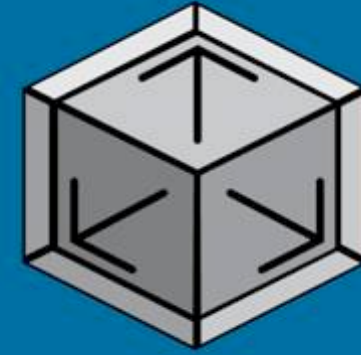


TheServerSide JAVA SYMPOSIUM



EVERYTHING YOU EVER WANTED TO
KNOW ABOUT ONLINE VIDEO

Matt Raible

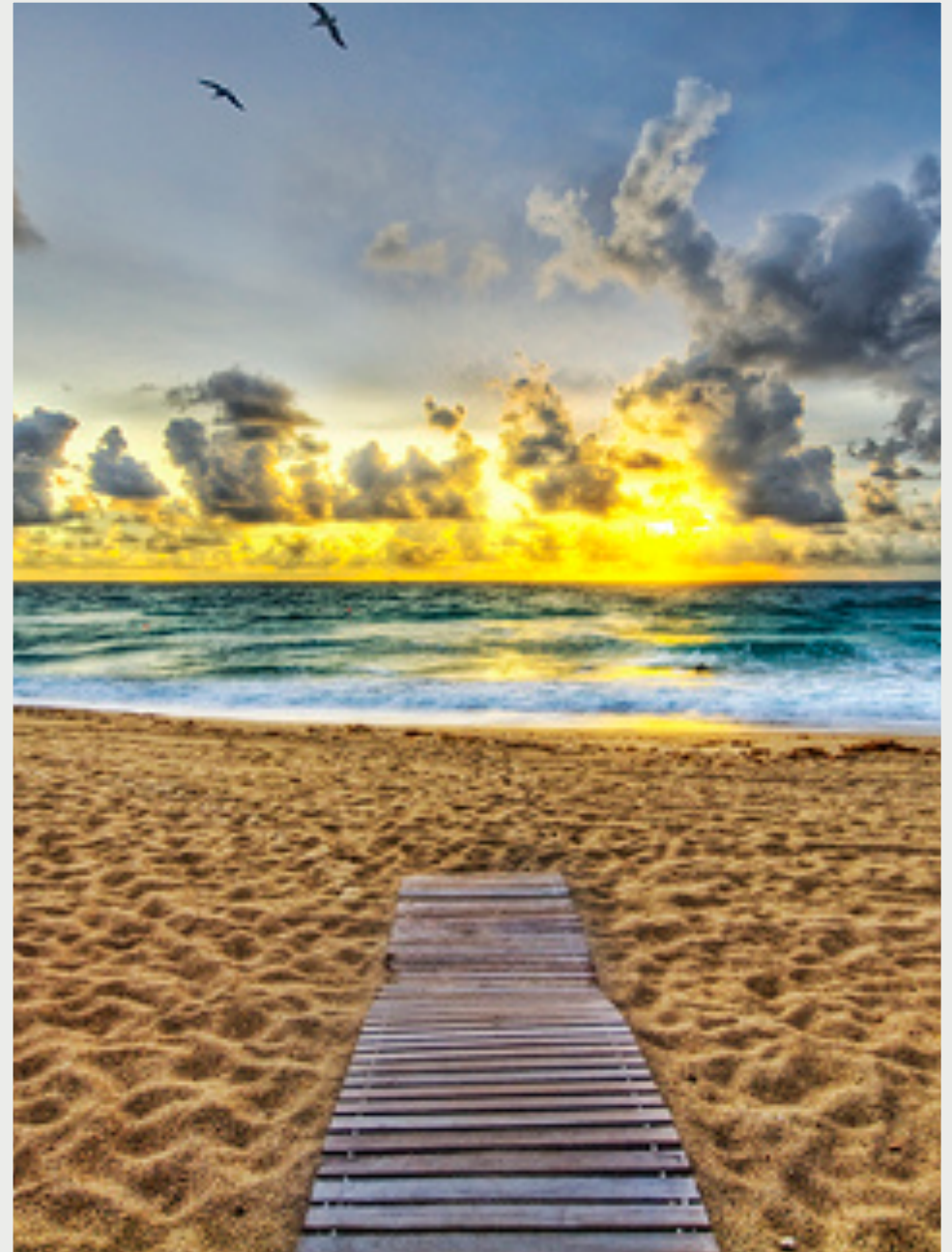
<http://raibledesigns.com>

Images by Stuck in Customs - <http://www.flickr.com/photos/stuckincustoms>

© 2010 Raible Designs

INTRODUCTIONS

- Do you watch video online?
- Do you have cable or satellite?
- Netflix Subscriber?
- Do you think online video will replace cable / satellite?



Blogger on raibledesigns.com

Father, Skier,
Cyclist

Web Framework Connoisseur

Montana Native

Founder of [AppFuse](http://AppFuse.com)

Who is **Matt Raible**?

SESSION AGENDA

- Online Video History
- Creating Video
- Publishing Video
- A Case Study
- Conclusion
- Q and A



BROADCAST TV

- Broadcast TV is Going The Way of the Dinosaur
- 52 percent of U.S. television viewers watch live broadcast TV compared to online and time-shifting alternatives.
- The younger people are, the less time they spend on live television.
- Two major forces are at work here:
 - The huge growth in video content being made available.
 - The growth in all kinds of devices to deliver that content.

