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:

Meet Sir Timothy John Berners-Lee

https://www.youtube.com/watch?v=OM6XIIICm_qo 2009
The Key Idea of the Web

  “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"?

- 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

Web 0.5, 1.0, 1.5 are *retronyms!*
Web 2.0 Meme Map

- Flickr, del.icio.us: Tagging, not taxonomy
- PageRank, eBay reputation, Amazon reviews: user as contributor
- Blogs: Participation, Not publishing
- BitTorrent: Radical Decentralization
- Gmail, Google Maps and AJAX: Rich User Experiences
- Google AdSense: customer self-service enabling the long tail
- Wikipedia: Radical Trust

**Strategic Positioning:**
- The Web as Platform

**User Positioning:**
- You control your own data

**Core Competencies:**
- Services, not packaged software
- Architecture of Participation
- Cost-effective scalability
- Remixable data source and data transformations
- Software above the level of a single device
- Harnessing collective intelligence

- "An attitude, not a technology"
- The Long Tail
- Data as the "Intel Inside"
- The perpetual beta
- Software that gets better the more people use it
- Play
- Rich User Experience
- Trust your users
- Small Pieces Loosely Joined (web as components)
- Hackability
- The Right to Remix "Some rights reserved"
- Emergent: User behavior not predetermined
- Granular Addressability of content

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

<table>
<thead>
<tr>
<th>Web 1.0</th>
<th>Web 2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoubleClick</td>
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<td>Akamai</td>
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<td>Content management</td>
<td>Wikis</td>
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<td>Taxonomy</td>
<td>Folksonomy</td>
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</tbody>
</table>
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!

Internet-Protest gegen Online-Überwachung

Buch von Angelika Fleckinger 2011
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

Hana S. Noor Al-Deen, John Allen Hendricks (eds.):
Social Media -Usage and Impact, Lexington Books 2012
Social Networks, First Generation

- **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
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
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

Example: facebook.com (2)

User demographics for Germany 2013 (socialbakers.com)
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
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 (%)

Source: Piper Jaffray

Piper Jaffray research: 7,200 US students
Social Networks, Fourth Generation?

- Mobile device centered
- Real-time
- Media-Rich
- Anonymous
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.)
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
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
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)
Die Pommes sind wirklich extrem lecker. Sehr interessant sind zudem die reiche Auswahl an verschiedenen Dip-Möglichkeiten. Gerne wieder - hmm lecker! - Joachim B.

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

• “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
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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)

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

curationnation.org
Content Indexing + Automatic Filtering: Examples

[Image of Google News with search results for the Beatles Abbots Road leads to top 20 on iTunes]

[Image of the Harry Potter Automatic News Aggregator website]

hpana.com
News Curation Tools and Services: Examples

newscred.com

Your Creative Newsroom

newscrowler.com

The Future of Search
Curated Content. All at your fingertips.
Video Curation and Aggregation: Example

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.
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

Filter APIs

By Category  By Protocols_Formats

Include Deprecated APIs

<table>
<thead>
<tr>
<th>API Name</th>
<th>Description</th>
<th>Category</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Maps</td>
<td>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...</td>
<td>Mapping</td>
<td>12.05.2005</td>
</tr>
<tr>
<td>Twitter</td>
<td>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...</td>
<td>Social</td>
<td>12.08.2006</td>
</tr>
<tr>
<td>YouTube</td>
<td>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...</td>
<td>Video</td>
<td>02.08.2006</td>
</tr>
</tbody>
</table>
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 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.
REST (Representational State Transfer)

• REST: One method to call a Web Service API

• History:

• 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:

```xml
<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:
    ```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:
      ```php
      people_findByUsername(), getPhotos()
      ```

Selected(!) API Kits for Flickr
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
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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
Second Life

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
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Literature:
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

https://www.youtube.com/watch?v=OM6XIICm_qo