

# 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)

# Outline

\* = Nicht für Nebenfach !

1. Introduction and Motivation
  2. Interactive Web Applications
  3. Web Paradigms and Interactivity \*
  4. Technology Evolution for Web Applications \*
  5. Communities, the Web, and Multimedia
  6. Digital Rights - Definition and Management
  7. Cryptographic Techniques
  8. Multimedia Content Description
  9. Electronic Books and Magazines
  10. Multimedia Content Production and Distribution
  11. Web Radio, Web TV and IPTV
  12. Multimedia Conferencing
  13. Signaling Protocols for  
Multimedia Communication \*
  14. Visions and Outlook
- Part I:  
Web Technologies  
for Interactive MM
- Part II:  
Content-Oriented  
Base Technologies
- Part IV:  
Multimedia  
Distribution Services
- Part IV:  
Conversational  
Multimedia Services

# Meet Sir Timothy John Berners-Lee



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



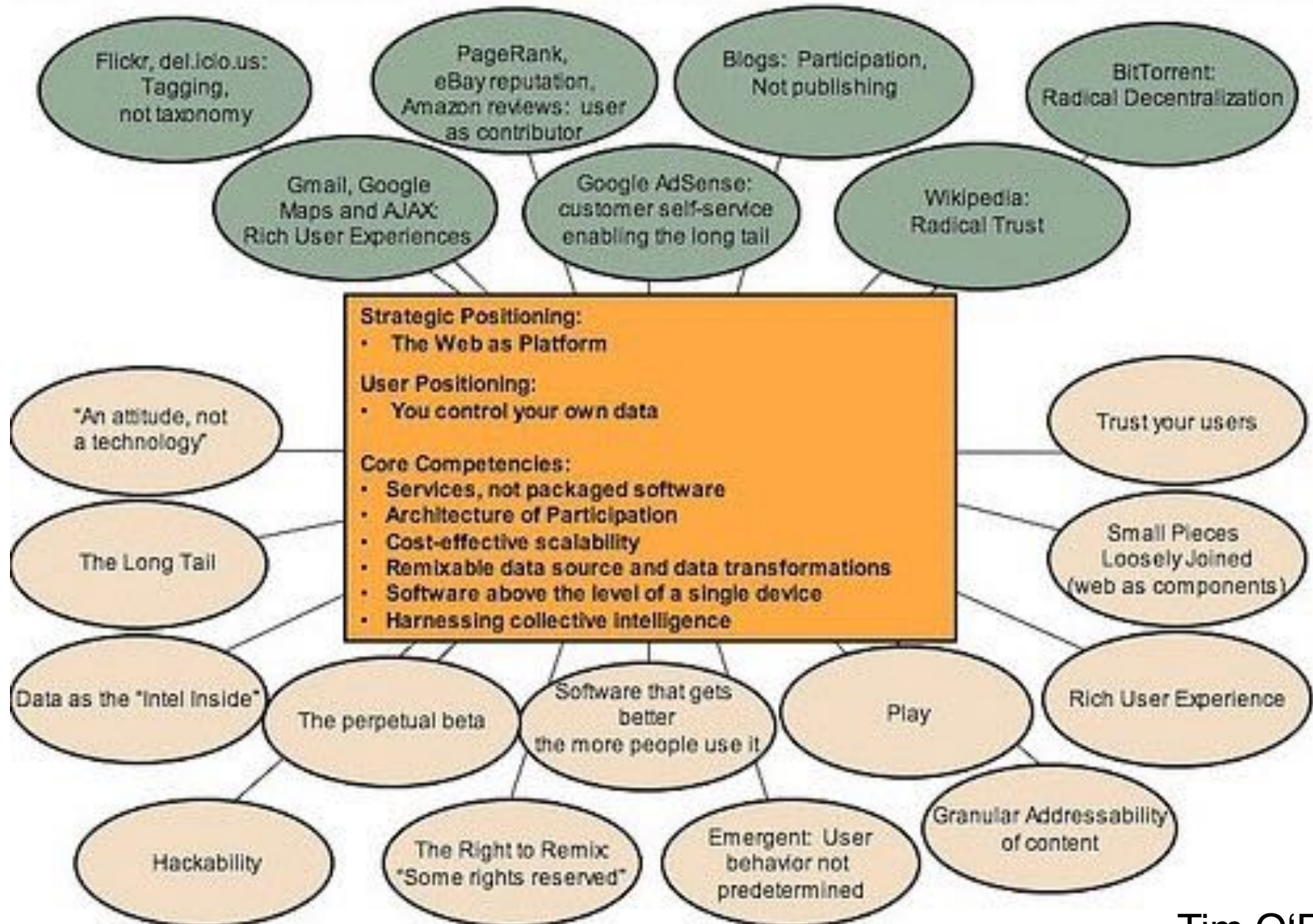
Tim O'Reilly

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

# Find the Betas!



<https://bstevenson2012.wordpress.com/2012/04/26/web-2-0-perpetual-beta/>



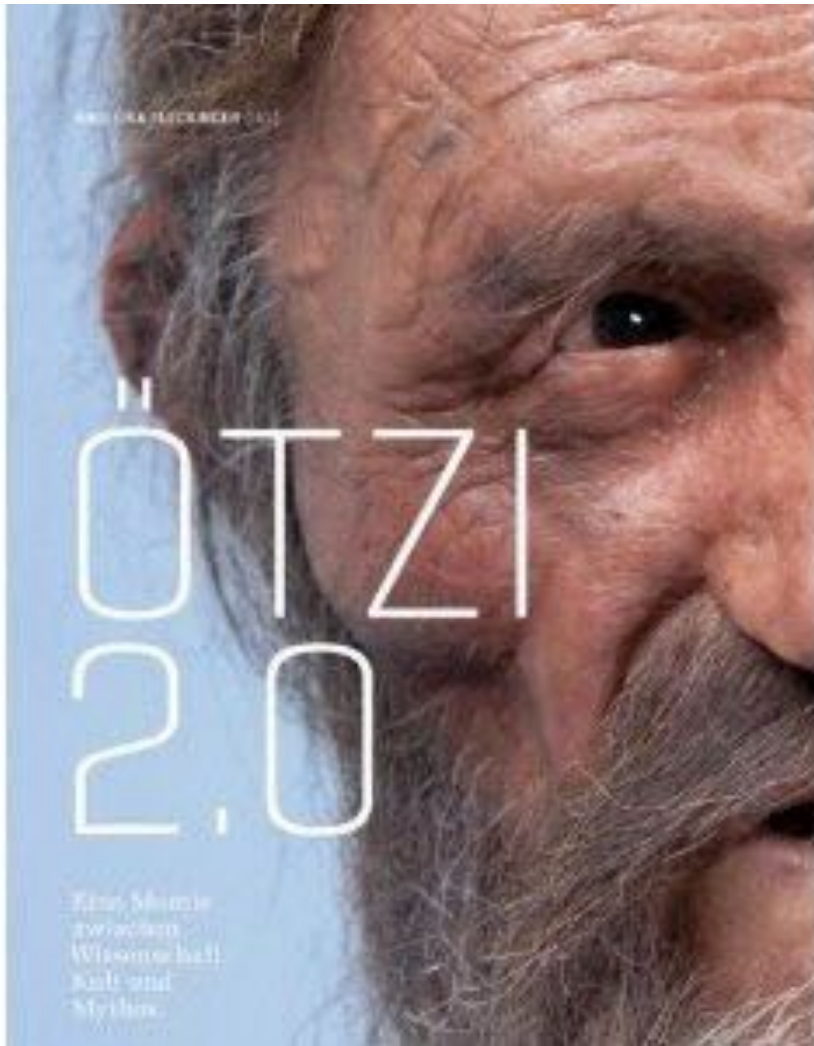
2015

# 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!

Museum  
Brandhorst  
2015



Book by Angelika Fleckinger 2011



Ethikzentrum  
LMU 2015

**Ethik\_2.0?**

Zur #normativen Dimension des digitalen Lebens

