Delving into the

Mobile Web Framework

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Overview

1. Design Principles
2. Architectural Patterns
3. Building for Degradation

Design Principles

for a mobile experience

Keep It Simple

- Markup should be simple and compatible
  - XHTML MP 1.0
  - WCSS
- Mobile users want information fast
  - Minimize scrolling
  - Avoid excess decoration
  - Short text and icons
- Do not clutter the screen

Task-Oriented Content

- Get the user quickly to where they want
  - Minimize the number of pages to complete a task
  - Keep the user focused on the current task
- Don't create a mini version of a desktop site
- Reconsider movement around the site

Consider the Context

- Small screen
  - Tightened focus over less real estate
- Touch interface
  - Multi-touch and gestures
  - Different sort of interactive experience
- Mobility
  - Locational awareness
  - Different goals

Demo

from desktop to mobile

Architectural Patterns

that minimize mobile development costs

Architectural Goals

- Encapsulation
- Layers
- Reusability
- Business logic integrity
- Interface consistency

Approaches

- Shared Libraries
- Model-view-controller (MVC)
- Service-oriented architecture (SOA)

Shared Library

- Concept
  - Libraries of functions and/or objects
  - Separate desktop, tablet and mobile apps
- Properties
  - Reuses objects to accomplish the same task
  - Consistency if the library is used and maintained
  - Requires homogeneous environment

Shared Library

- Good use cases
  - Decorators
  - Session and state management
  - Data setters and getters

Shared Decorator Library

- Object that encapsulates some element
  - Methods permute the content of the element
  - Render method generates the actual output
- Use case:
  - Instantiate the decorator
  - Modify element attributes
  - Add contained entities
  - Render to produce actual HTML output

Shared Decorator Library

- MWF provides two decorator sets
  - HTML Decorators
  - Site Decorators
- Site decorators create MWF entities.
- MWF entities are semantic HTML.
  - Can style them in a desktop manner as well.
  - Can simply define different CSS for desktop.

Shared Decorator Library

- Using the .menu-full decorator directly

```
$decorator = Site_Decorator::menu_full(array(), array('class'=>'main-menu'));

$decorator->set_title('Menu')

$decorator->add_item('Item 1', '#1')

$decorator->add_item('Item 2', '#2')

$decorator ->add_item('Item 3', '#3')

$decorator->add_item('Item 4', '#4')

$decorator->add_item('Item 5', '#5')

$decorator->render();
```

Shared Decorator Library

- Encapsulate the .menu-full decorator

```
class Front_Page_Menu_Full_Site_Decorator extends Menu_Full_Site_Decorator {
    public function __construct($title = false, $params = array())  {
        parent::__construct($title, $params);
        $this->set_param('class', 'main-menu menu-full');
        $this->set_title('Menu');
        $this->add_item('Item 1', '#1');
        $this->add_item('Item 2', '#2');
        $this->add_item('Item 3', '#3');
        $this->add_item('Item 4', '#4');
        $this->add_item('Item 5', '#5');
    }
}
```

Shared Decorator Library

- Using the shared library

```
$menu = new Front_Page_Menu_Full_Site_Decorator();

echo $menu->render();
```

- Mobile and desktop sites both define CSS
  - CSS handler covers the mobile site
  - Different CSS file for the desktop site
- Can consolidate to one invoking script:
  - Redirect script or User_Agent call

Demo

Working with Decorators

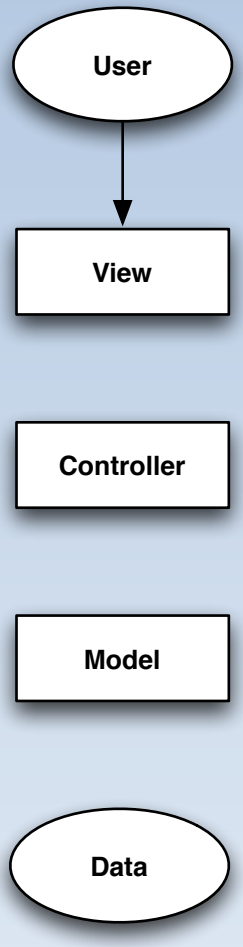
From Decorators to Views

- A decorator may use multiple decorators
  - Many site decorators are tag composites
  - A page decorator could also be a composite
  - UC San Diego has a Java-based page decorator
- Multi-element decorators are views
  - Pass a set of data into an encapsulating object
  - Object renders output based on data

