they can meet you there.', and 'Share where you're going to get tips and advice from friends who've been.' Below the map is the **waze** logo with the tagline 'OUTSMARTING TRAFFIC, TOGETHER.' In the bottom left is a dark box for **MapsWithMe Pro, Offline Karten** by MapsWithMe, featuring a green map icon with a red pin and a 4.5-star rating from 247 reviews. In the bottom right is a **foursquare** advertisement with the text 'DISCOVER WHAT'S NEARBY' and 'Looking for a lunch spot nearby or a great burrito in a new city? foursquare helps you find the best in any area. And the more you and', accompanied by images of two smartphones displaying the Foursquare app interface.

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 of the German Chancellery (Die Bundeskanzlerin). At the top, there is a search bar labeled 'Suchbegriff' and navigation links for 'English', 'Übersicht', 'Abo', 'Impressum', and 'Kontakt'. The logo of the Chancellery is on the left, and the signature of Angela Merkel is on the right. Below the navigation bar, there are tabs for 'START', 'AKTUELL', 'ANGELA MERKEL', 'KANZLERAMT', and 'UNTERWEGS'. The 'AKTUELL' tab is selected. On the left side, there is a vertical menu with orange buttons for 'Artikel', 'Mediathek', 'Reden', 'Interviews und Beiträge', 'Pressemitteilungen', 'Pressekonferenzen', 'Podcasts', and 'Archiv'. The 'Podcasts' button is highlighted. The main content area is titled 'PODCASTS' and shows 'Anzahl der Einträge: 166'. There are pagination links: '1-25 | 26-50 | 51-75 | 76-100 | 101-125 >>'. Below this, there is a table with columns 'Datum' and 'Titel'. The first entry is dated '17.10.2009' with the title 'Investitionen in Kultur sind Investitionen in die Zukunft'. The second entry is dated '10.10.2009' with the title 'Buchmesse unter wunderbaren Vorzeichen'. Each entry has a small thumbnail image to its left.

- “History”: iPod & Broadcasting
 - Discussed since 2000, massive use since 2003
 - Word of the year of the New Oxford American Dictionary 2005
- Media file distributed regularly (paid or unpaid)
 - Subscription or individual download
 - Originally mainly audio
- **User-Generated Content (UGC):**
 - Amateur (audio)podcasts: minimal hardware/software requirements

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

The image shows a screenshot of the German news website Bild.de. At the top left is the EDEKA logo. A large blue banner at the top center contains the text "Jetzt mitbrutzeln und heiße Preise gewinnen!" (Now get a free ride and hot prices!). Below this is a navigation bar with links for "VOLKSFRONSTOCK", "POST-SERVICE", "VOLKS-TABLETTE", "TANKTIPP", and "MASSA HAUS". A search bar labeled "SUCHBEGRIFF" and "SUCHEN" is on the right. The main navigation bar includes "Home | 5.05.10 | 14:44 | Neu anmelden | Login" and "1414 | ONLINE-SERVICES | RSS | ABD | MOBIL". Below this are category links: "NEWS", "POLITIK", "UNTERHALTUNG", "SPORT", "BUNDESLIGA", "LIFESTYLE", "RATGEBER", "AUTO", "DIGITAL", "SPIELE", and "REGIONAL". The main content area features a large headline "Athen brennt 3 Tote" (Athens burns 3 dead) with sub-headlines: "► Massen-Demo außer Kontrolle" and "► Wütender Mob zündet Banken an". A yellow banner below reads "BILD.de-Reporter berichtet LIVE". An inset image shows a riot scene with fire and police. On the right side, there is a vertical advertisement for EDEKA with the text "Mit Liebe geschenkt." and "222 Einkaufs...".