# 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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Literature:

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



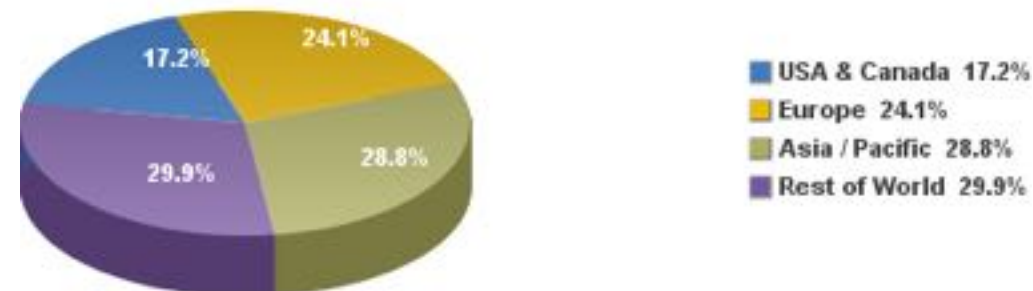
spiegel.de, 11.06.2012



# Example: facebook.com

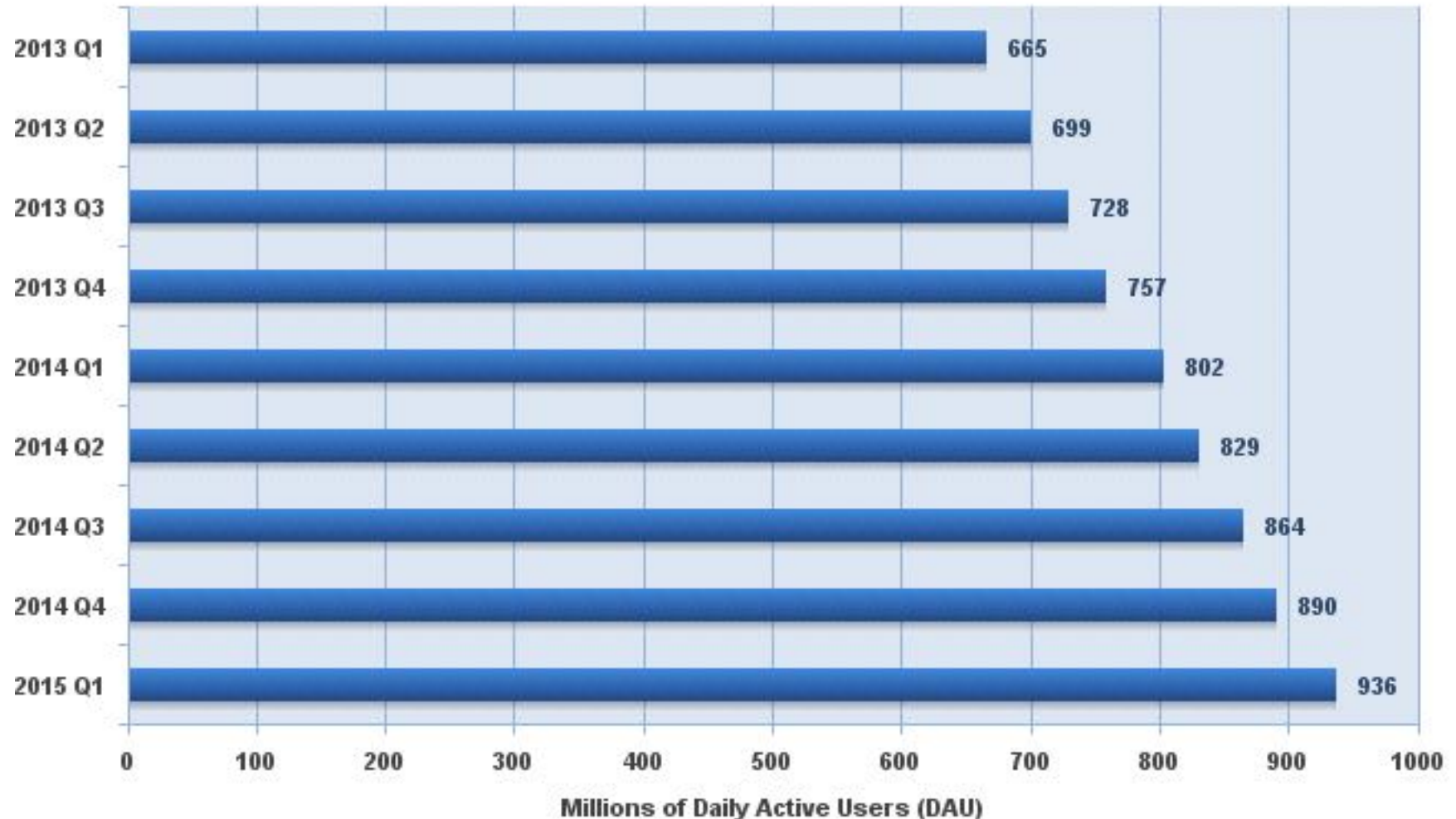
- History:
  - Mark Zuckerberg and friends, Harvard, October 2003:
    - » Facemash: Comparing student photos
  - Mark Zuckerberg, February 2004: "The Facebook" for Harvard students
  - Stepwise expansion to other universities, colleges and high schools
  - Sept, 2006: Open to everybody of age 13 and up
- Popularity:
  - Alexa.com: Number 2 globally and in USA, Number 3 in Germany
  - Socialbakers.com: 936 million users daily  
83% outside USA  
87% mobile users
  - Fb: > 1 billion daily average users on average for September 2015

**Facebook Users in the World  
Daily Active Users (DAU) - 2015Q1**



Source: Internet World Stats - [www.internetworldstats.com/facebook.htm](http://www.internetworldstats.com/facebook.htm)  
Basis: Facebook Published Data, retrieved on April 26, 2015  
Copyright © 2015, Miniwatts Marketing Group

# Facebook Growth in the World between 2013 Q1 and 2015 Q1

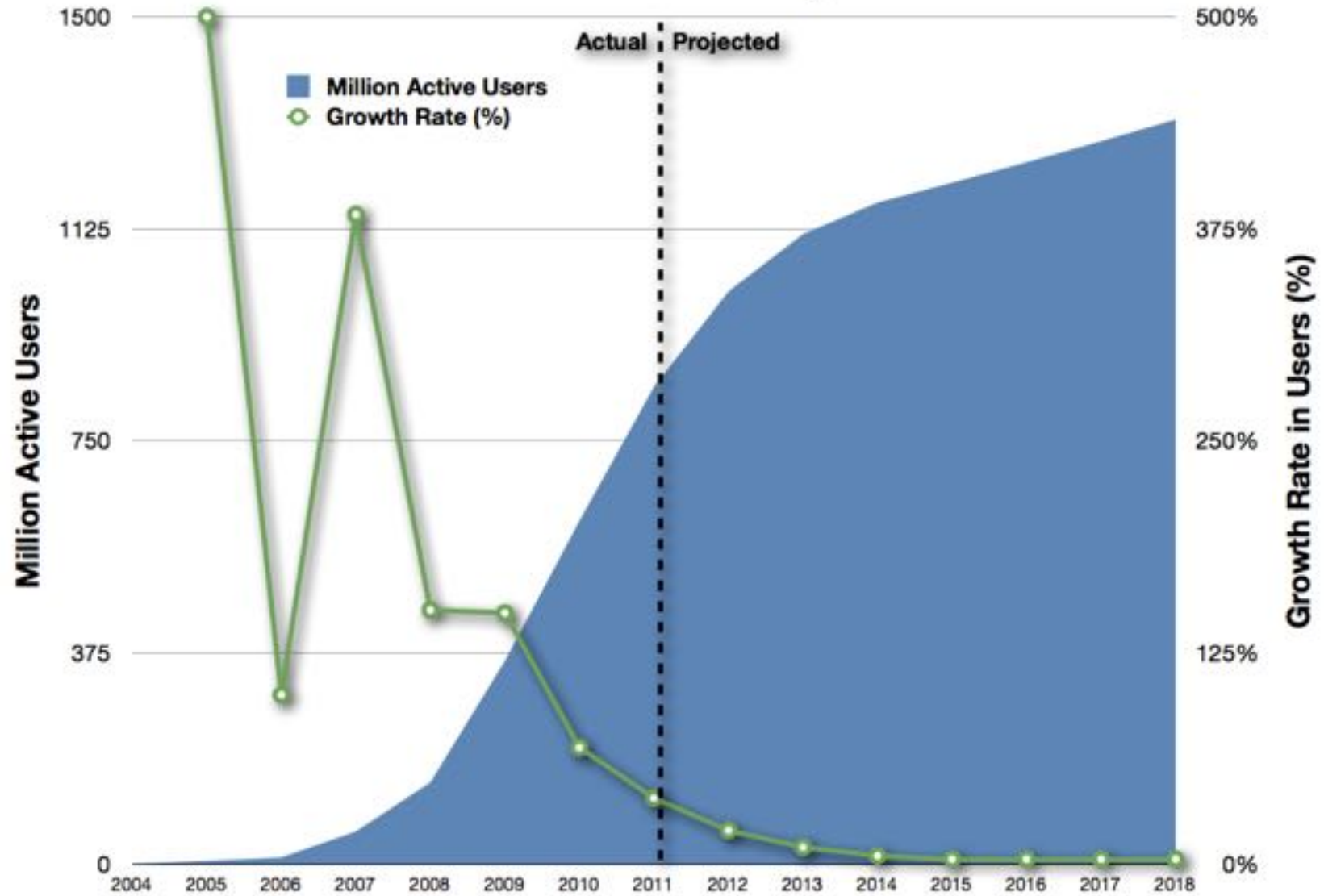


Source: Internet World Stats - [www.internetworldstats.com/facebook.htm](http://www.internetworldstats.com/facebook.htm)