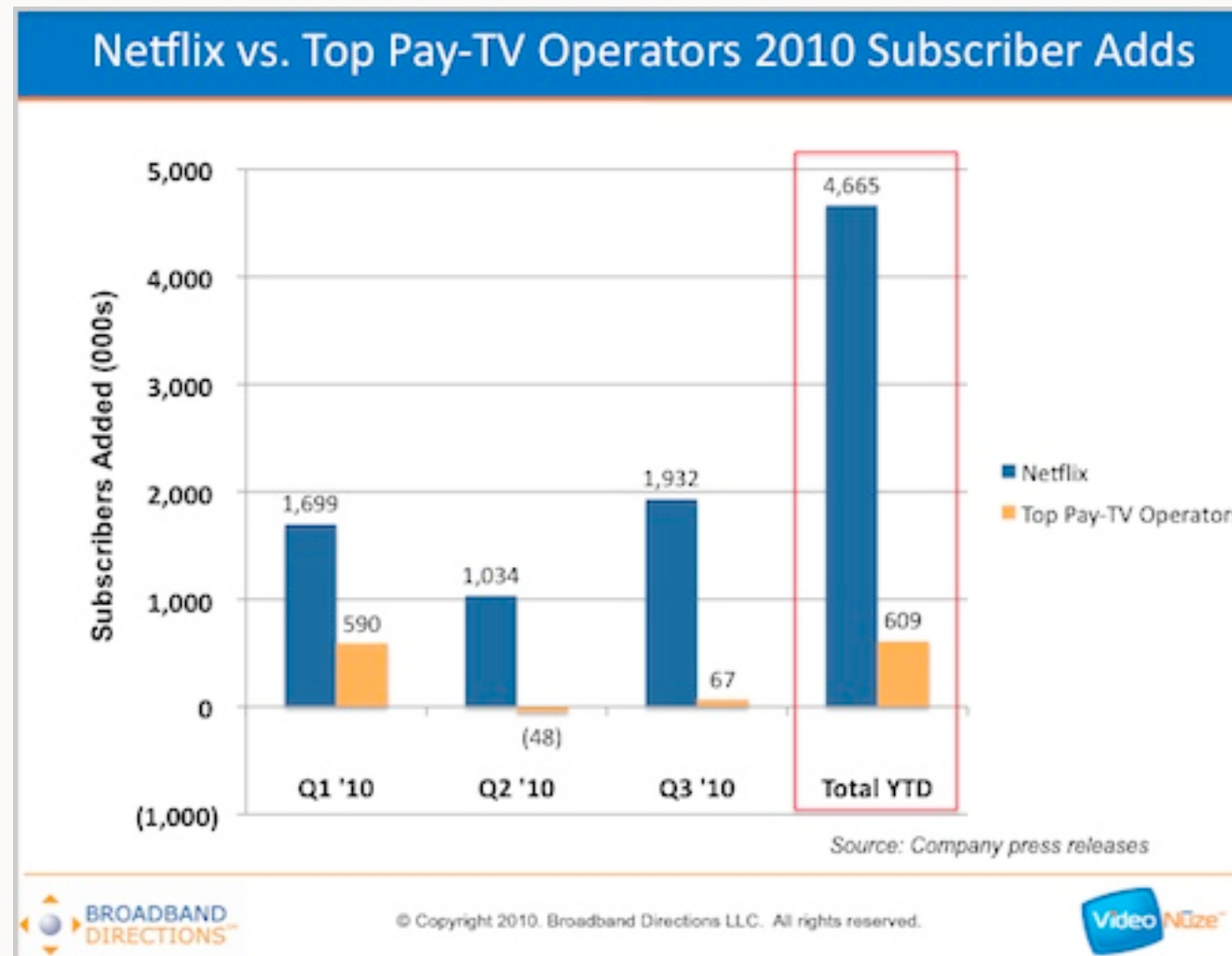
ONLINE LIVE TV

- In the past year, U.S. audiences spent a whopping 648 percent more time watching live television on the Internet.
- The growth in time spent on such sites as YouTube and Hulu is up 68% and 75%, respectively.
- Viewers tend to spend more time watching live TV than non-live TV online.
- Top online live TV providers:
 - USTREAM, Justin.tv and Livestream

HOW PEOPLE WATCH

- Online Video: approximately 70% of global online consumers watch online video.
- Mobile Video: is already used by 11% of global online consumers.
- Tablet PCs: are expanding the definition of mobile video.
- Television: is a universally important platform for video consumption.
- “Over the Top” TV: televisions with Internet connections are gaining interest.

NETFLIX

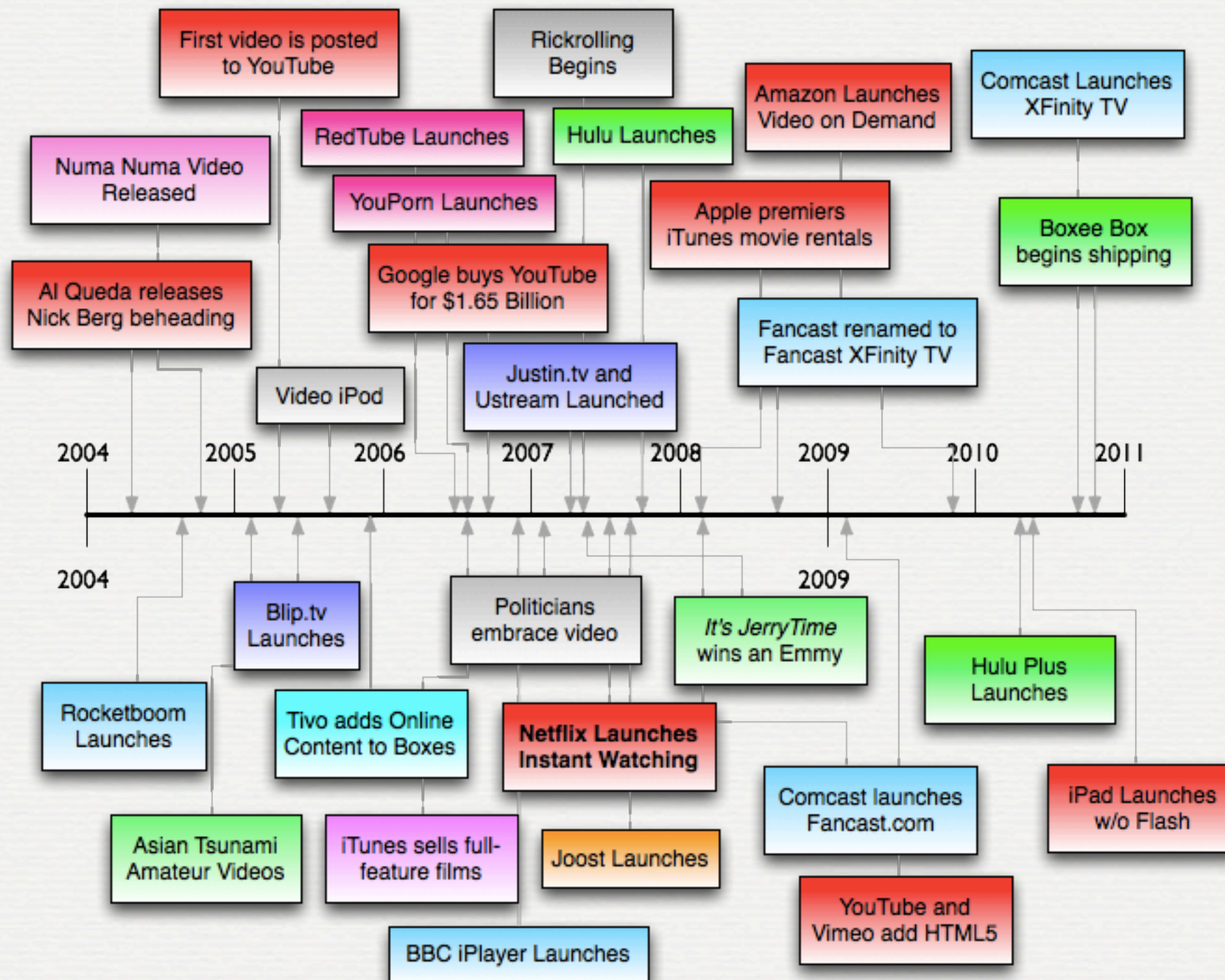


Netflix Has Added 8 Times As Many Subscribers in 2010 As Top Pay-TV Operators, Combined

HISTORY OF ONLINE VIDEO

<http://www.youtube.com/watch?v=jM0lF-LHWqg>

ONLINE VIDEO TIMELINE



CREATING

How does one create video?



TYPES OF PROVIDERS

- Netflix
- Hulu
- XFINITY TV (Comcast)
- ABC, CBS, NBC, Fox
- iTunes
- YouTube



NO, RAW PROVIDERS!

- You
- Networks
- Movie Studios



DO IT YOURSELF

- Just Do It!
- SD or HD?
- Pick a Camera
- Lighting and Content
- Backgrounds
- Camera Settings
- Don't Burn Down your House



VIDEO CONTAINER FORMATS

- MPEG 1 / MPEG 2 - .mpg
- MPEG 4 - .mp4
- QuickTime - .mov
- Flash Video - .flv
- Ogg - .ogv
- WebM - .webm
- Audio Video Interleave - .avi



WATCHING A VIDEO

- Video Player does 3 things at once:
 - Interprets the container format for available tracks and data to decode next.
 - Decodes the video stream and displays images on screen.
 - Decodes the audio stream and sends sound to speakers.

VIDEO CODECS

- Hundreds (~230) of video codecs.
- Most Relevant:
 - H.264
 - Theora
 - VP8



AUDIO CODECS

- Hundreds of audio codecs.
- For the web, only 3:
 - MP3
 - AAC
 - Vorbis



ENCODING PROFILES

- Baseline Profile
 - Video Conferencing and Mobile
- Main Profile
 - Consumer Broadcast
- Extended Profile
 - Streaming Video
- High Profile
 - HD DVD and Blu-ray Discs



BIT RATE AND VIDEO

- 16 kbit/s – videophone quality (minimum necessary for a consumer-acceptable "talking head" picture using various video compression schemes)
- 128 – 384 kbit/s – business-oriented videoconferencing quality using video compression
- 1.15 Mbit/s – VCD quality (using MPEG1 compression)
- 3.5 Mbit/s - Standard-definition television quality (with bit-rate reduction from MPEG-2 compression)
- 9.8 Mbit/s – DVD (using MPEG2 compression)
- 8 to 15 Mbit/s – HDTV quality (with bit-rate reduction from MPEG-4 AVC compression)

BIT RATE AND VIDEO

- 19 Mbit/s approximate - HDV 720p (using MPEG2 compression)
- 24 Mbit/s max - AVCHD (using MPEG4 AVC compression)
- 25 Mbit/s approximate - HDV 1080i (using MPEG2 compression)
- 29.4 Mbit/s max – HD DVD
- 40 Mbit/s max – Blu-ray Disc (using MPEG2, AVC or VC-1 compression)

ENCODING SOFTWARE

- Ogg Video
 - Firefogg
 - ffmpeg2theora
- H.264 Video
 - HandBrake
- WebM
 - ffmpeg 0.6+



ENCODING SOFTWARE

- iMovie
- Final Cut Pro
- Adobe Premiere
- Pinnacle Studio
- After Effects
- Windows Movie Maker



PUBLISHING

How does one publish video?



