Topics

- HTML5 Structural Elements
- HTML5 Media Elements
- HTML5 User Interaction
- Related Specifications
  - SVG
  - WebGL
- CSS3 visual effects, transitions, and animations
- CSS3 multicolumn layout

HTML5 Structural elements

- Structural elements to mark up page
  - Used for controlling layout
  - Should conserve layout semantics

HTMLS5 Structural Elements

- <section> - Content section
- <aside> - Content sidebar
- <nav> - Navigation container
- <article> - Self-contained composition (E.g. blog post, news article, webshop product)
- <header>, <footer> - Heading and footer of a section

HTML5 Video

- Native video
- The <video> element
  - Consistent browser video handling
  - Enables DOM-manipulation as every other DOM-element
    - Resizing
    - Transitions
    - Styling
    - ...

Video-element Attributes

HTML Attributes

- Autoplay
- Controls
- Poster
- Muted
- Height, width
- Loop
- Preload
- Src

DOM Attributes

- error
- src
- currentSrc
- readyState
- controls
- volume
- currentTime
- startTime
- played
- ended
- ...

Video-element API

- Methods
  - load()
  - play()
  - …
- Events
  - loadstart
  - progress
  - play
  - pause
  - timeupdate
  - ...

Customizing Controls

- Customizing controls by using media methods and firing media events with graphical elements
- Media loading - preloading

Multiple formats

- Multiple <source>-elements

```
<video>
    <source src=...>
    <source src=...>
</video>
```

Web Video Codecs

- Container – Video Codec – Audio Codec
  - WebM – VP8 – Vorbis (Open license)
  - MP4 – H.264 - MP3 (Royalty-based license)
  - OGV – Theora – Vorbis (Open license)

Video Utilization

- Access Media Devices (E.g. webcam etc.)
  - Through getUserMedia API
- Video Conferencing
  - Streaming video P2P through WebSockets
- Augmented Reality
  - Layering graphics, information objects, interactive content etc. on top of the video stream.
- …

HTML5 Audio

- Native audio
- The <audio>-element
  - Shares anatomy with the video-element

Audio-element Attributes

- Autoplay
- Controls
- Loop
- Preload
- Src

HTML5 Canvas

- A pixel-based scene for graphics rendering
  - Canvas API: A 2D drawing context
  - API supports drawing lines, fills, images etc.
  - Every graphics operation manipulates solely the pixels addressed by the operation
  - The entire scene must be re-rendered frame by frame for frame-based animation

Canvas Basics Examples

```
var canvas=document.getElementById('myCanvas');
var ctx=canvas.getContext('2d');
ctx.fillStyle='#FF0000';
ctx.fillRect(0,0,80,100);
```

Using Images and Video on a Canvas

- The Canvas API supports rendering images straight on to the canvas
  - Pattern example:

```
ctx.fillStyle = ctx.createPattern( img, 'repeat');
ctx.fillRect( 0, 0, canvas.width, canvas.height);
```

- Capturing images from video
  - Capturing the pixel data from video-element and projecting it on the canvas
  - Enables real-time video pixel-processing
  - Enables real-time video streaming etc.

Canvas Javascript APIs

- Paper.js – Vector animation library for the Canvas-element
- InfoVis Toolkit
- Processing.js

Canvas Performance

- CPU-accelerated rendering
- GPU-accelerated rendering (Chrome)

HTML5 Drag and Drop

- Ad Hoc implementations of Drag and Drop have existed for a long time
- Microsoft origin (IE5). Copied by other browser vendors
- Reverse engineered and documented by HTML5 editor Ian Hickson
- The API enables
  - Drag and drop within the browser
  - Drag and drop to external applications (E.g. Adobe Photoshop)

HTML4/HTML5 Event Attributes

- Event Attributes
  - Window Events
  - Form Events
  - Keyboard Events
  - Mouse Events
  - Media Events