Facebook daily active users worldwide, retrieved on April 26, 2015

Copyright © 2001-2015, Miniwatts Marketing Group

# Facebook Historical and Projected Growth



Source: Tim McCaffery, 2012  
<http://bylimesdesign.com/blog/?p=43>

# A Glimpse at the Financial Side of Facebook

- History:
  - 2007: Microsoft buys 1.6% share for \$240 million
  - September 2009: First time positive cash flow
  - IPO: May 2012, offering price \$38.00
  - Share price Nov 14: \$75
  - Current price (Nov 15): \$106

INVESTING | 7/18/2012 @ 7:18AM | 4,842 views

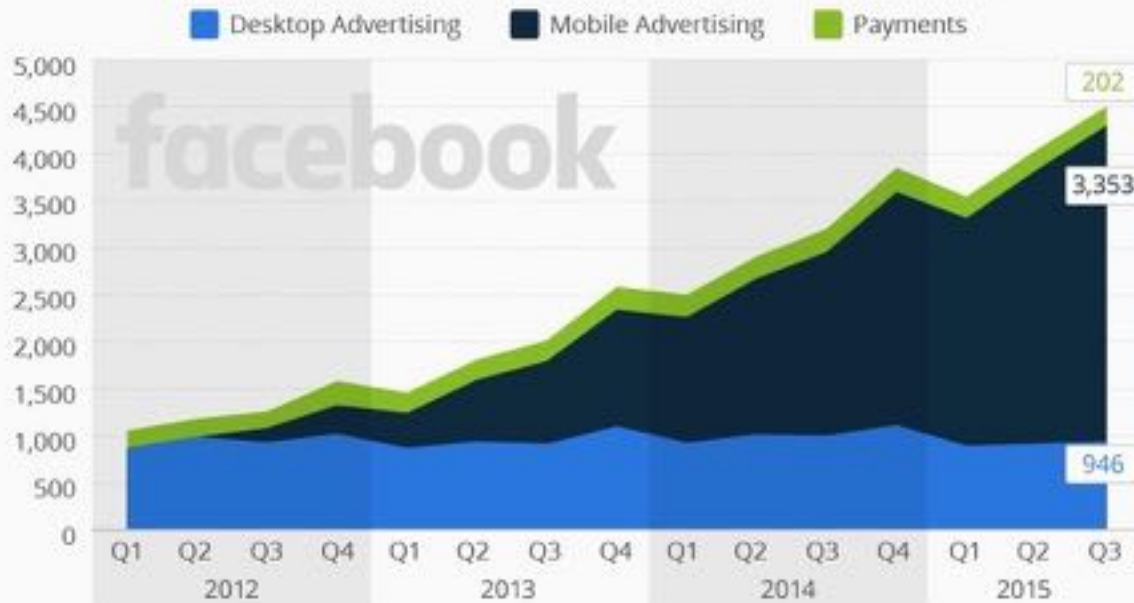
## Facebook Needs a Mobile Business Model Now

Christopher Versace, Contributor

forbes.com, 2012

## Facebook's Growth Is Entirely Fueled by Mobile Ads

Facebook's quarterly revenue broken down by segment (in million U.S. dollars)



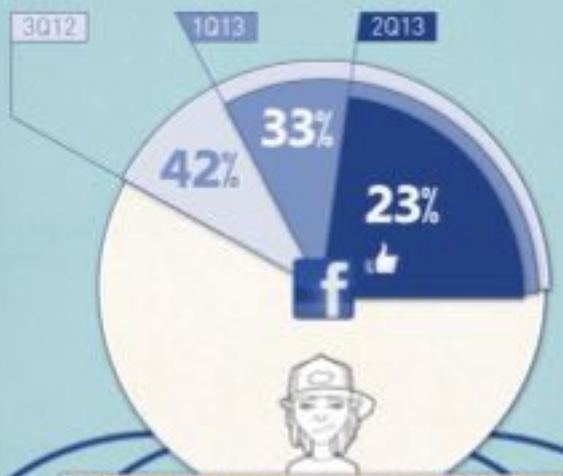
© StatistaCharts Source: Facebook

statista



# where have all the teenagers gone?

Percent of teens who claimed facebook as their most important social network.



Teens are leaving facebook for other services.



Facebook still has the most active users, but percentage-wise users are getting older which could hurt facebook in the future.

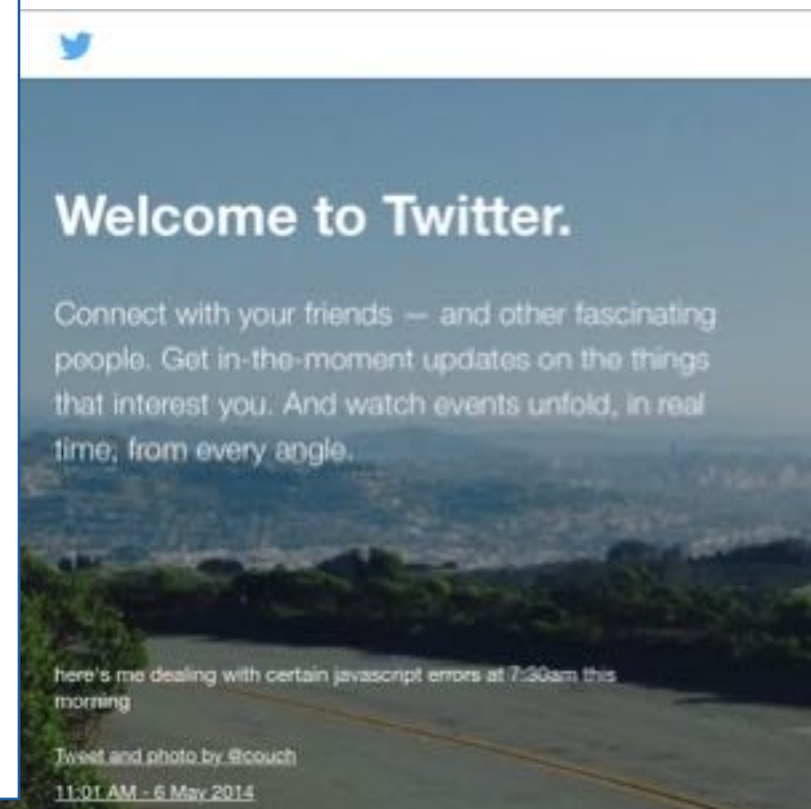
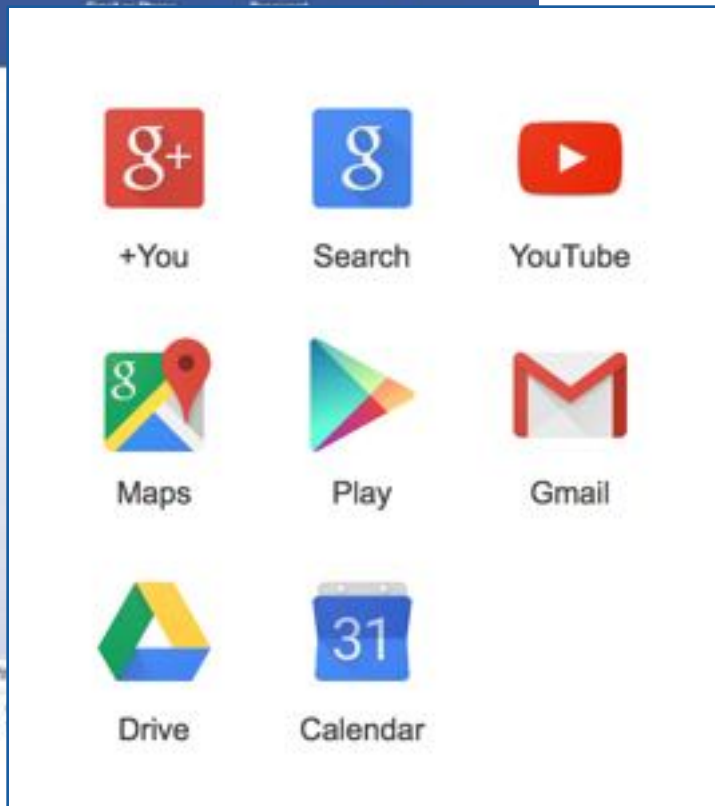
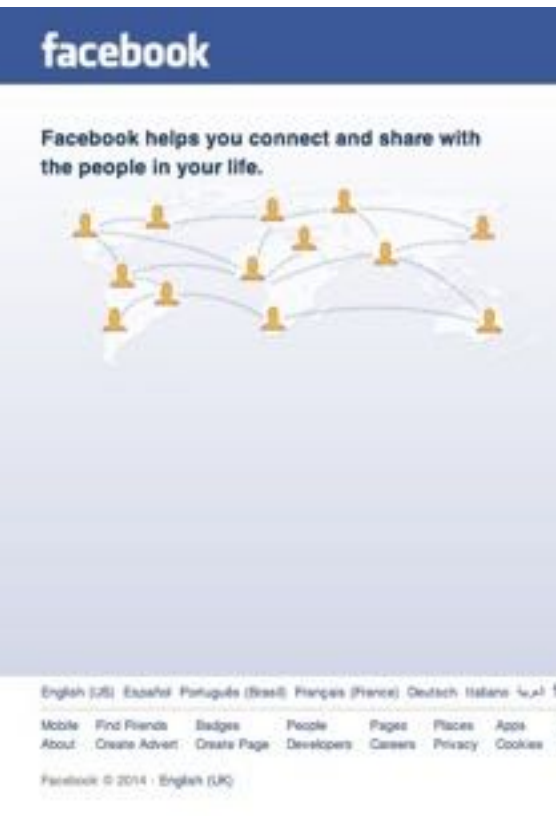
# why are they leaving facebook?