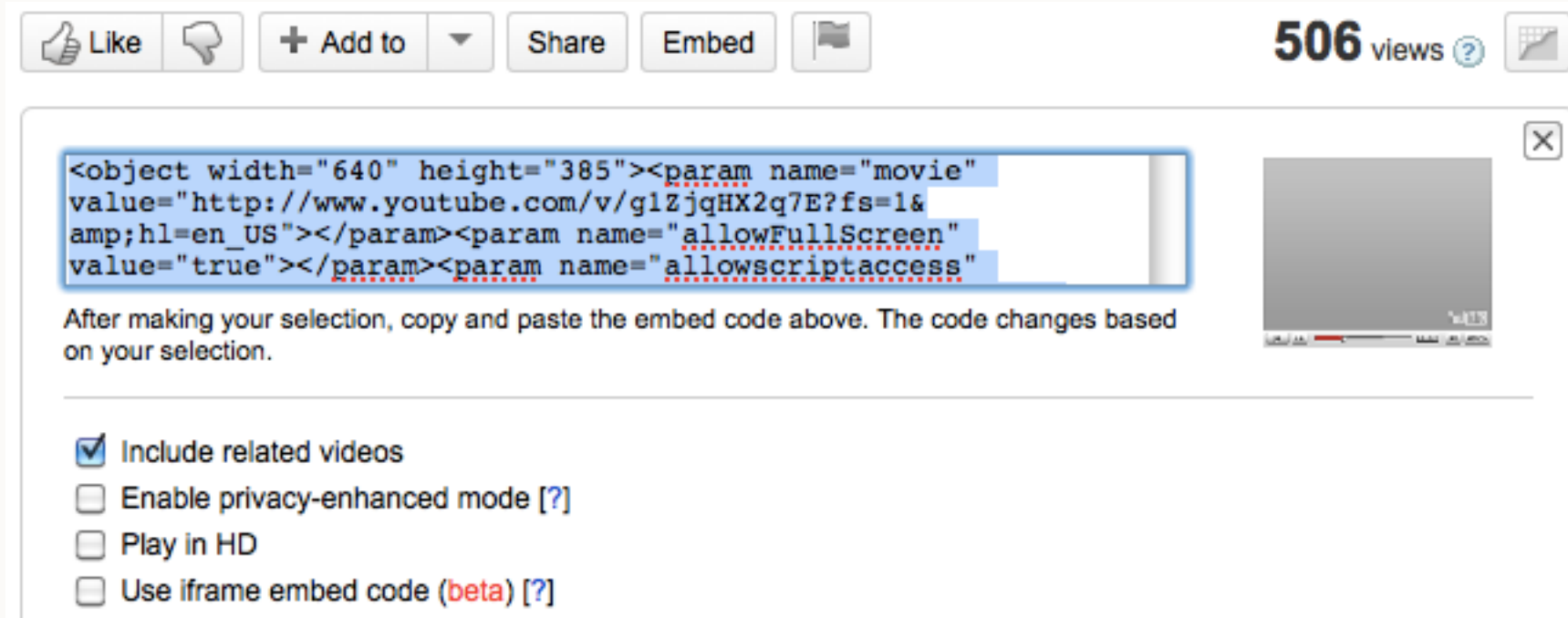
EDIT AND PUBLISH

*Getting Started in Video
Editing and Publishing*

<http://www.youtube.com/watch?v=wEC9JKQVoj0>

YOUTUBE EMBED

- <http://www.youtube.com/watch?v=g1ZjqHX2q7E>
- Click Embed and copy code to your website



The image shows the YouTube video player interface for the video <http://www.youtube.com/watch?v=g1ZjqHX2q7E>. The video has 506 views. The 'Embed' button is selected, and the embed code is displayed in a text box. The code is as follows:

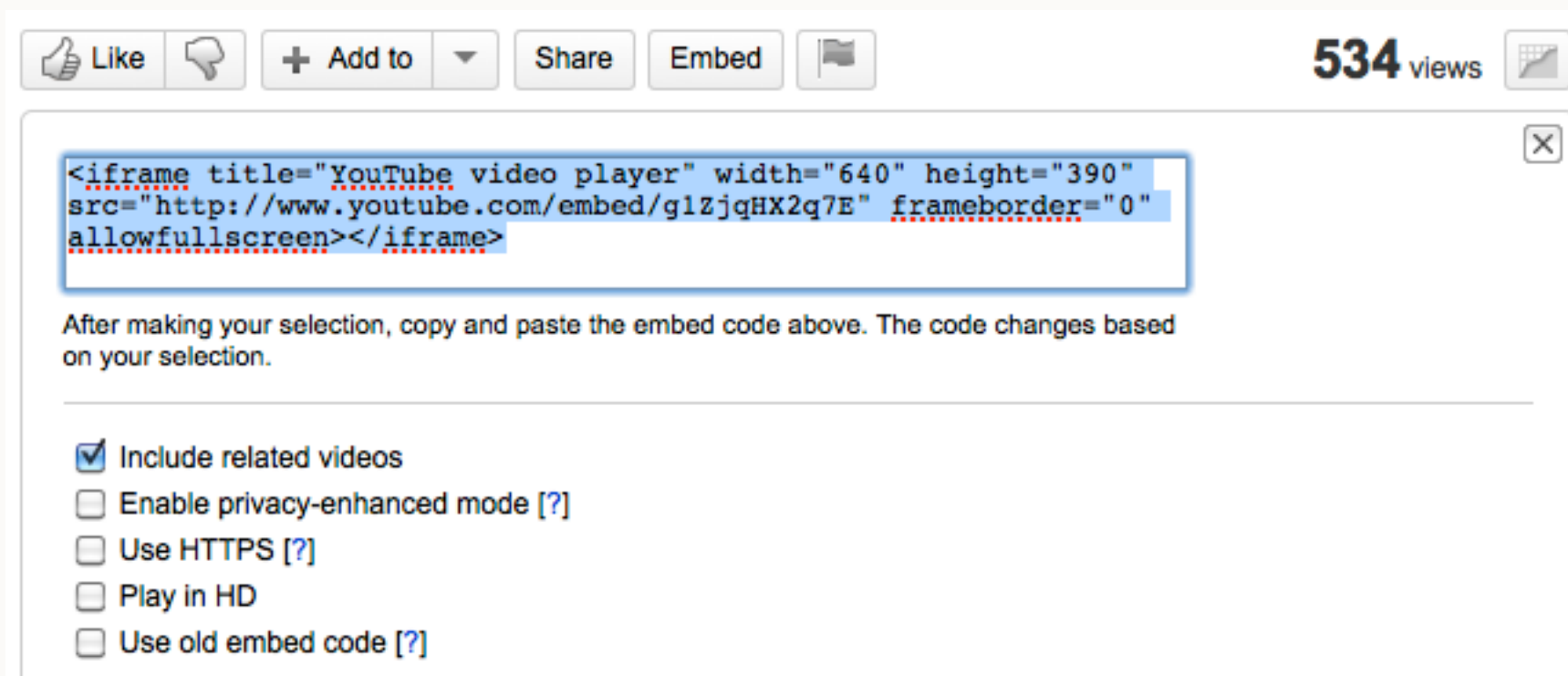
```
<object width="640" height="385"><param name="movie" value="http://www.youtube.com/v/g1ZjqHX2q7E?fs=1&hl=en_US"></param><param name="allowFullScreen" value="true"></param><param name="allowscriptaccess" value="always"></param></object>
```

After making your selection, copy and paste the embed code above. The code changes based on your selection.