CSS3 Visual Effects

- CSS3 Transforms
- CSS3 Transitions
- CSS3 Animation

CSS3 Transforms

- 2D Transforms
  - Move
  - Scale
  - Skew
  - Rotate
  - ...
- 3D Transforms
  - Transforms in 3D space

CSS3 Transform Examples

- Rotate
  - Rotate 2D – transform: rotate(90deg);
  - Rotate 3D – transform: rotateX(90deg);
- Move
  - Translate 2D – transform: translate(10px, 5px)
  - Translate 3D – transform: translate3D(10px, 5px, 5px)

CSS3 Animations

- @keyframes rule

```
@keyframes colorTween
{
   0%   {background: red; left:0px; top:0px;}
   50%  {background: blue; left:200px; top:200px;}
   100% {background: red; left:0px; top:0px;}
}
```

- Animation property

```
animation: colorTween 5s;
```

CSS3 Transitions

- Transition effect when changing style on an element
- A transition is specified by
  - A CSS-property
  - Transition duration
- Example (Multiple property transitions)

```
transition: width 2s, height 2s, transform 2s;
```

CSS3 Transitions

- Transition properties
  - Transition
  - Transition-property
  - Transition-duration
  - Transition-timing-function (Speed of duration, e.g. 'ease', 'linear' etc.)
  - Transition-delay

CSS3 Typography

- @font-face rule

```
@font-face {
font-family: SansationLight;
src: url('Sansation_Light.ttf'),
    url('Sansation_Light.eot') format("opentype"); /* IE */
}
```

- Font family property

```
font-family : SansationLight, Verdana, Arial ;
```

CSS3 User Interface

- User-interface Properties
  - Appearance
  - Box-sizing
  - Icon
  - Nav-* ('down', 'up', etc.)
  - Outline-offset
  - Resize

CSS3 Multicolumn Layout

- Multiple columns as in newspapers
- Multiple column properties
  - columns
  - column-count
  - column-fill
  - column-gap
  - ...

HTML5 Frameworks

- Sproutcore
- Sencha
- Cappuchino
- Google Web Toolkit (GWT)
- PhoneGap
- Titanium Appcellerator

Web Application Examples

- 280slides
- Mockingbird
- Lucidchart
- Google Docs
- Chrome Applications

Other UI-related Specifications

- SVG
- WebGL

SVG

- Scalable Vector Graphics
  - Markup language for describing vector graphics
  - Adapted as HTML5 extension
- Different profiles
  - SVG 1.1 Full
  - Two mobile profiles:
    - SVG Basic (SVGB)
    - SVG Tiny (SVGT)

SVG on the Web

- Inline SVG
  - SVG is text-based and whereas indexable by search engines
  - Reliable rendering of vector graphics
  - No need for plugins
- SVG-elements are included in DOM
  - Reachable through scripting
- SVG Framework
  - Raphäel

SVG Functionality

- Filter effects
- Interactivity
- Linking
- Scripting
- Animation
- Fonts
- Metadata
- Paths
- Shapes
- Text
- Painting / fill
- Color
- Gradients and patterns
- Clipping, masking and composition

Browser Native Support

- Native support in newer versions of major browsers
  - Opera 8+
  - Gecko Engine since 2005 (E.g. Firefox)
  - WebKit Engine since 2006 (E.g. Safari, Chrome)
  - IE9 (SVGB)
- Google index SVG content since 2010

SVG vs Canvas

- SVG is a markup-based description language for vector graphics
  - High-level mathematical model of the content
- Canvas is a pixel-based scene for rendering graphics
  - Low-level bitmap model of the content

WebGL

- Web-based Graphics Library
  - API for rendering and interacting with 3D models (In the canvas-element)
  - Based on OpenGL
  - Supported by major browser vendors except Microsoft
  - Implemented on different levels by supporting vendors (Limited support on mobile platforms). Maintained by Khronos group

WebGL Canvas API

- WebGL Quick Reference
- Libraries for simplified WebGL
  - Three.js
  - Processing.js
  - ...

Reverse Engineering

- Google Chrome Frame