- "There's, like, so many adults and stuff."
- "The content is, like, way too long. You know, like, I have a short attention span and stuff."
- "It, like, totally doesn't have the features I like and stuff."
- "Oh my God, stuff could, like, totally spread forever and it could, like, so come back and haunt me, like, when I apply for college or a job and stuff."
- "Like, my friends are leaving and stuff."

<http://www.financedegreecenter.com/facebook/>  
 Based on other sources, e.g.  
<http://www.pewinternet.org/2013/05/21/teens-social-media-and-privacy/>

# Social Networks, Third Generation

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

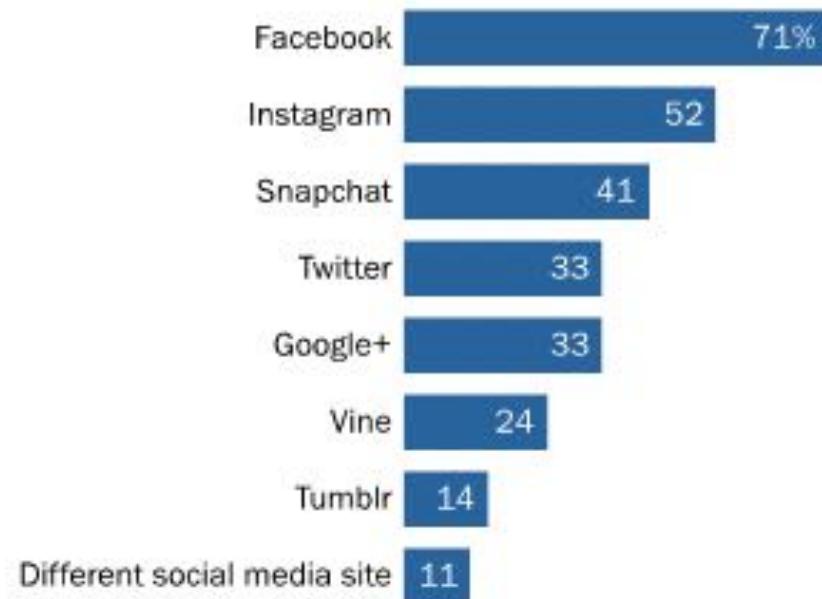




# Usage of Social Networks by US Teens

## Facebook, Instagram and Snapchat Top Social Media Platforms for Teens

% of all teens 13 to 17 who use ...

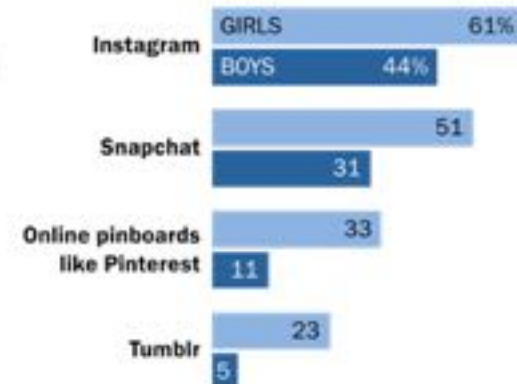


Source: Pew Research Center's Teens Relationships Survey, Sept. 25-Oct. 9, 2014 and Feb. 10-Mar. 16, 2015. (n=1,060 teens ages 13 to 17).

PEW RESEARCH CENTER

## Girls Dominate Visually-Oriented Social Media Platforms

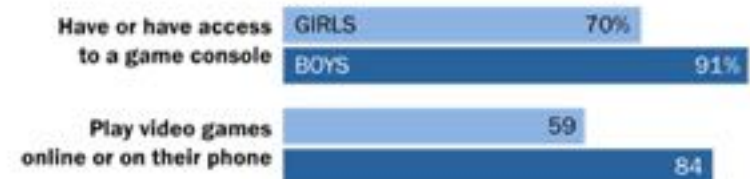
Percent of girls and boys who use ...



## Boys Are More Likely to Play Video Games



Percent of girls and boys who ...



Source: Pew Research Center's Teens Relationships Survey, Sept. 25-Oct. 9, 2014 and Feb. 10-Mar. 16, 2015. (n=1,060 teens ages 13 to 17).