- ☒ Include related videos
- ☐ Enable privacy-enhanced mode [?]
- ☐ Play in HD
- ☐ Use `iframe` embed code (beta) [?]

YOUTUBE EMBED

- <http://www.youtube.com/watch?v=g1ZjqHX2q7E>
- *New!* Click Embed and copy **iframe** code



Like Add to Share Embed 534 views

```
<iframe title="YouTube video player" width="640" height="390" src="http://www.youtube.com/embed/g1ZjqHX2q7E" frameborder="0" allowfullscreen></iframe>
```

After making your selection, copy and paste the embed code above. The code changes based on your selection.

- ☒ Include related videos
- ☐ Enable privacy-enhanced mode [?]
- ☐ Use HTTPS [?]
- ☐ Play in HD
- ☐ Use old embed code [?]

YOUTUBE DOWNLOAD

- <http://www.youtube.com/watch?v=g1ZjqHX2q7E>
- Use Firebug or Web Inspector to copy large file URL.
- Paste URL in browser to download .flv.
- Install Perian for QuickTime Player.
- Open .flv, save as .mov then embed in Keynote.



KEYNOTE EMBED EXAMPLE



YOUTUBE'S 50 BEST VIDEOS

<http://bit.ly/youtube-best50-2010>



CHARLIE BIT MY FINGER - AGAIN!

http://www.youtube.com/watch?v=_OBlgSz8sSM



DAVID AFTER DENTIST

<http://www.youtube.com/watch?v=txqiwrbyGrs>



DOUBLE RAINBOW

<http://www.youtube.com/watch?v=OQSNhk5ICTI>



<http://www.youtube.com/watch?v=oHg5SJYRHA0>



WHAT ABOUT COMMERCIAL VIDEO?

OV PLATFORMS

- Content Ingest
- Encoding
- Storage
- Content Management
- Analytics
- Playback



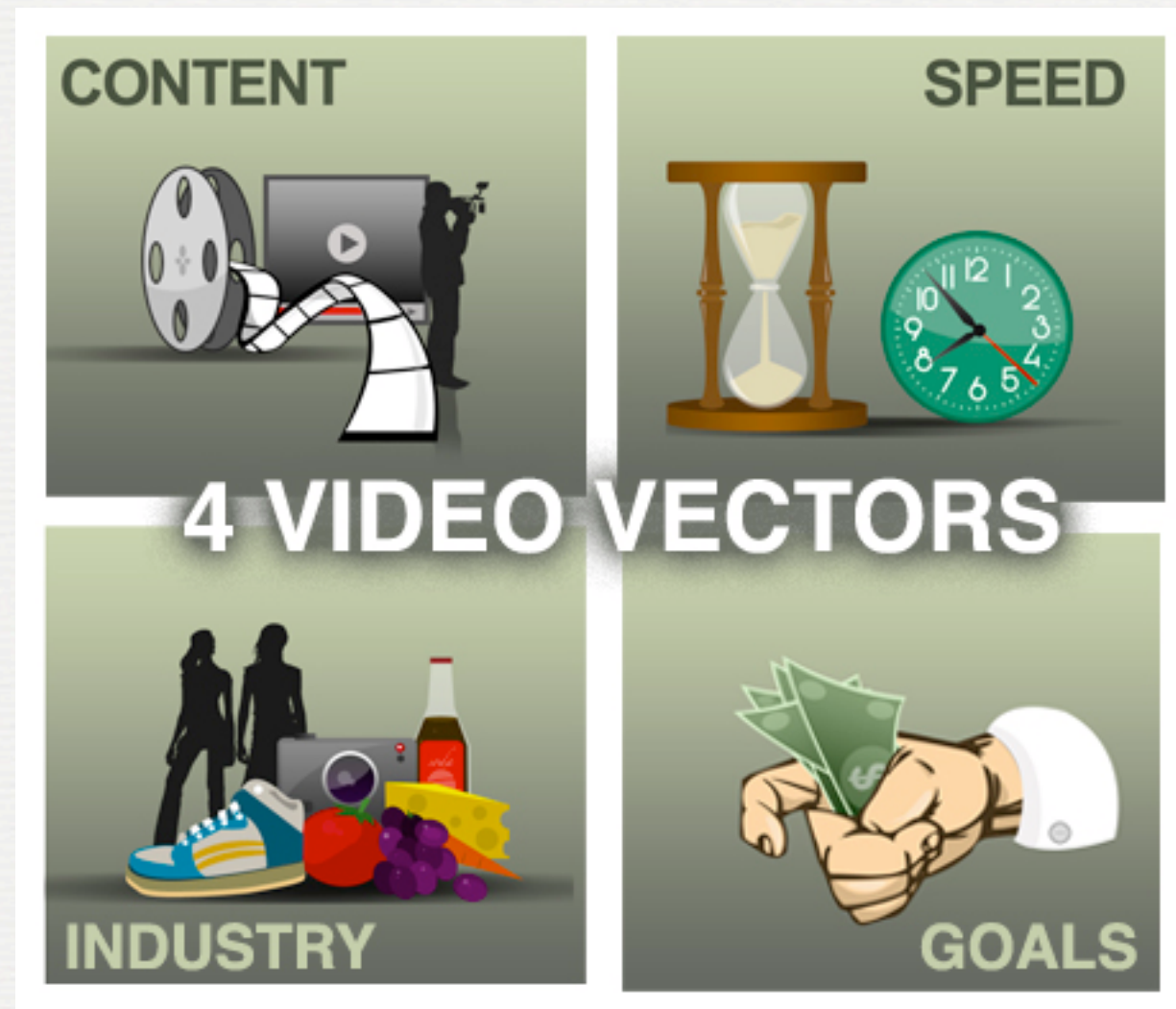
OV PLATFORM PROVIDERS

- Brightcove
- thePlatform
- Magnify
- Ooyala
- Kaltura*

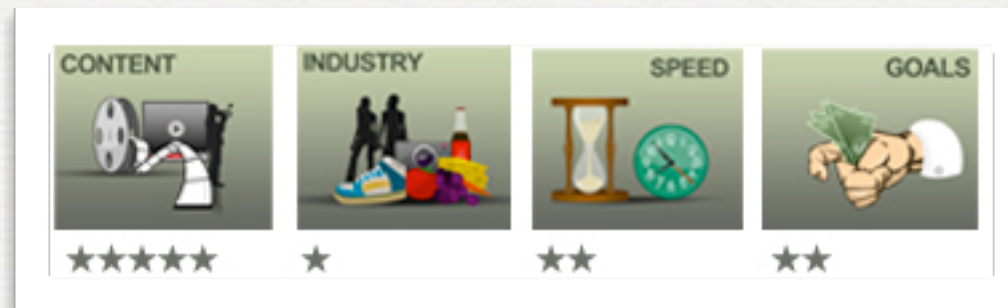
* open source platform



CHOOSING AN OVP

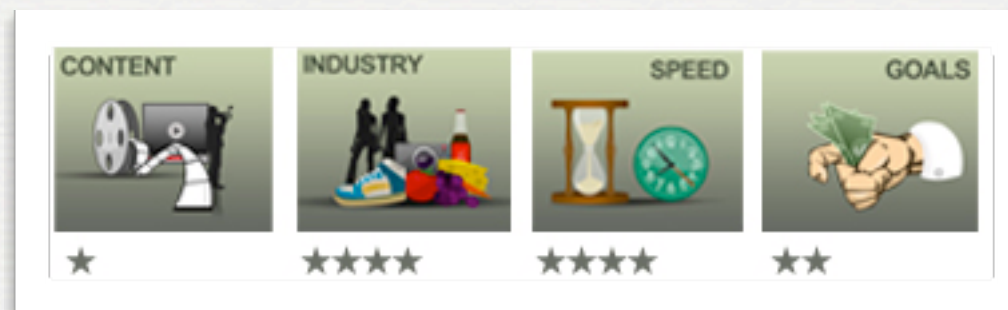


MAJOR MEDIA MAKER



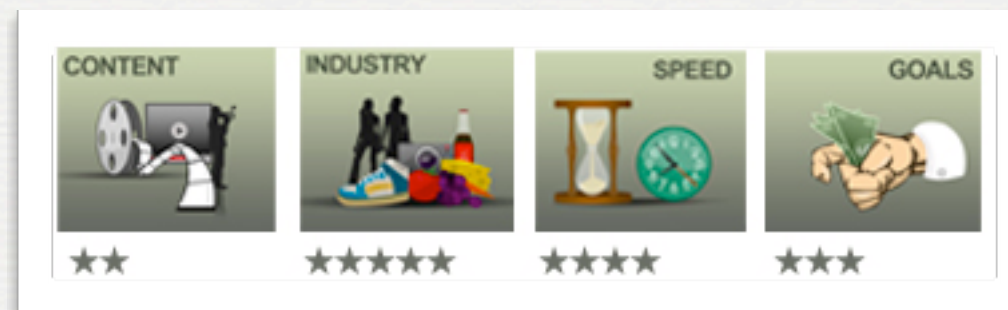
Good solutions for the Major Media Maker are Brightcove, Kaltura, Ooyala, or building your own solution with JW Player or Flowplayer.