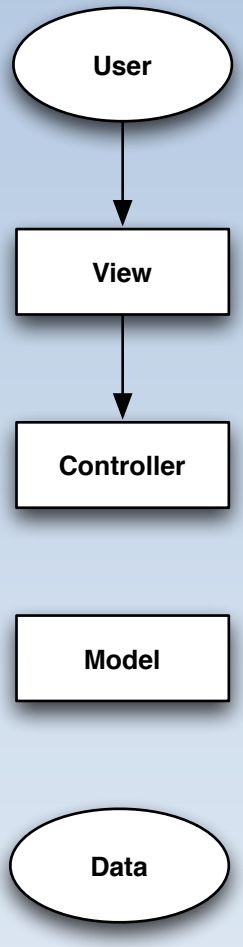
Model-View-Controller

- Model
  - Manages, mediates and manipulates data
- View
  - Encapsulates the user interface
- Controller
  - Bridges model and view with business logic

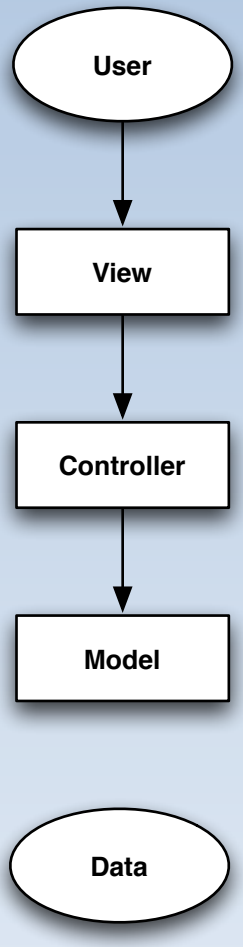
Model-View-Controller Layers



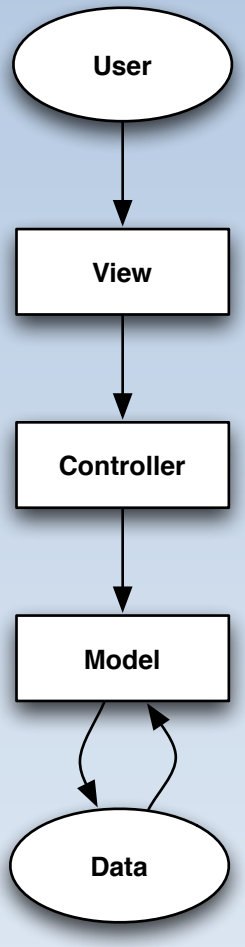
Model-View-Controller Layers



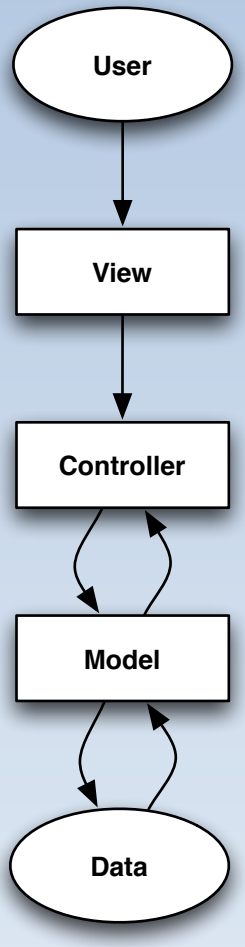
Model-View-Controller Layers



Model-View-Controller Layers



Model-View-Controller Layers



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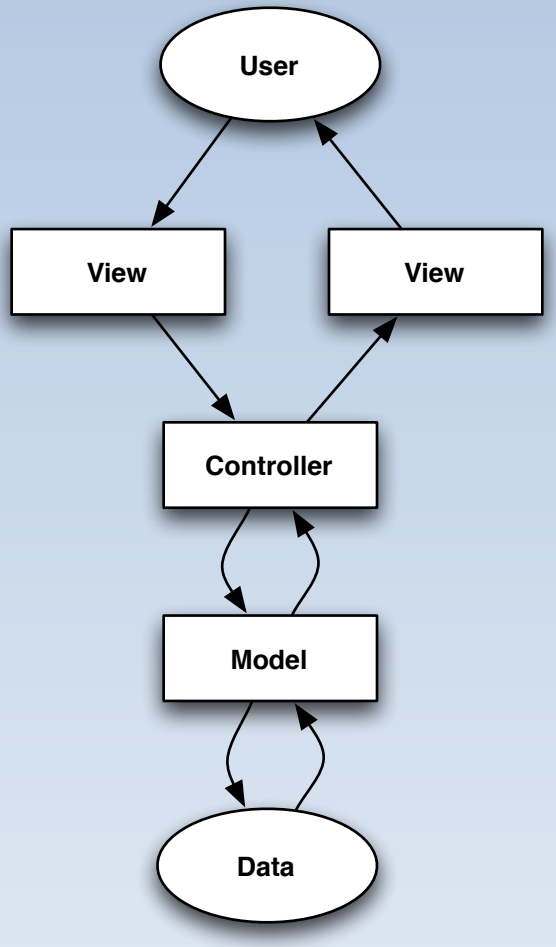