PEW RESEARCH CENTER

# Social Networks, Fourth Generation?

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



## FEATURES

Voice Chat

Group Chat

Moments

Free Call

Video Call

Sticker Gallery

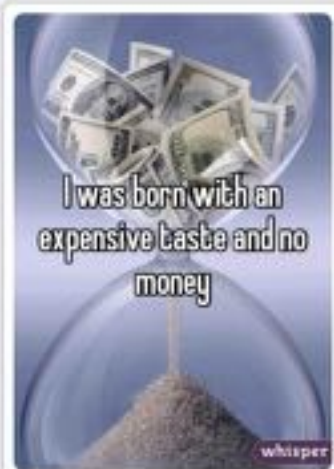
Broadcast Messages

Friend Radar



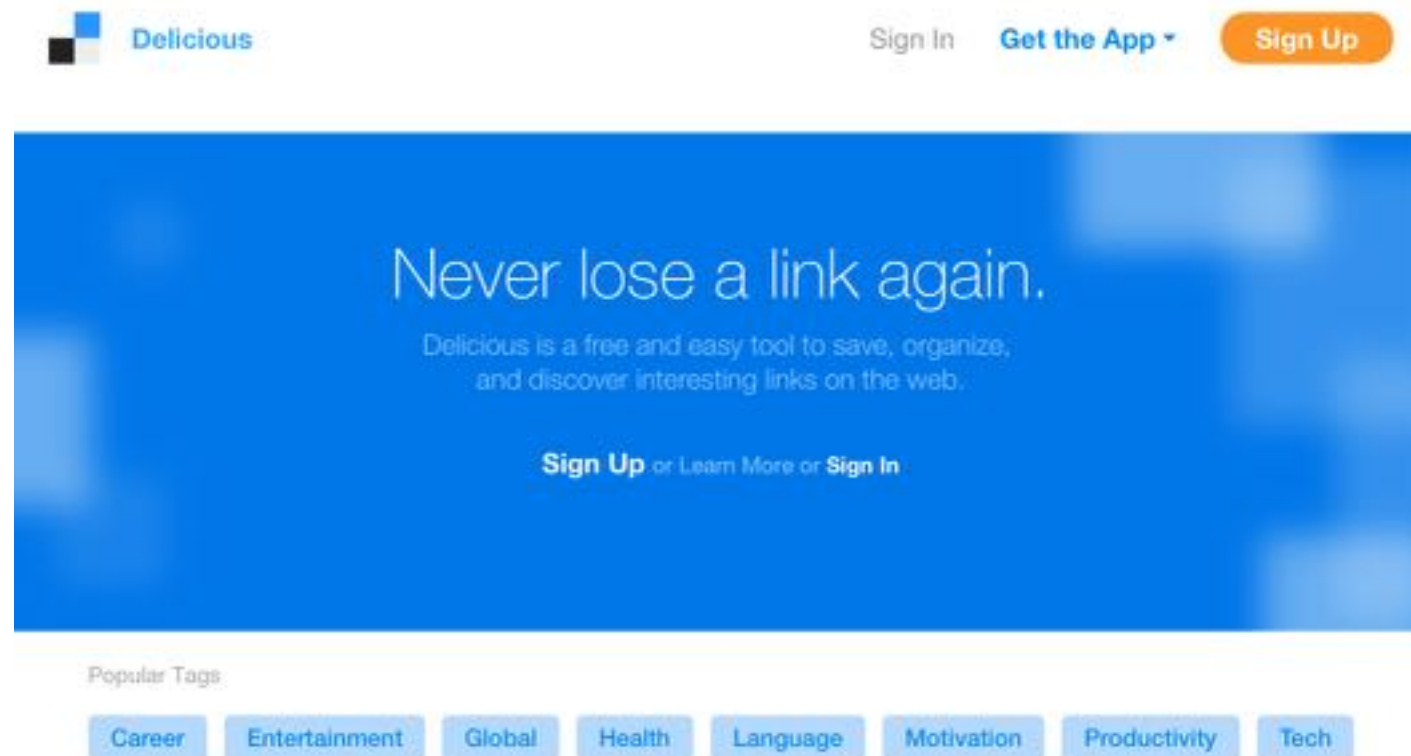
Popular LOL Confessions Relationships OMG Military Fa

## 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

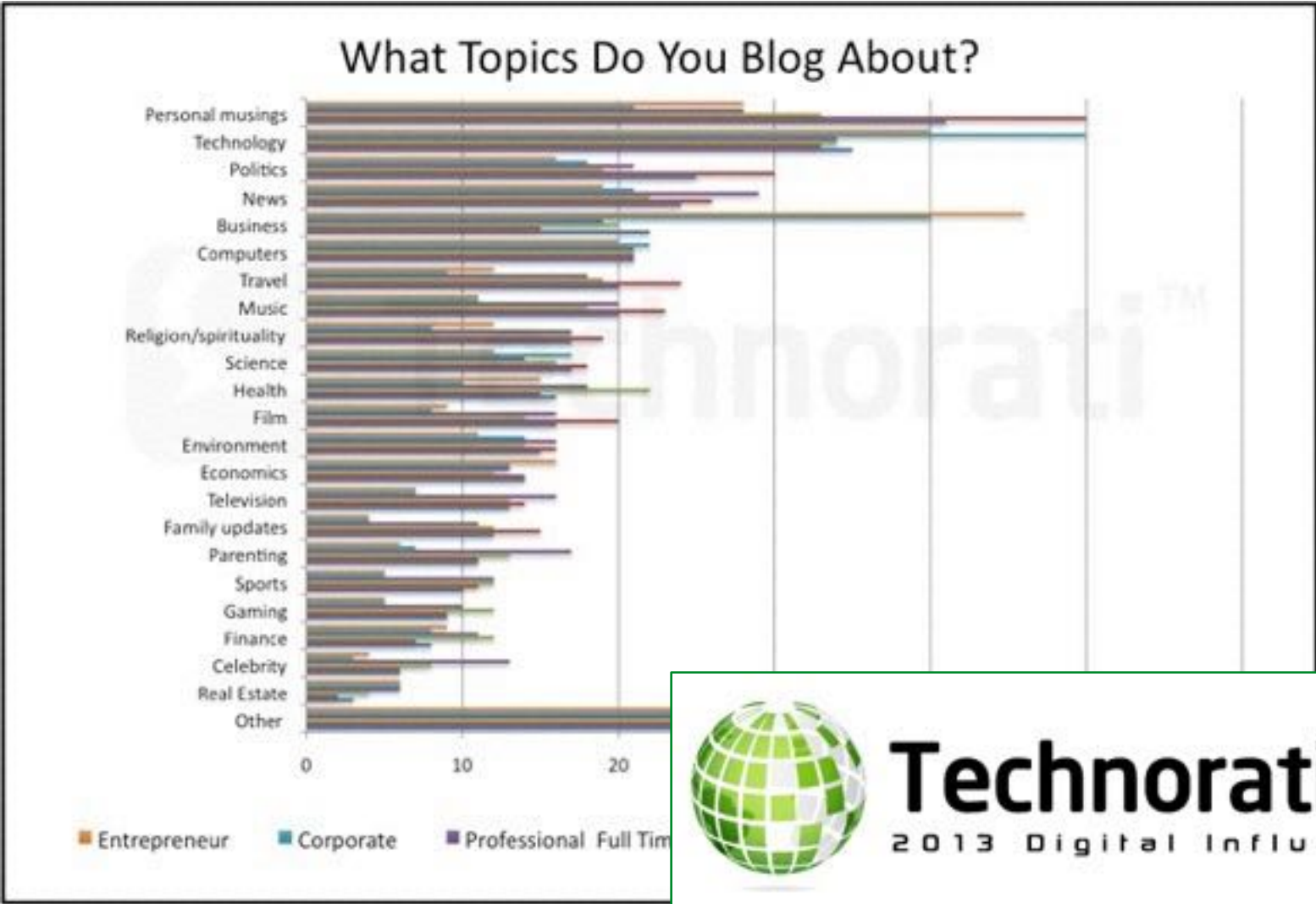


# Blog Search

- 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)



# Diversity of Blog Topics



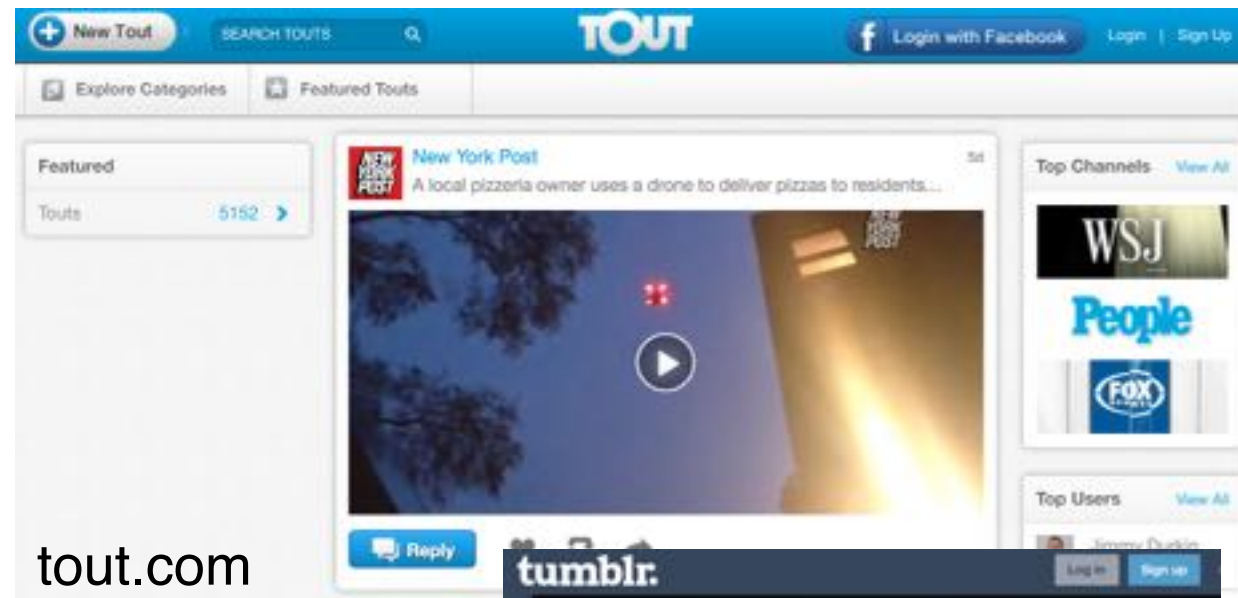
Technorati.com State of the Blogosphere 2011 (last edn.)