SOCIAL MEDIA MAVEN



Good solutions for the Social Media Maven might be self server video players like Vimeo or Viddler, or more full featured video discovery solutions like VodPod or Magnify.net.

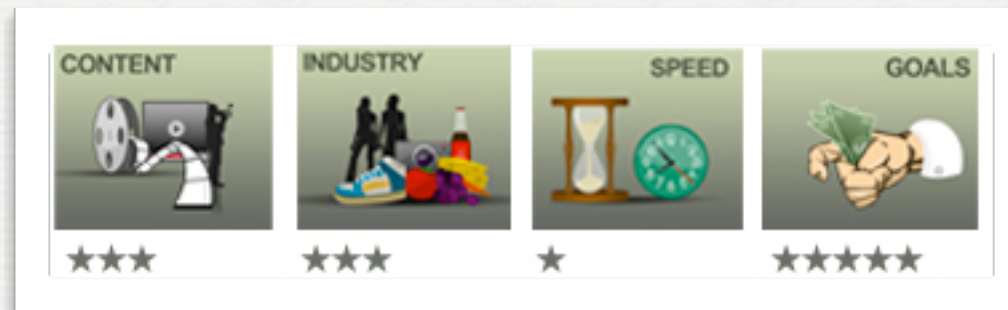
BRAND BUILDING DESTINATION



Good solutions for you include solutions with integrated social media tools, robust API's, a diverse mix of on-page players, and database driven video library pages.

For an open source solution, Kaltura offers some of these features, as does Ooyala, and Magnify.net powers these solutions.

MONETIZATION MONSTER



For the hard core revenue driven site, the number one, two and three concern is ad serving.

Among the solutions for this complex integration are Brightcove, Magnify and Ooyala.

CONTENT DELIVERY NETWORK

- Puts data close to client
- Optimize capacity per customer
- Improved stream quality & performance
- Security for videos
- Web Caching



COMMERCIAL CDNS

- Akamai
- CDNetworks
- Limelight
- Cachefly
- Level 3



ANALYTICS

- Track page and video views
- Analyze and optimize
- 2 Types: log files and page tagging
- A/B Testing



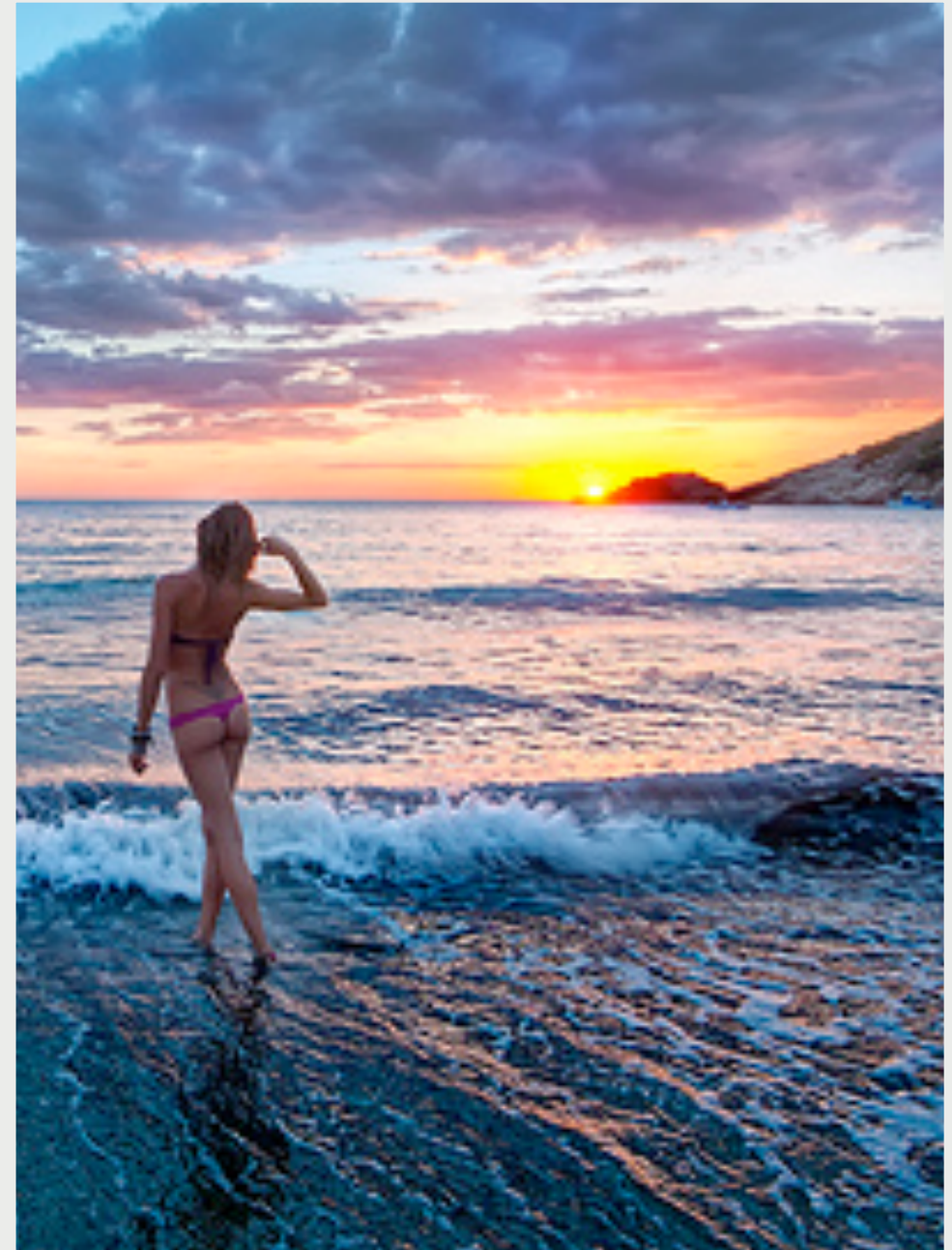
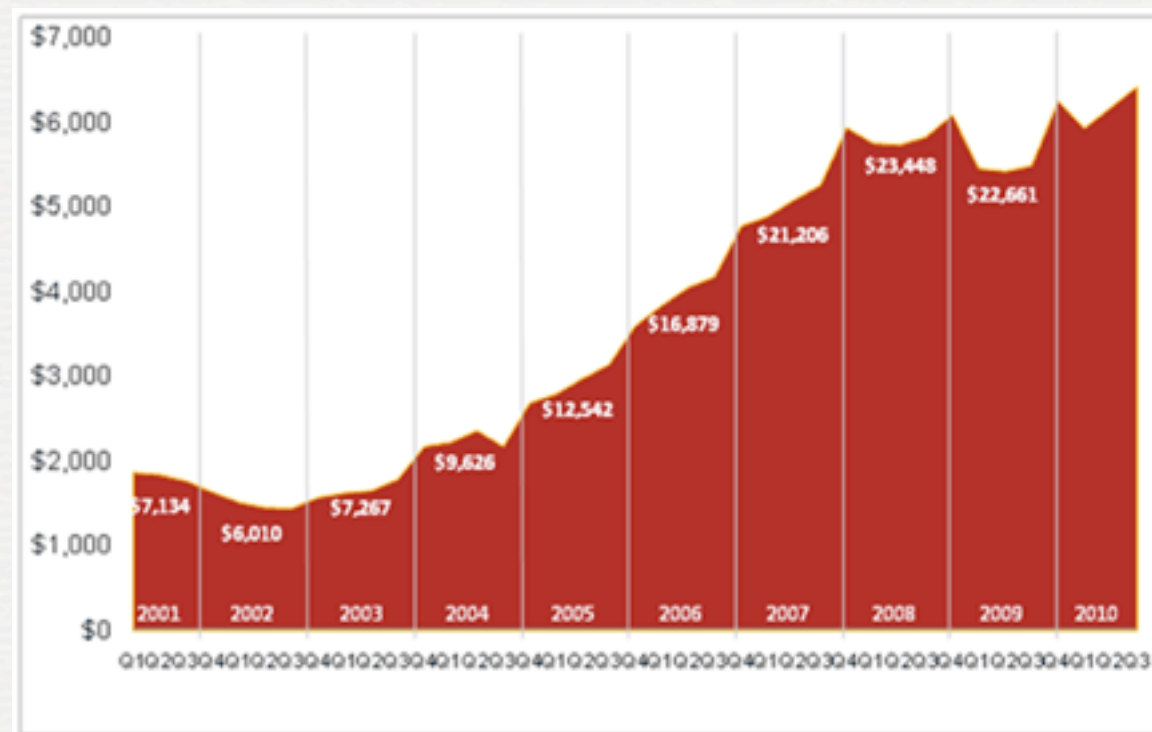
ANALYTICS TOOLS