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

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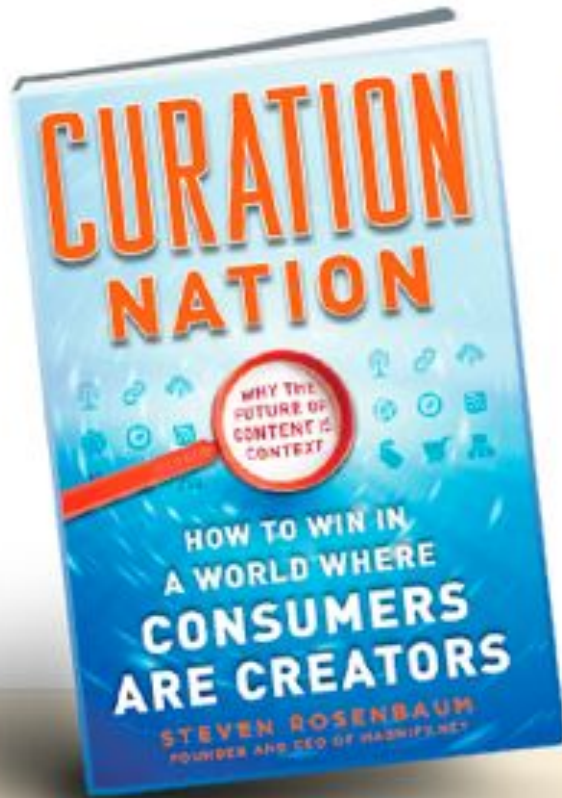
R. Yee: Pro Web 2.0 Mashups, Remixing Data and Web Services,
Apress 2008

Content Aggregation, Indexing, Curation

- Content aggregation:
 - Combination of content on specific topics from various sources
 - Finding content (indexing), filtering content, publishing combined content
- Indexing:
 - 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)

<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

BUY THE BOOK

amazon.com

soocoread

BORDERS.

BARNES & NOBLE
BOOKSELLERS

BUY IN BULK

curationnation.org

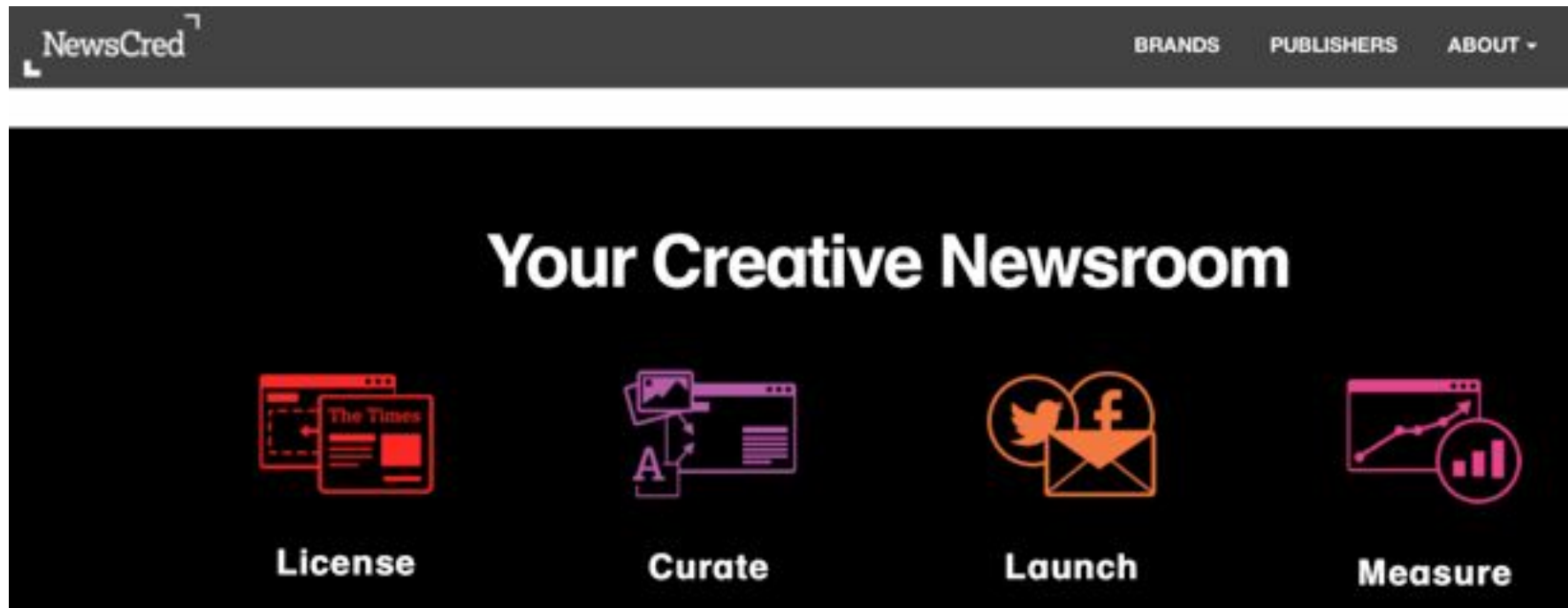
Content Indexing + Automatic Filtering: Examples