April 2005: Term "tumblelog"

# 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



tout.com



# Real Time Media

- ***Everything in the world is now real time on the Web.***
- 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

twitter Home Profile Friends

**New! Lists.** A great way to organize the people you follow and discover new and interesting accounts. (BETA)


Lists are timelines you build yourself, consisting of friends, family, co-workers, sports teams, you name it.


Create a new list Close


What are you doing? 140


Latest: Working on a Web 2.0 lecture about 3 hours ago update

Real-time results for #unibrennt Imu Save this search

 yannerl "Sind Sie jetzt hier zum Besetzen oder wollen Sie die Vorlesung hören?" #unibrennt #mucbrennt #LMU about 2 hours ago from Tweet

 fadenb Gerade hitzige Diskussion im Audimax der #LMU über Sinn von Studiengebühren. Einige verstehen Redner(innen)listenkonzept nicht! #unibrennt about 2 hours ago from Twitterfall

 Isarnixe RT @muenchenblogger Sportfreunde Stiller im Audimax <http://tinyurl.com/ya92r4n> #unsereuni #unibrennt #Imu #Bildungsstreik #europabrennt about 2 hours ago from web

 OOZE Sportfreunde Stiller spontan im Audimax #LMU #unibrennt Livestream: <http://www.ustream.tv/channel/audimax-lmu-muenchen-plenum> about 12 hours ago from Tweetie

2009/10

# 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 advertisements 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 'HUNG HOM'. To the right of the map is a Facebook advertisement with the text 'Add a location to your posts' and a list of 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 a Waze advertisement with the text 'waze OUTSMARTING TRAFFIC, TOGETHER.' To the right of the Waze ad is a Foursquare advertisement with the text 'foursquare DISCOVER WHAT'S NEARBY' and a paragraph: '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'. Below the Foursquare ad are two smartphone screens displaying the Foursquare app interface. At the bottom left is an advertisement for 'MapsWithMe Pro, Offline Karten' by MapsWithMe, featuring a green map icon with a red pin and a star rating of (247).



## 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

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 - hmmm lecker! - Joachim B.

You and 8 friends have been here

Save Like

## Cafe Flower

Amalienstraße 33  
Other - Food



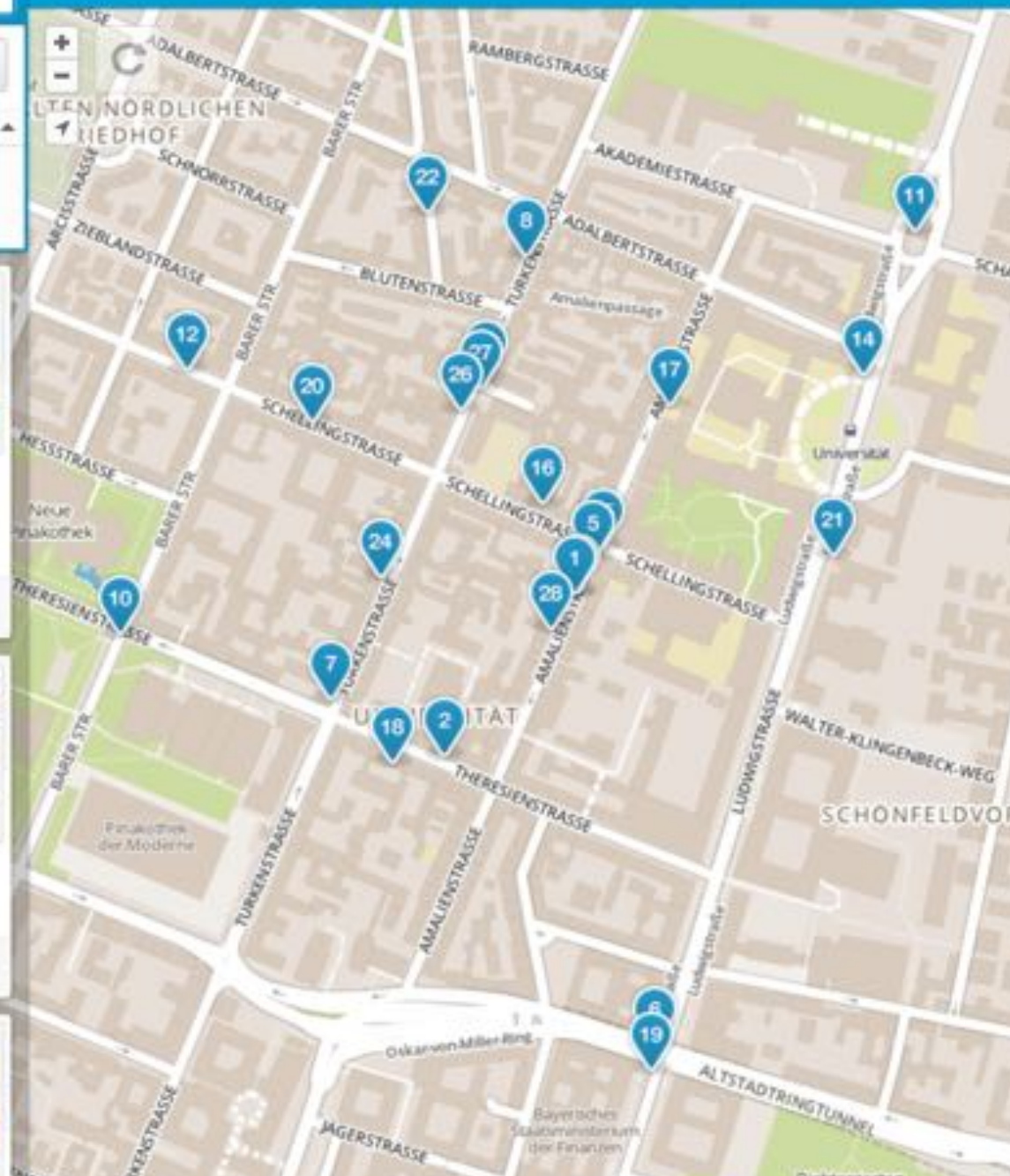
Der Koch/Besitzer des Soul Kitchen ist nun hier zu finden. Wer es schon vermisst hat, nichts wie ab ins Cafe Flower!!! - Alexander D.

A new spot in the neighborhood

Save Like

## Zum Koreaner

7.7  
Amalienstr. 51  
Korean · 1 here now



# Podcasting



The screenshot shows the website 'Die Bundeskanzlerin' (The Federal Chancellor's Office). The top navigation bar includes 'START', 'AKTUELL', 'ANGELA MERKEL', 'KANZLERAMT', and 'UNTERWEGS'. The main content area is titled 'PODCASTS' and displays 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'. The left sidebar contains a menu with categories like 'Artikel', 'Mediathek', 'Reden', 'Interviews und Beiträge', 'Pressemitteilungen', 'Pressekonferenzen', 'Podcasts', and 'Archiv'.

- “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. The main headline reads "Athen brennt 3 Tote" (Athens burns 3 dead). Below the headline, there are sub-headlines: "Massen-Demo außer Kontrolle" (Mass demo out of control) and "Wütender Mob zündet Banken an" (Furious mob sets banks on fire). A yellow banner indicates "BILD.de-Reporter berichtet LIVE" (BILD.de reporter reports LIVE). The website's navigation bar includes categories like NEWS, POLITIK, UNTERHALTUNG, SPORT, BUNDESLIGA, LIFESTYLE, RATGEBER, AUTO, DIGITAL, SPIELE, and REGIONAL. A search bar is visible at the top right. On the right side of the page, there is a large advertisement for EDEKA, featuring the text "Jetzt mitbrutzeln und heiße Preise gewinnen!" (Now grab and win hot prices!) and "Wir lieben Lebensmittel." (We love food.). The advertisement is partially obscured by a large, crumpled white paper graphic with the text "Mit Liebe geschenkt." (Gifted with love.) and "222 Einkäufe." (222 purchases.).