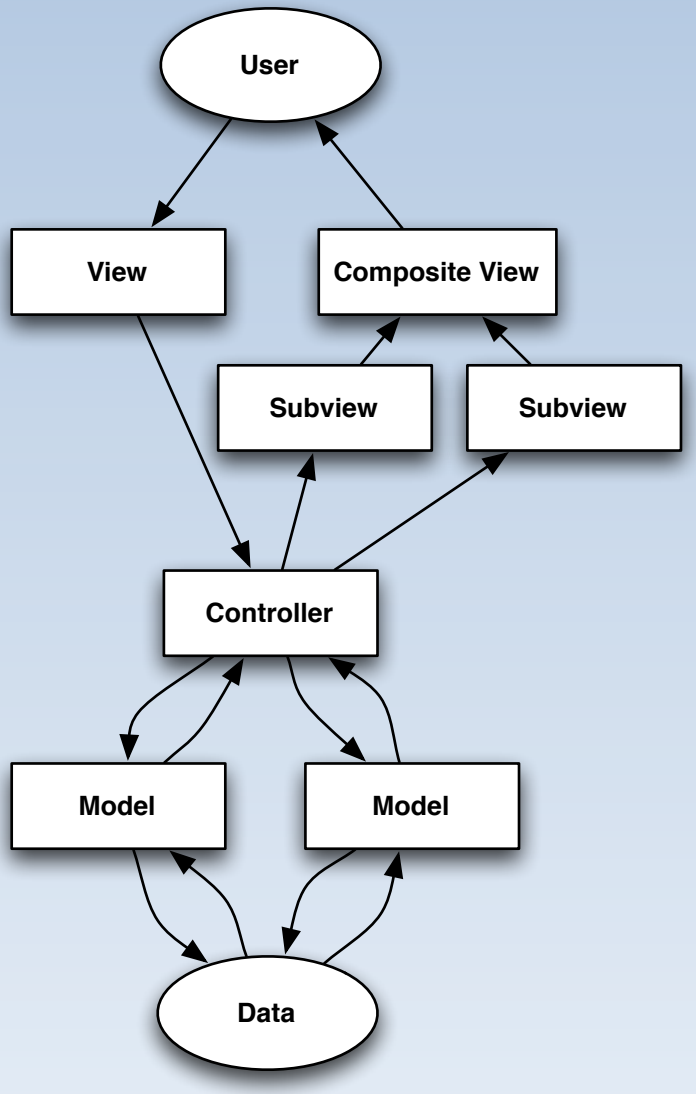


Model-View-Controller Layers



MVC for Mobile Web Apps

- Can build one app that supports:
  - Desktop
  - Tablet
  - Mobile
- MVC approach:
  - One set of controllers and models
  - Different composite views for mobile & desktop
  - Reuse subviews in different composite views

Demo

MVC in Practice

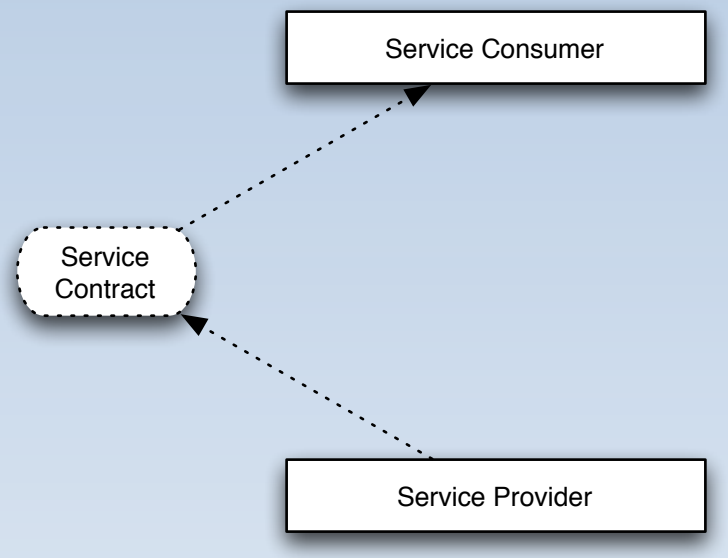
From MVC to SOA

- Views separate rendition from
  - Business logic
  - Data models
- Going a step further:
  - One entity handles business logic & data models
  - Another entity handles rendition
- Basis of service-oriented architecture