The screenshot shows the Google News interface. At the top left is the "Google news" logo. To its right is a search bar with "Search News" and "Search the Web" buttons. Below the search bar is a link for "Advanced news search". On the left side, there is a "Top Stories" sidebar with a list of topics including "iTunes". The main content area is titled "iTunes" and features a sub-header "Add to my personalized news page". The primary news item is titled "The Beatles' Abbey Road leads to top 20 on iTunes" with a star icon. It is dated "Vancouver Sun - 50 minutes ago". The text of the article snippet reads: "The now-settled battle between the Beatles and iTunes isn't the first time the band has fought to protect its profits. LOS ANGELES - The Beatles soared up ...". Below the main text are several links: "Video: BEATLES AND iTUNES STRIKE DEAL" (with a YouTube icon), "Beatles storm iTunes charts on first day of sale" (with "The Guardian" as the source), "Techtree.com - NEWS.com.au - Los Angeles Times - Wikipedia: Apple Corps v Apple Computer", and "all 3,636 news articles »". There is also a small thumbnail image on the left of the main article with the text "tomorrow is just another that you'll never forget".

The screenshot shows the banner for "THE HARRY POTTER AUTOMATIC NEWS AGGREGATOR". The banner features a dark background with a pattern of red and gold. In the center, the word "HPANA" is written in large, golden, serif letters. To the left of the text are two characters from the Harry Potter series, and to the right are two more characters. Below the banner, there is a navigation bar with social media icons for Google+, MySpace, and YouTube, and a language selection menu: "Translate to: Español · Français · Português · Italiano · Deutsch". Below the navigation bar is a menu with links: "Home", "News Browser", "Community", "Shopping", "Members", and "About". At the bottom of the banner, there are links for "Front Page", "HP Fan Trips", and "MugglePost.com".

hpana.com

News Curation Tools and Services: Examples



The screenshot shows the NewsCred website. At the top left is the NewsCred logo. To the right are navigation links for BRANDS, PUBLISHERS, and ABOUT. The main content area has a dark background with the heading "Your Creative Newsroom". Below this heading are four icons representing different stages of the newsroom process: License (a newspaper icon), Curate (a document with a magnifying glass), Launch (social media icons for Twitter and Facebook), and Measure (a line graph and bar chart).

newscred.com

storycrawler.com



The image shows the StoryCrawler logo, which consists of a stylized white 'S' on a black background. Below the logo is the text "STORYCRAWLER" and a tagline: "THE FUTURE OF SEARCH" in large blue letters, followed by "Curated Content. All at your fingertips." in smaller grey letters.



Video Curation and Aggregation: Example



LEARN

BUY

CONTENT

SUPPORT

ABOUT

CONTACT US

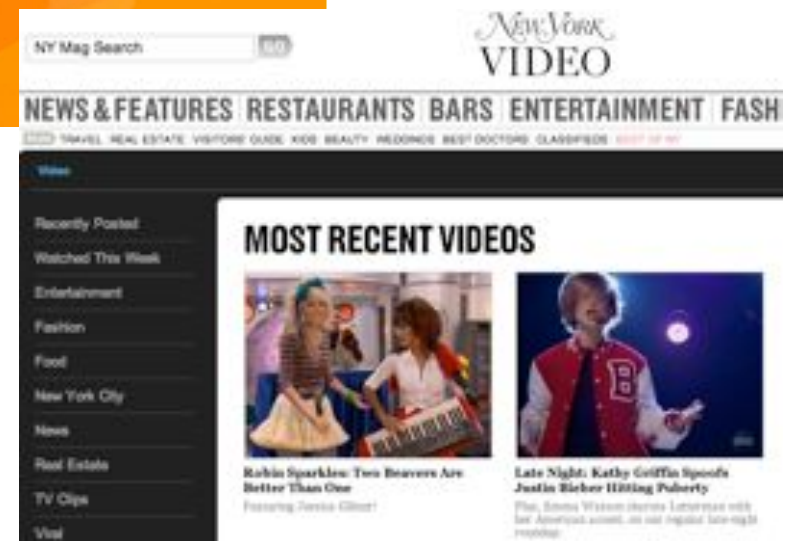
How Curation and Monetization Works in the World of Web Video