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

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Literature:

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

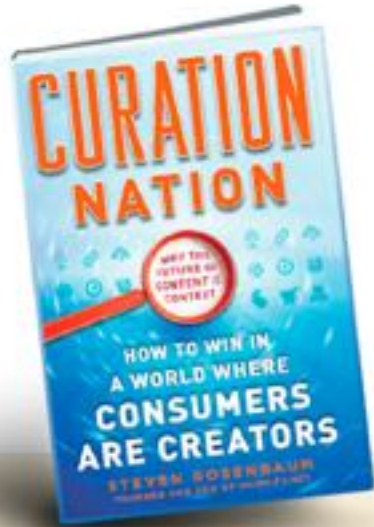
# Content Aggregation, Indexing, Curation

- 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

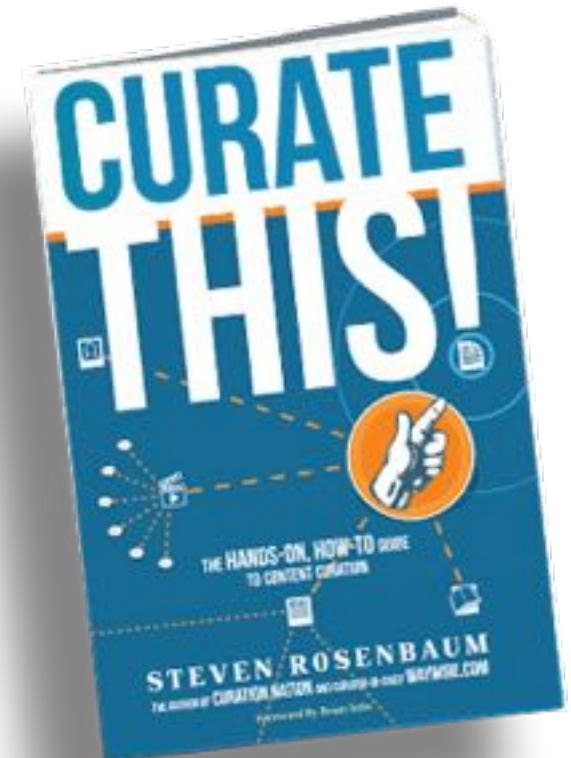
amazon.com



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



# News Curation Tools and Services: Examples



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

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



# Video Curation and Aggregation: Example



waywire.com  
ENTERPRISE

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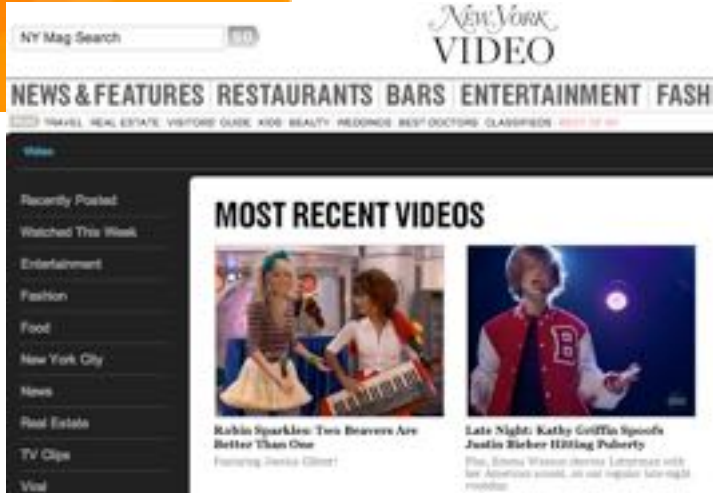


How Curation and Monetization Works in the World of Web Video

VIDEO.  
DON'T SWEAT IT.  
CURATE IT.  
(It's better.)

The banner features a central graphic of a video player window with a play button and a bar chart below it, set against an orange background.

[enterprise.waywire.com](http://enterprise.waywire.com)



NY Mag Search

New York VIDEO

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**Robin Sparkles: Two Beavers Are Better Than One**  
Featuring Jessica Climent

**Late Night: Kathy Griffin Spoofs Justin Bieber Hiding Puberty**  
Plus, Selena Gomez covers Labyrinth with her Apesauce record. All and regular late-night replays.

The screenshot shows a dark-themed interface with a search bar, navigation menu, and a grid of video thumbnails with titles and descriptions.

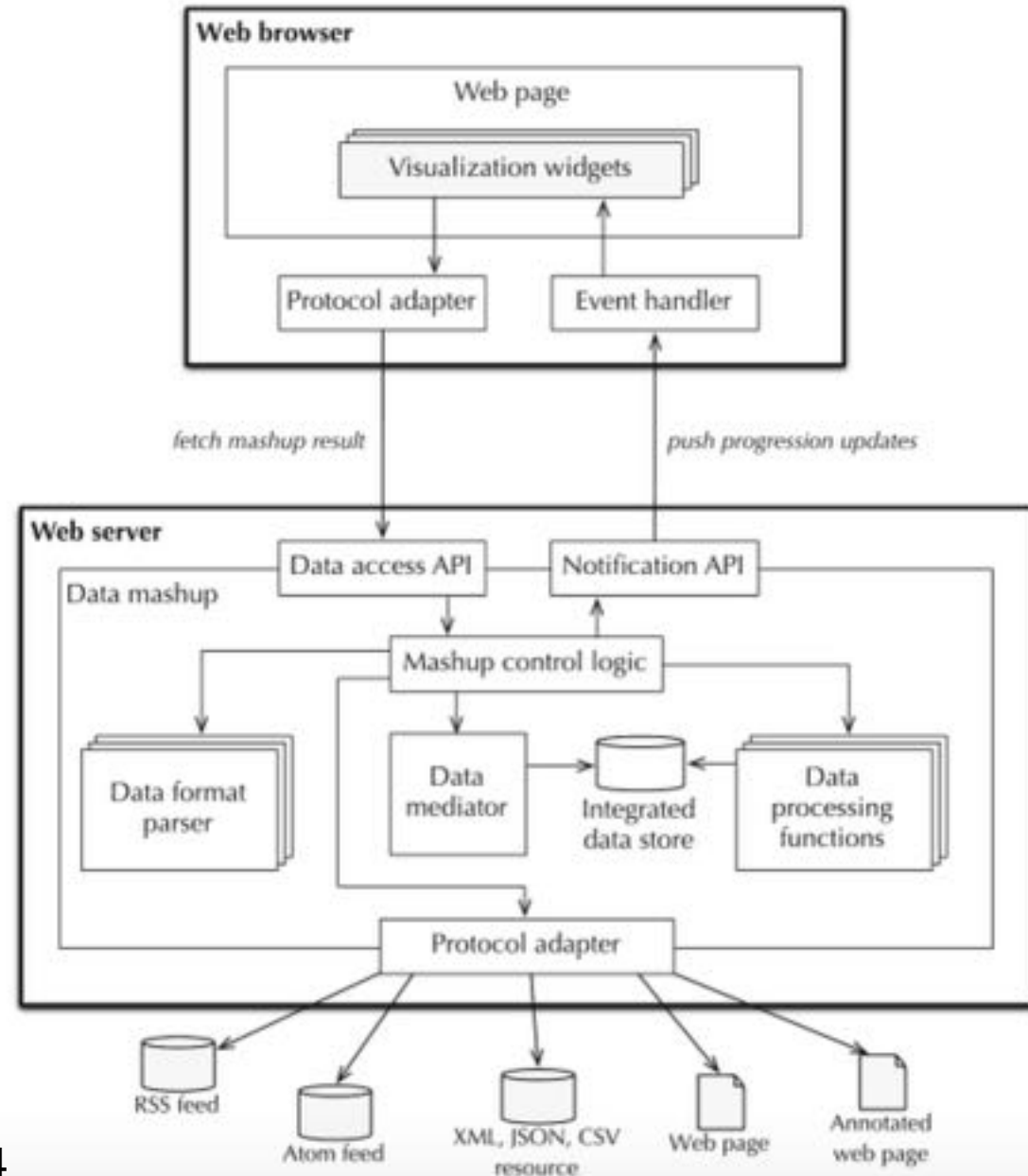
[videos.nymag.com](http://videos.nymag.com)