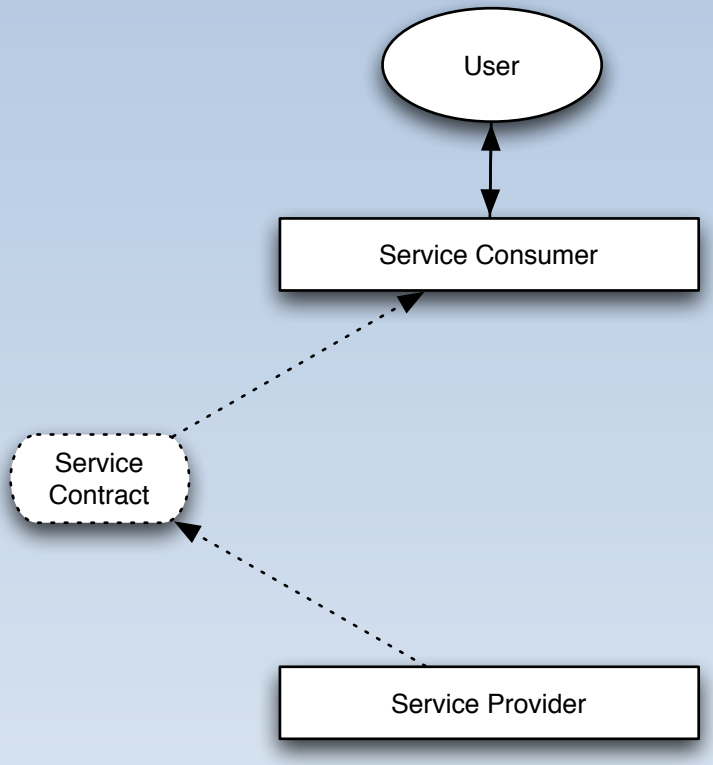
Service-Oriented Architecture

- Service provider
  - Exposes business logic through service interfaces
  - Mediates & manipulates data based on services
- Service consumer
  - Invokes services provided by the service provider
- Service definition
  - Contract between provider & consumer