- Logfile-based:
 - AWStats
 - Webalizer
- Hosted Solutions:
 - Omniture
 - Google Analytics
 - Webtrends



ADVERTISING

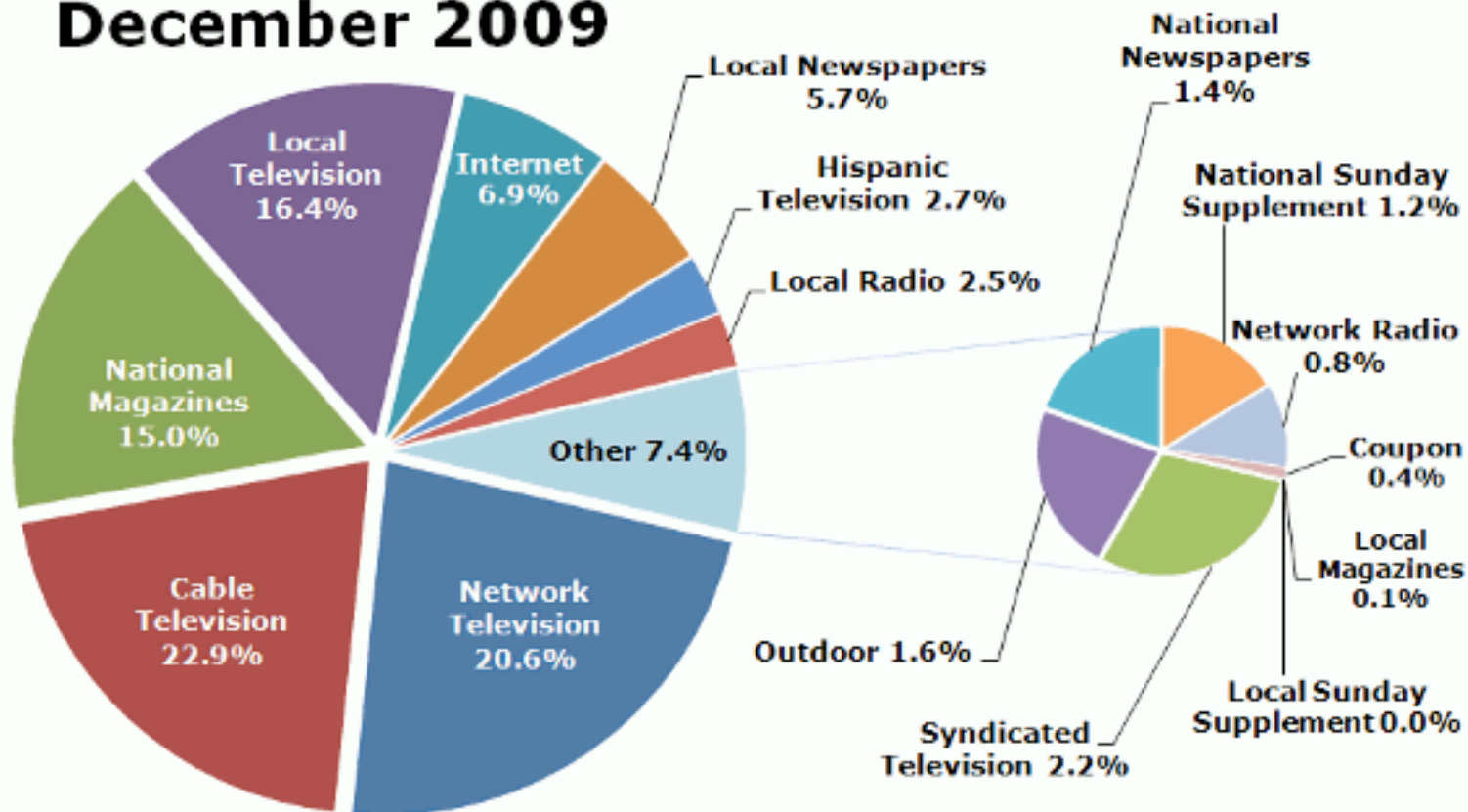
- It's how you make \$\$ on the web.
- Good advertising is information.