VIDEO.
DON'T SWEAT IT.
CURATE IT.

(It's better.)

enterprise.waywire.com



videos.nymag.com

Print Media from Curated Online Content



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

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:
 - Program access (API) to Web service over Internet
- Basic alternatives:
 - Client-side mashup
 - Server-side mashup (more frequent)
- Various technologies for transmission/invocation:
 - REST
 - SOAP
 - XML-RPC

World of Web APIs

ProgrammableWeb: the world's largest API repository, **GROWING DAILY**

Search Over 12,344 APIs

Search APIs

Filter APIs

By Category

By Protocols/Formats

Include Deprecated APIs

API Name	Description	Category	Date
Google Maps	The Google Maps API allow for the embedding of Google Maps onto web pages of outside developers, using a simple JavaScript interface or a Flash interface. It is designed to work on both mobile...	Mapping	12.05.2005
Twitter	The Twitter micro-blogging service includes two RESTful APIs. The Twitter REST API methods allow developers to access core Twitter data. This includes update timelines, status data, and user...	Social	12.08.2006
YouTube	The Data API allows users to integrate their program with YouTube and allow it to perform many of the operations available on the website. It provides the capability to search for videos, retrieve...	Video	02.08.2006

See
programmable
web.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 provided to the 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.setContentTypes](#)
 - [flickr.photos.setDates](#)
 - [flickr.photos.setMeta](#)
 - [flickr.photos.setPerms](#)
- (excerpt)

REST (Representational State Transfer)

- REST: One method to call a Web Service API
- History:
 - Roy Fielding 2000, Ph.D. thesis
- 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

Example: REST Request/JSON Response

- Request:

```
http://api.flickr.com/services/rest/  
?method=flickr.blogs.getList&api_key=8c...93  
&format=json
```

- Response:

```
jsonFlickrApi({  
  "stat": "ok",  
  "blogs": { "blog": [  
    {"id": "73",  
     "name": "Bloxus test",  
     "needspassword": "0",  
     "url": "http://remote.bloxus.com/"},  
    {"id": "74",  
     "name": "Manila Test",  
     "needspassword": "1",  
     "url": "http://flickrtest1.userland.com/"}]  
  }  
})
```