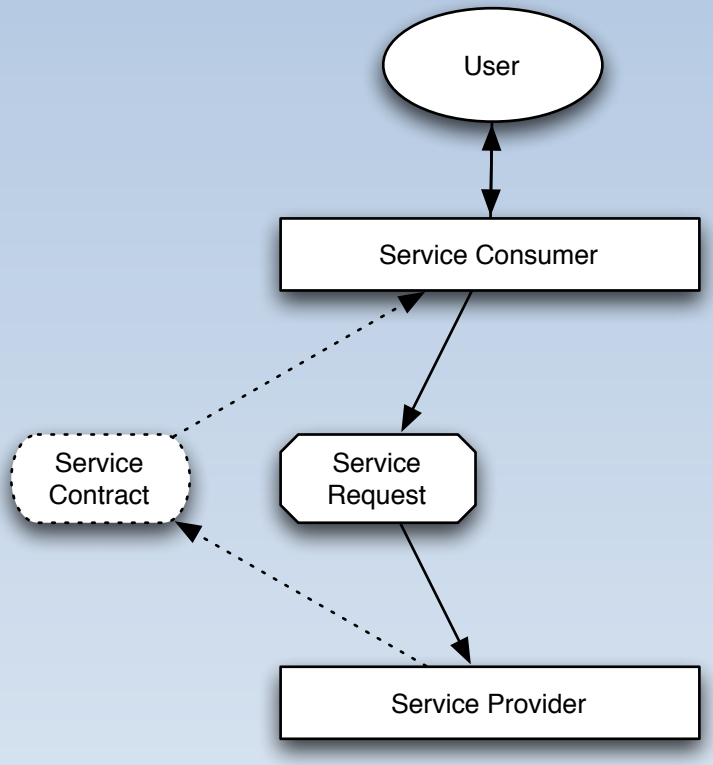
Service-Oriented Architecture



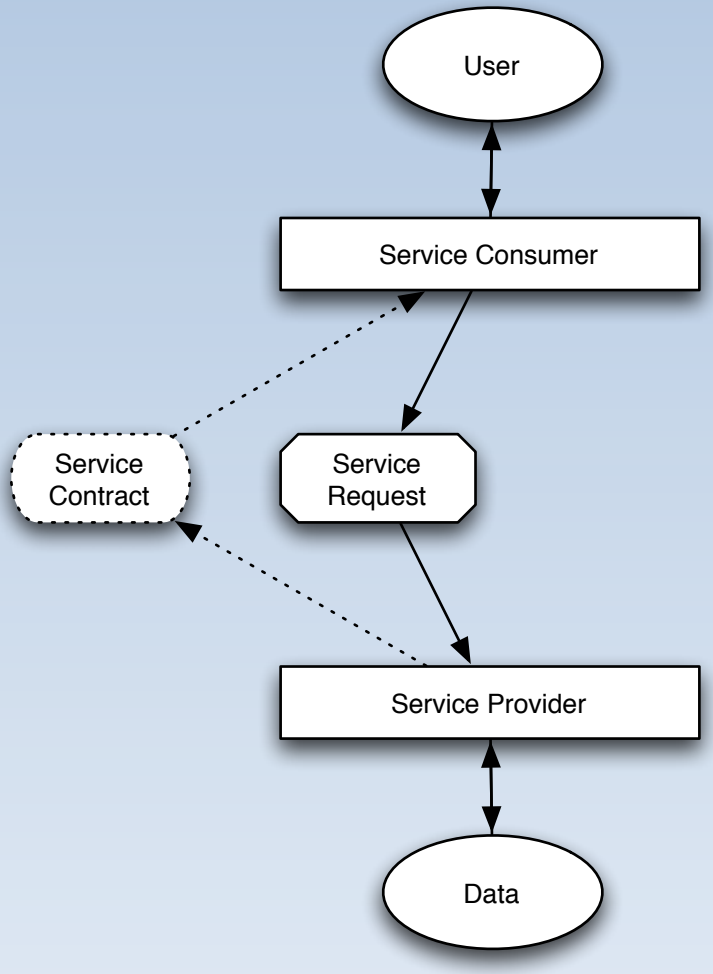
Service-Oriented Architecture



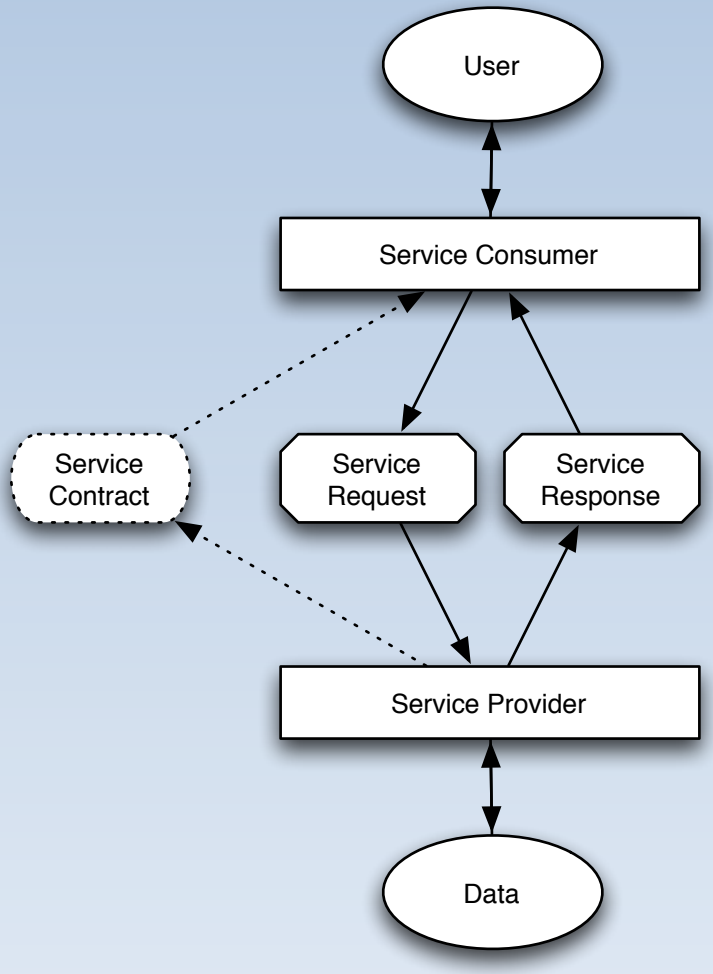
Service-Oriented Architecture



Service-Oriented Architecture



Service-Oriented Architecture



Service-Oriented Architecture

- Service contract
- Loose coupling
- Abstraction
- Reusability
- Autonomy
- Ganularity
- Statelessness