ADVERTISING

Share of Ad Spending by Medium

December 2009



MC MARKETINGCHARTS.COM

Source: The Nielsen Company, AdAcross

AD PROVIDERS

- Google AdSense



- DoubleClick



- Lightningcast



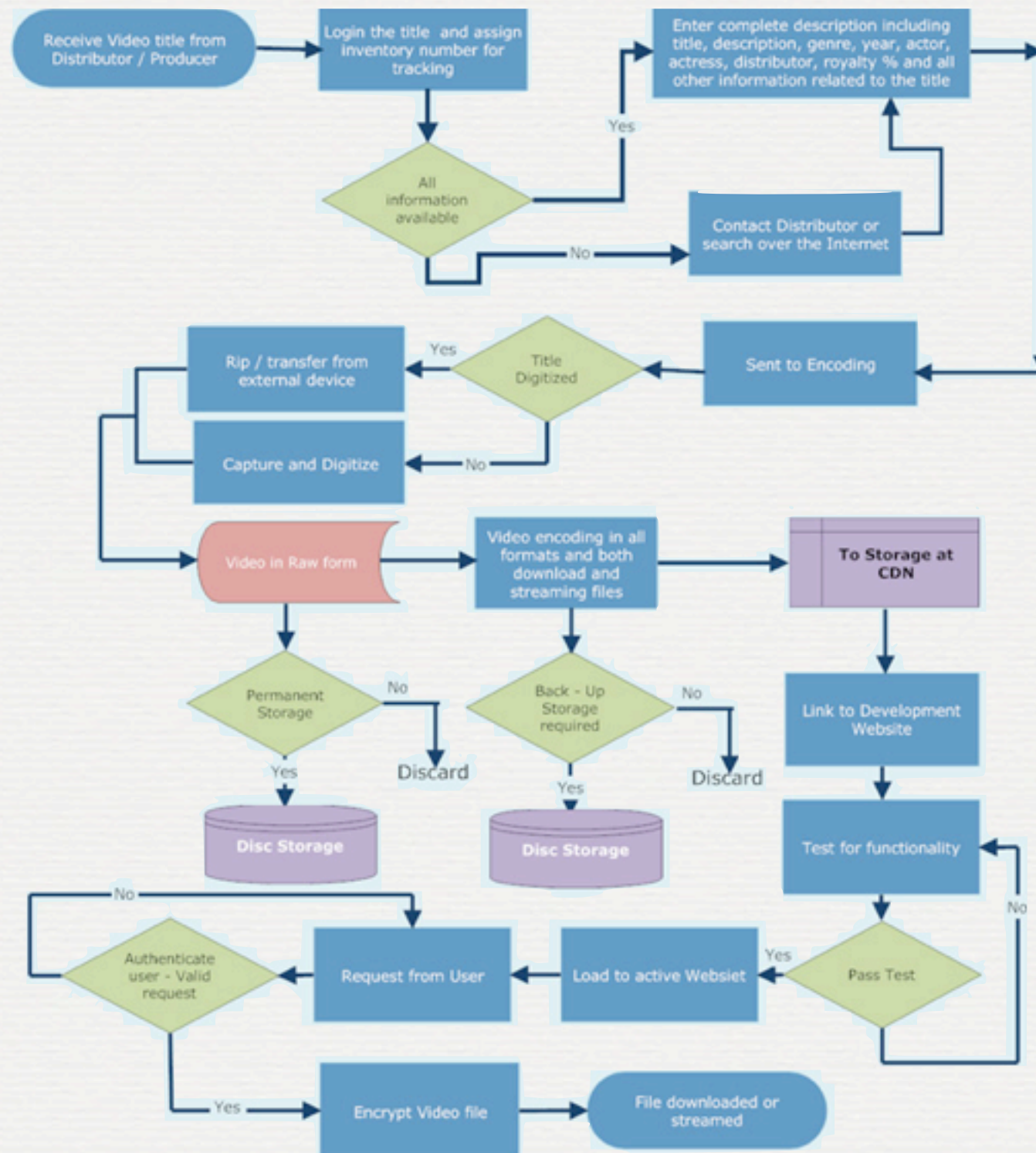
- FreeWheel



- ScanScout



THE INGEST PROCESS





THE VIDEO PLAYER

HTML5

HTML5 is a set of web standards being developed by the "Web Hypertext Application Technology Working Group"

The HTML5 standard includes many new features for more dynamic web applications and interfaces. One such component being specified and implemented is the `<video>` element.

BROWSER CODEC SUPPORT

VIDEO CODEC SUPPORT IN UPCOMING BROWSERS					
CODECS/CONTAINER	IE	FIREFOX	SAFARI	CHROME	OPERA
Theora+Vorbis+Ogg	.	3.5+	†	5.0+	10.5+
H.264+AAC+MP4	9.0+	.	3.0+	5.0+	.
WebM	9.0+*	4.0+	†	6.0+	10.6+

* Internet Explorer 9 will only support WebM "when the user has installed a VP8 codec," which implies that Microsoft will not be shipping it.

† Safari will play anything that QuickTime can play, but QuickTime only comes with H.264/AAC/MP4 support pre-installed.

‡ Google has committed to supporting WebM "in a future release" of Android, but there's no firm timeline yet.

<http://diveintohtml5.org/video.html#what-works>

HTML CODE

- Progressive download:

```
<video src="video.mp4"></video>
```

- HTTP Live Streaming:

```
<video src="http://live.stream.com/channel/  
index.m3u8"></video>
```


THE <VIDEO> TAG

- Use “width” and “height” to size video.
- Use “controls” attribute to show native controls.
- Use “preload” to enable pre-loading of video.
- Use “autoplay” to play video when page loads.
- Can control video player with JavaScript:
 - **play()** and **pause()** methods
 - **currentTime**, **volume** and **muted** properties

MULTIPLE ENCODINGS

```
<video id="movie" width="320" height="240" preload controls>
  <source src="pr6.mp4" />
  <source src="pr6.webm" type='video/webm; codecs="vp8, vorbis"' />
  <source src="pr6.ogv" type='video/ogg; codecs="theora, vorbis"' />
  <object width="320" height="240" type="application/x-shockwave-flash" data="flowplayer-3.2.1.swf">
    <param name="movie" value="flowplayer-3.2.1.swf" />
    <param name="allowfullscreen" value="true" />
    <param name="flashvars" value='config={"clip":
      {"url": "http://wearehugh.com/dih5/good/bbb_480p.mp4", "autoPlay":false, "autoBuffering":true}}' />
    <p>Download video as <a href="pr6.mp4">MP4</a>, <a href="pr6.webm">WebM</a>, or <a href="pr6.ogv">Ogg</a>.</p>
  </object>
</video>
<script>
  var v = document.getElementById("movie");
  v.onclick = function() {
    if (v.paused) {
      v.play();
    } else {
      v.pause();
    }
  };
</script>
```


OPEN SOURCE HTML5 VIDEO PLAYERS

- FlareVideo - MIT
- Video JS - LGPL
- Projekktor - GPL
- Kaltura HTML5 Video Player - MIT
- JW Player for HTML5 - free for non-commercial



FLASH VIDEO

- Flash Video was introduced in Flash Player 6 (2002)
- Adobe claims:
 - 98% of U.S. web users have Flash installed.
 - 99.3% percent of all Internet desktop users.
- Flash very low % on mobile devices b/ c of Apple.
- W3C Interest Group for Web on TV