<http://www.flickr.com/services/api/response.json.html>

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

API Kits

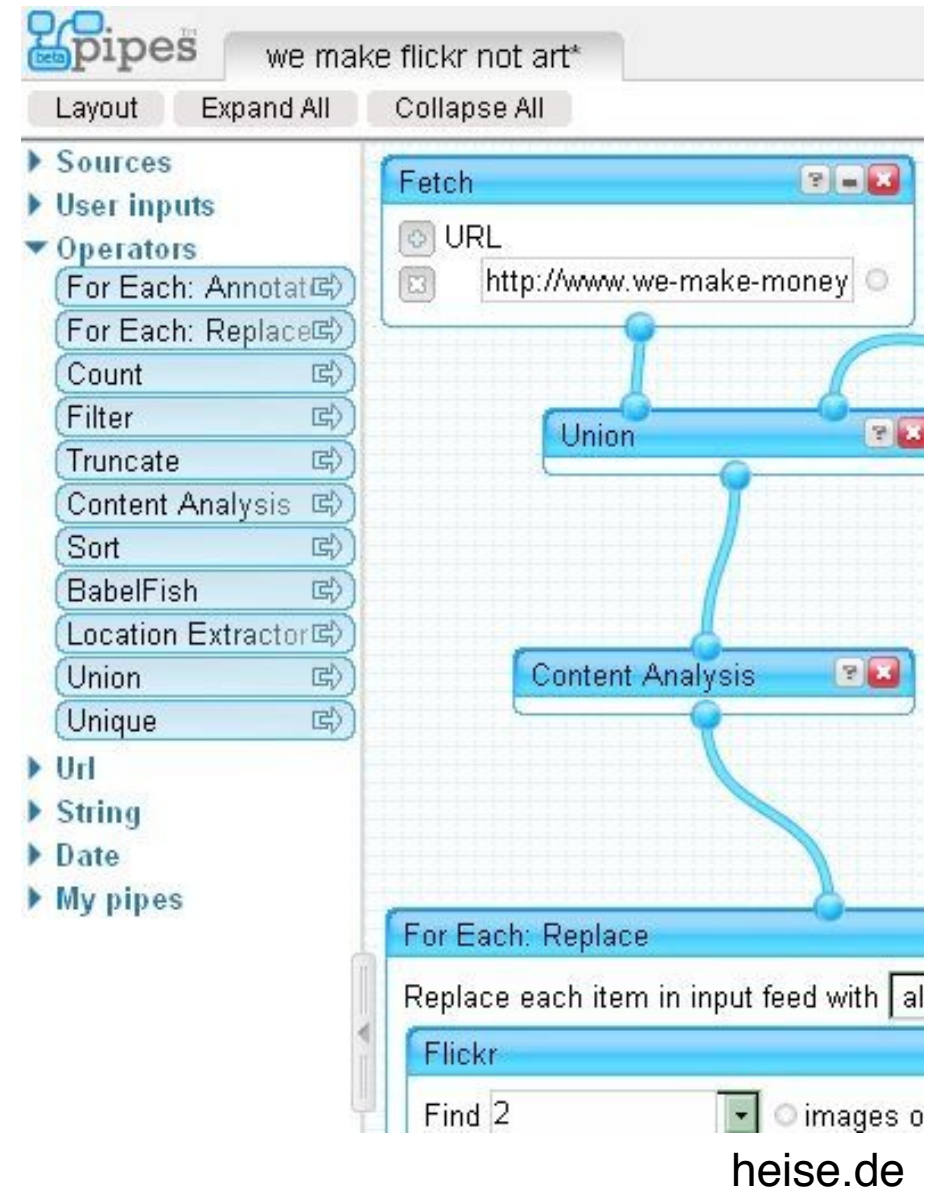
- Requests are constructed and responses are evaluated within scripts
 - Mostly server-side scripts, e.g. PHP
 - Constructing a request in PHP:
`$content = file_get_content($url) ;`
- Simplifying development for specific API:
API Kits
 - Example: phpflickr.com
 - "Wrapper" around API functions and invocation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

Selected(!) API Kits
for Flickr

ActionScript	<ul style="list-style-type: none">• flickr api (docs)• Flashr• Flickr API Interfaces REST• as3 flickr lib
C	<ul style="list-style-type: none">• Flickcurl
Cold Fusion	<ul style="list-style-type: none">• CFlickr
Common Lisp	<ul style="list-style-type: none">• Clickr
cUrl	<ul style="list-style-type: none">• Curlr
Delphi	<ul style="list-style-type: none">• dFlickr
Java	<ul style="list-style-type: none">• flickrj• jlickr
.NET	<ul style="list-style-type: none">• Flickr.NET
Objective-C	<ul style="list-style-type: none">• ObjectiveFlickr
Perl	<ul style="list-style-type: none">• Flickr::API 0.03• Flickr::Upload 1.06
PHP	<ul style="list-style-type: none">• PEAR::Flickr API• phpFlickr
PHP5	<ul style="list-style-type: none">• Phlickr
Python	<ul style="list-style-type: none">• 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