# Mashup

- *Mashup*: Web application that uses content from more than one source to create a single new service displayed in a single graphical interface.  
([https://en.wikipedia.org/w/index.php?title=Mashup\\_\(web\\_application\\_hybrid\)&oldid=692257036](https://en.wikipedia.org/w/index.php?title=Mashup_(web_application_hybrid)&oldid=692257036))
- Architectural components:
  - Presentation (new layout or based on existing Web presentation)
  - Mashup logic (Application program interface (API) to Web services)
  - Data transfer and integration
- Basic alternatives:
  - Client-side mashup
  - Server-side mashup
- Various technologies for transmission/invocation:
  - REST
  - SOAP
  - XML-RPC

F. Daniel, M. Matera:  
Mashups - Concepts, models,  
and architectures, Springer  
2014

# Server-Side Mashup Architecture



Source: Daniel/Matera 2014

# World of Web

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



Filter APIs


 Include Deprecated APIs

API Name	Description	Category	Date
<a href="#">Google Maps</a>	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
<a href="#">Twitter</a>	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
<a href="#">YouTube</a>	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.setContentType](#)
- [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

# 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](http://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"><li>• <a href="#">flickr api (docs)</a></li><li>• <a href="#">Flashr</a></li><li>• <a href="#">Flickr API Interfaces REST</a></li><li>• <a href="#">as3 flickr lib</a></li></ul>
C	<ul style="list-style-type: none"><li>• <a href="#">Flickrurl</a></li></ul>
Cold Fusion	<ul style="list-style-type: none"><li>• <a href="#">CFlickr</a></li></ul>
Common Lisp	<ul style="list-style-type: none"><li>• <a href="#">Clickr</a></li></ul>
cUrl	<ul style="list-style-type: none"><li>• <a href="#">Curlr</a></li></ul>
Delphi	<ul style="list-style-type: none"><li>• <a href="#">dFlickr</a></li></ul>
Java	<ul style="list-style-type: none"><li>• <a href="#">flickrj</a></li><li>• <a href="#">lickr</a></li></ul>
.NET	<ul style="list-style-type: none"><li>• <a href="#">Flickr.NET</a></li></ul>
Objective-C	<ul style="list-style-type: none"><li>• <a href="#">ObjectiveFlickr</a></li></ul>
Perl	<ul style="list-style-type: none"><li>• <a href="#">Flickr:API 0.03</a></li><li>• <a href="#">Flickr:Upload 1.06</a></li></ul>
PHP	<ul style="list-style-type: none"><li>• <a href="#">PEAR::Flickr_API</a></li><li>• <a href="#">phpFlickr</a></li></ul>
PHP5	<ul style="list-style-type: none"><li>• <a href="#">Phlickr</a></li></ul>
Python	<ul style="list-style-type: none"><li>• <a href="#">Beel's Python Flickr API</a></li><li>• <a href="#">flickr.py</a></li></ul>

# 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



**Yahoo Pipes:** Pipes creation will not be supported as of Aug. 30 this year. Pipes infrastructure will run until Sept. 30, 2015 in read-only mode to help developers migrate their data. Please visit <http://pipes.yahoo.com/pipes> for additional details.

heise.de

# 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)`
- Using location in Google Maps:
  - `navigator.geolocation.getCurrentPosition(showMap);`
  - ```
function showMap(position) {  
    var latlon = position.coords.latitude + "," +  
                position.coords.longitude;  
    var img_url = "http://maps.googleapis.com/maps/api/  
staticmap?center=  
"+latlon+"&zoom=14&size=400x300&sensor=false";  
    ...  
}
```

Example code based on [w3schools.org](http://w3schools.org)

# 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.com

Email  Password  LET'S GO! More ways to login

I've forgotten my password

## A STRANGE PLACE WITH AWESOME PEOPLE

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[HOME](#) [COMMUNITY](#) [HABBOMALL](#) [PLAYING HABBO](#)

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Nov 23, 2015 | Campaigns, Furni, Special Offers

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[SAFETY TIP](#)

# Second Life



Images: Wikipedia

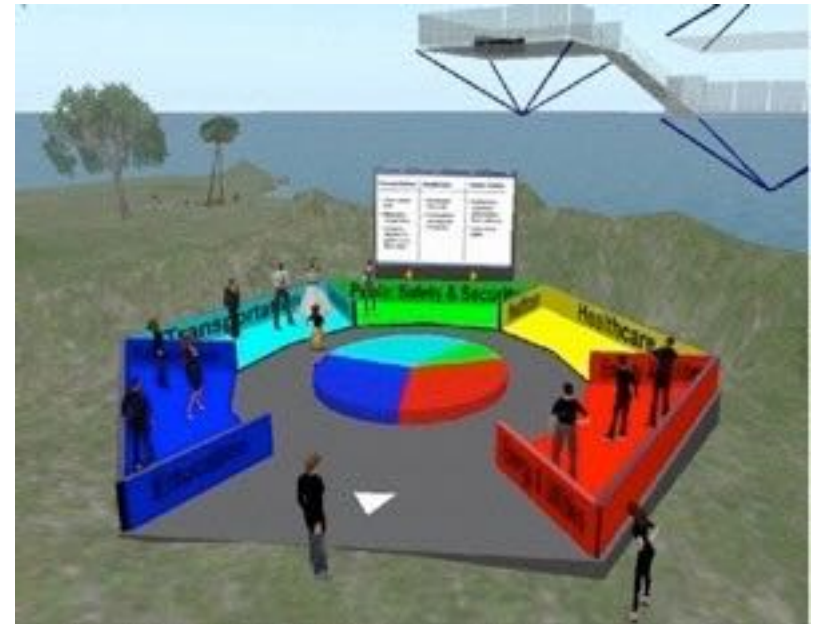


# Second Life and Business

- 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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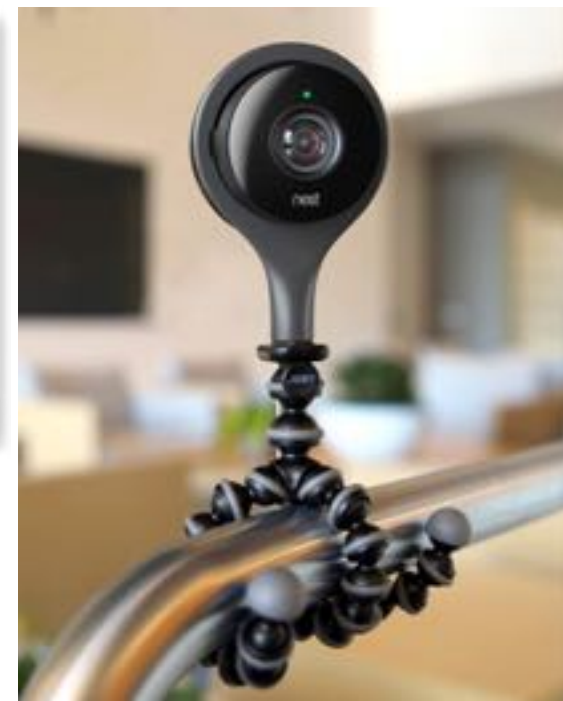
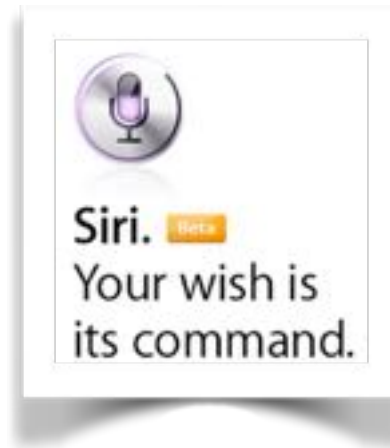
5.5 Web of Data and Things

Literature:

T. O'Reilly, J. Battelle: Web Squared: Web 2.0 Five Years On, 2009  
([http://assets.en.oreilly.com/1/event/28/web2009\\_websquared-whitepaper.pdf](http://assets.en.oreilly.com/1/event/28/web2009_websquared-whitepaper.pdf))

# Web 2.0 Five Years On: Web Squared

- Smartphones and wearables:
  - Collective intelligence
  - Driven by sensors
  - Talking to the Web (OK Google, Siri, Cortana)
  - Information shadows, Internet of Things: Web meets World
  - Geo-tagging of pictures (GPS + camera)
  - Face recognition in photo archive
  - Object recognition via smartphone
- How does the Web learn?
  - Key competency of the Web 2.0 era: Discovering *implied metadata*
  - *Mapping from unstructured data to structured data sets* will be a key Web Squared competency.
- Real-time: Web as Collective Mind



nest home cam

august smart lock



Picture: slashgear

# Sir Timothy John Berners-Lee, Again



Linked Data

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