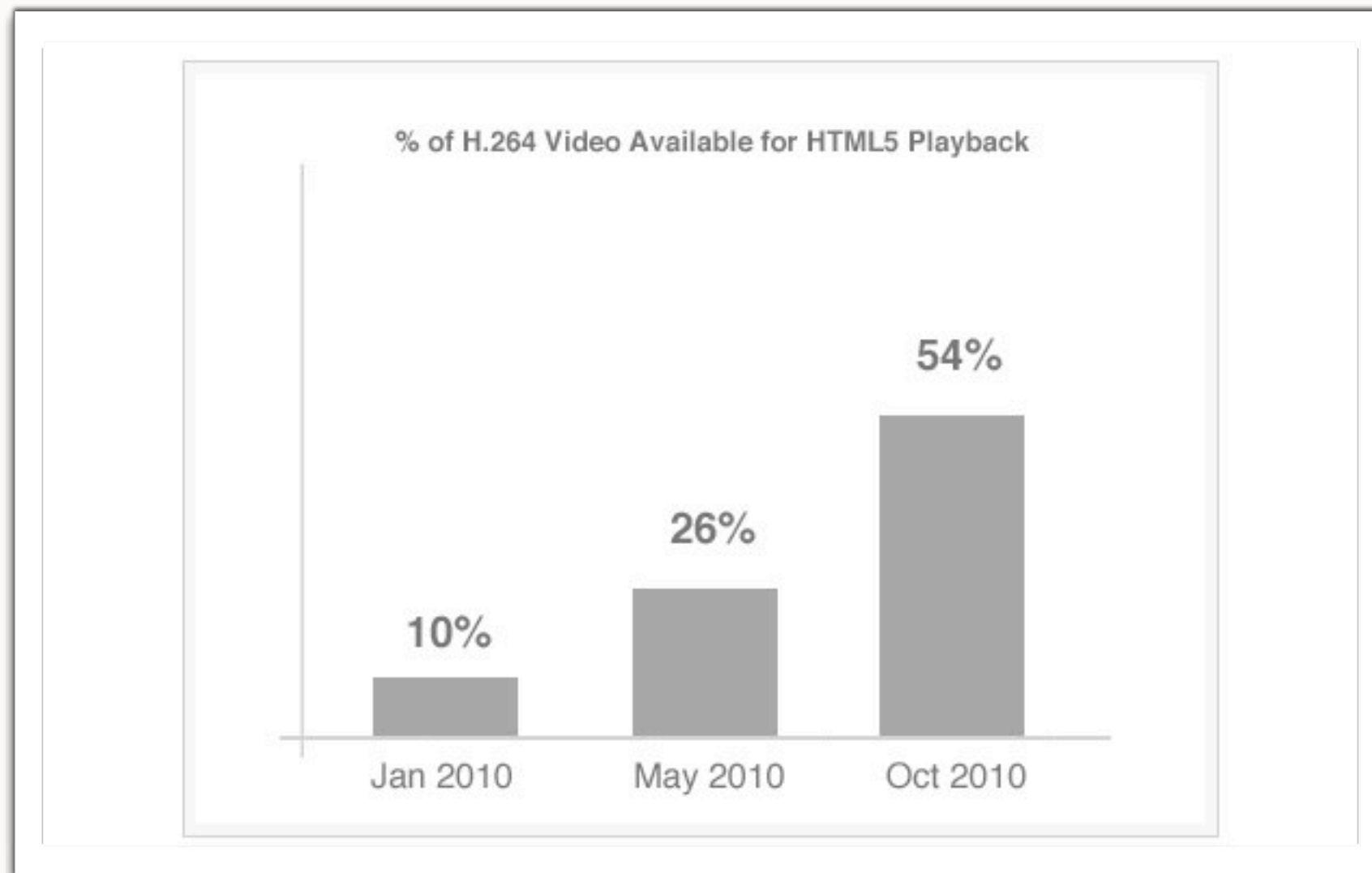
TOP VIDEO SITES

Top U.S. Online Video Properties* by Videos Viewed December 2008 Total U.S. – Home/Work/University Locations Source: comScore Video Metrix		
Property	Videos (000)	Share (%) of Videos
<i>Total Internet</i>	14,318,722	100.0
Google Sites	5,905,854	41.2
Fox Interactive Media	444,865	3.1
Yahoo! Sites	330,025	2.3
Viacom Digital	290,558	2.0
Microsoft Sites	247,903	1.7
Hulu.com	240,585	1.7
AOL LLC	197,135	1.4
Turner Network	183,948	1.3
Disney Online	148,434	1.0
ESPN	102,542	0.7

Source: <http://comscore.com>

Top U.S. Online Video Properties by Video Content Views Ranked by Unique Video Viewers October 2010 Total U.S. – Home/Work/University Locations Source: comScore Video Metrix			
Property	Total Unique Viewers (000)	Viewing Sessions (000)	Minutes per Viewer
<i>Total Internet : Total Audience</i>	175,186	5,473,282	908.0
Google Sites	146,346	2,019,298	271.6
Yahoo! Sites	53,839	233,098	30.3
Viacom Digital	52,885	176,457	53.7
VEVO	47,569	236,461	77.9
Facebook.com	47,423	162,402	17.1
Microsoft Sites	47,095	265,506	38.9
AOL, Inc.	43,381	195,946	22.9
Fox Interactive Media	38,478	187,204	16.5
Break Media Network	31,115	122,070	41.2
Hulu	29,650	182,404	207.8

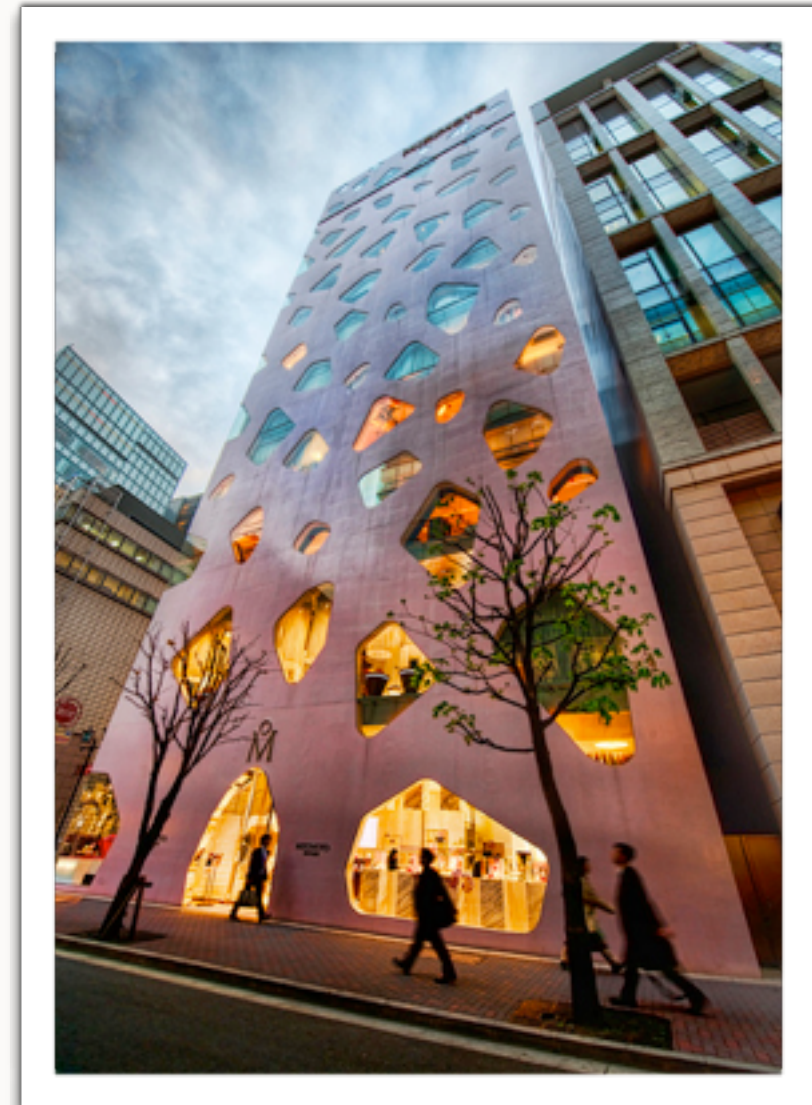
MAJORITY OF ONLINE VIDEO NOW IN HTML5



http://www.readwriteweb.com/archives/html5_video_market_penetration.php

OPEN SOURCE FLASH VIDEO PLAYERS

- Open Video Player (OVP)
 - Business-friendly license
- Flowplayer
 - GPL or Commercial
- Strobe Media Playback
 - BSD
- IW Player
 - Non-commercial or \$\$



MEDIA STREAMING

- Real Time Messaging Protocol (RTMP)
 - Proprietary protocol by Adobe
 - Requires Flash Media Server
- HTTP Live Streaming
 - Developed by Apple, submitting to IETF
- HTTP Dynamic Streaming
 - Adobe's implementation of HTTP Live Streaming
- Progressive Download

FLASH VS. HTML5 PERF

Mac Tests

- With **Safari**, HTML5 was the most efficient and consumed less CPU than Flash using only 12.39% CPU. With Flash 10.0, CPU utilization was at 37.41% and with Flash 10.1, it dropped to 32.07%
- With **Google Chrome**, Flash and HTML5 were both ***equally inefficient*** (both are around 50%)
- With **Firefox**, Flash was only slightly less efficient than in Safari, but better than in Chrome

Windows Tests

- **Safari** wouldn't play HTML5 videos, so there was no way to test that. However, Flash 10.0 used 23.22% CPU but Flash 10.1 *only used 7.43% CPU*
- **Google Chrome** was more efficient on Windows than Mac. Playback with Flash Player 10.0 was about 24% more efficient than HTML5, while ***Flash Player 10.1 was 58% more efficient than HTML5.***
- On **Firefox**, Flash 10.1 dropped CPU utilization to 6% from 22% in Flash 10.0
- In **IE8**, Flash 10.0 used 22.41% CPU and Flash 10.1 used 14.62% CPU

OTHER OPTIONS

- It's really a question of native vs. web.
- iPad / iPhone, use `MPMoviePlayerViewController`
- Android, use `MediaPlayer`
- Webapp with HTML5 is the most portable, but HTML5 video might not be ready for primetime...



HULU



HTML5 Isn't Ready for Prime Time

“HTML5 lacks maturity in reporting, advertising and content security.”

<http://gigaom.com/video/hulu-html5-isnt-ready-for-prime-time/>

NETFLIX



Netflix: No Plans for HTML5 Video

“The Silverlight player is used for PC/Mac playback only, and the basic HTML5 Video doesn’t have a viable DRM solution at this point.”

<http://gigaom.com/video/netflix-no-plans-for-html5-video/>

IS THERE HOPE?

- W3C will try to address commercial video requirements before HTML5 spec completion.
- W3C is aiming for HTML5 spec completion by May 2011.
- W3C only defines web document language, not protocols, so MP4 video and DRM are outside of their domain.
- TimedTracks just got accepted from WHATWG into W3C HTML5.

A CASE STUDY

Building an Online Video Web Application





TWC IPAD APP RELEASED YESTERDAY
#2 in the App Store

QUESTIONS?

Contact Information

<http://raibledesigns.com>

<http://twitter.com/mraible>

Download Presentation

<http://slideshare.net/mraible>