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 and using it in Google Maps:
 - ```
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

# 5 Communities, the Web and Multimedia

5.1 Evolution of the Web

5.2 Social Networks and Social Media

5.3 Web Content Aggregation and Integration

5.4 Virtual Worlds in the Web

5.5 Web of Data and Things

# 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)
  - One million regular users (2014)
  - Full virtual environment, avatars, extensive creative tools
- Other virtual worlds, e.g.
  - habbo.com

# Example: Habbo.de

The screenshot shows the Habbo.de website interface. At the top, a status bar displays "2,782 Habbos im Hotel" on the left and "Nicht eingeloggt" on the right. Navigation links include "Mein Habbo", "Meine Taler", and "Habbo Club". A central banner features the Habbo logo and a character holding a key, with the text "Hallo! Bitte einloggen bzw. registrieren." and buttons for "Kostenlos registrieren!" and "Einloggen". A "Check ein! HABBO HOTEL" button is also visible. Below the banner is a navigation menu with icons for "START", "NEU HIER?", "TALER KAUFEN", "EVENTS", "GAMES", "COMMUNITY", "SHOP", "HILFE & SICHERHEIT", and "MOBILE". A secondary menu lists various hotel features like "Habbo Hotel", "Willkommen im Habbo Hotel", "Haustiere", "Möbel", "Renovierung", "Habbo Homes", "Habbo Web", and "Habbo Games". The main content area is titled "HABBO HOTEL" and includes sections for "Neu im Habbo?" (with numbered steps 1 and 2), "Wichtigste Funktionen" (listing Habbo Konsole, Habbo Geldbörse, and Hotel Navigator), "Werbung" (with a "Wohin möchtest du gehen?" section for "Freibad" and "Battle Ball"), and a "Jackie Chan Adventures" advertisement.



# Second Life



Images: Wikipedia

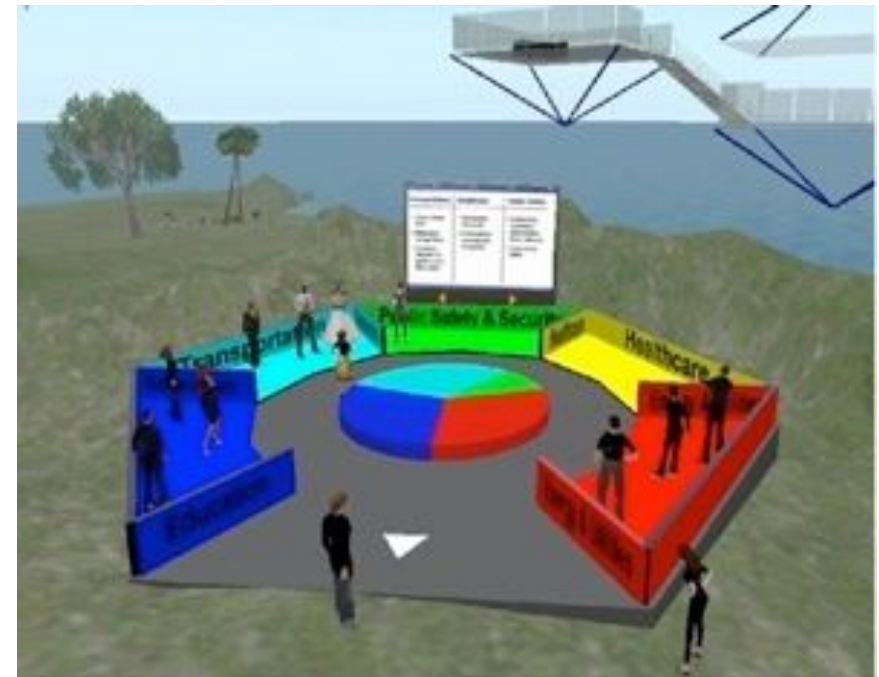


# Second Life and Business

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



francisanderson.wordpress.com



IBM Conferences, using Opinionator

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

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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 wearables:
  - Collective intelligence
  - Driven by sensors
  - Talking to the Web (Hello Google, Siri)
  - Information shadows, Internet of Things: Web meets World
  - Geo-tagging of pictures (GPS in camera)
  - Face recognition in photo archive
  - Object recognition via smartphone
- Key competency of the Web 2.0 era:  
Discovering *implied metadata*



Nikon Android camera

# Sir Timothy John Berners-Lee, Again



Linked Data

[https://www.youtube.com/watch?v=OM6XIIcm\\_qo](https://www.youtube.com/watch?v=OM6XIIcm_qo)