SOA through Web Services

- Often implemented through web services
- Two common modern protocols:
  - SOAP
  - REST

SOA through Web Services

SOAP

- Transport neutral
- Message-driven
- XML
- Complex definition
- Verbose semantics
- Larger payload
- Must parse for AJAX

REST

- HTTP Transport
- HTTP URI/Request-driven
- XML, JSON, HTML, etc.
- Simple definition
- Limited semantics
- Minimized payload
- Can avoid parsing for AJAX

SOA for Mobile Web Apps

- Define business logic behind web services
- Client calls web services to perform actions
- An analogy back to MVC:
  - Client ~ View
  - Service ~ Controller + Models

SOA for Mobile Web Apps

- Design decisions:
  - REST or SOAP?
  - XML, JSON or HTML?
  - Thick or thin client?
  - Server or browser rendering?

SOA for Mobile Web Apps

- Design decisions:
  - **REST** or SOAP?
  - XML, **JSON** or HTML?
  - Thick or **thin** client?
  - **Server** or browser rendering?

SOA for Mobile Web Apps

- REST
  - Simple and easy to implement
  - Uses HTTP requests and responses
  - Allows XML, JSON, HTML, etc.
- JSON
  - Smaller payload than XML
  - No parsing required for Javascript

SOA for Mobile Web Apps

- Thin Client
  - Reusability
  - Business logic integrity
  - Focus client on presentation
- Server Rendering
  - Not all user agents allow Javascript or AJAX
  - Supplement with AJAX where possible

Building for Degradation

while using MWF and new HTML 5 Technologies

The Situation

- Not all phones
  - have the same features
  - provide access to the same features
  - provide the same access to the same features
- The goal:
  - Use top-end features when available
  - Still remain usable for low end devices
  - Avoid writing two applications

The Situation

- CSS 3
  - Gradients
  - Transitions
- HTML 5
  - Forms and Input Types
  - Semantic Entities
- Javascript
  - DOM Writing
  - AJAX
- Device APIs
  - Audio
  - Video
  - Geolocation
  - Compass
  - Accelerometer
  - Storage
  - Camera
  - Web Sockets

Degradation in MWF

- Handlers load styles/scripts in three tiers:
  - Basic
  - Standard
  - Full
- Degradation further prevalent in:
  - Geolocation
  - Transitions
  - Images

Degrading with CSS 3

- Presentational and cascades
  - Build up from WCSS definitions to CSS 3 definitions
  - If CSS 3 definitions aren't accepted, falls back
- A few simple degradations:
  - Rounded corners can degrade to square
  - Gradient can degrade to median value
  - Transitioning areas can degrade to blocks

Degrading with CSS 3

- Only load where it is allowed:
  - WCSS: Basic
  - CSS 2.1: Standard
  - CSS 3: Full
- This reduces payload size and validation concerns for devices in the classification

Degrading with HTML 5

- HTML 5 introduces new semantics
- Rather than use new entities directly:
  - Use classes on XHTML MP 1.0 elements
  - Transform to HTML 5 elements where supported
- MWF Forms API includes this approach:
  - https://github.com/ucla/mwf/wiki/Roadmap%3A-Framework-v1.2%3A-Forms

Degrading with Javascript

- Live DOM writes not supported universally
  - Degrades by showing what is visible on load
  - Use DOM write to change state of elements
- AJAX not supported universally
  - AJAX should be a plus, not a necessity
  - Define <a href…> to a new page
  - Override default with AJAX request
  - Web service can serve to AJAX and new pages

Degrading with Device APIs

- Audio/Video
  - Pre-HTML 5 semantics don't include tags
  - Degrade to other viable players
  - Least common denominator is error message
  - MWF will eventually have an Audio/Video API
- Geolocation
  - MWF has abstraction layer for HTML 5 & Gears
  - GPS failure is treated similarly to no GPS

Degrading with Device APIs

- Compass & Accelerometer
  - Degradation similar to Geolocation
  - API will be added to MWF
- Storage
  - Specifications shifting rapidly so use caution
  - Abstraction layer to handle shifting support
  - State-saving can be offloaded via AJAX
  - API will be added to MWF

Thank You

for listening