Adaptation of the Nevada Climate Change Portal Web Interface to Mobile Devices

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Nevada Climate Change Portal

- Seeks to advance the quality and quantity of climate information pertaining to the state of Nevada
- Contains temperature and other measurement datapoints
- Neutral presentation
- Available to any person for any purpose
- Currently under development
Research Goal

- Making the website usable on mobile devices
- Research applicable to mobile web development in general
- Exciting new area
Who?

“Raising awareness through easily accessible climate change data.”

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Scientists

Education Professionals

Interested Public
Why, Where, When?

**Why**
- Measurement history
- Recent updates
- News & Events

**Where**
- On the field
- At the office
- At home

**When**
- Any time
Development & testing on a wide range of mobile devices

Apple iPhone 3GS
Resolution: 480x320 px

Apple iPad 1G
Resolution: 1024x768 px

Android Comet
Resolution: 240 x 320 px
Challenge #1: Input Style

No physical keyboard
Cumbersome typing. Identified solutions:
• Use smart auto-complete
• Automatic log-in

No mouse pointer
Lack of precision leads to errors. Identified solutions:
• Consolidate information to reduce the number of hyperlinks
• Use buttons instead of embedded links where possible

Multitouch
New gestures need to be handled:
• Pinch
• Swipe
• Scroll
Challenge #1: Input Style

Embedded Links vs. Buttons

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research, education, personal interest

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Challenge #2: Battery Life

- Web browsing is a computationally intensive process, due to the lack of dedicated. This necessitates structural and implementation optimizations untypical for conventional websites.
- Video is decoded with the help of special-purpose onboard hardware.
- Graphics are optimized via dedicated hardware.
Challenge #2: Battery Life

A 50 percent reduction in loading times (execution) translates to 60 percent increase in battery life.
The limited screen real estate poses a number of challenges:

- Traditional menus used for navigation do not perform or fit well on mobile devices.
  - Identified solution: use vertical (one or two-column) menus for navigation.
- Lack of screen space in the horizontal direction.
  - Identified solution: one-column data layout.
- Pagination reduces user experience.
  - Identified solution: single page vs. multiple pages.
Challenge #3: Screen Size

One-column menu layout

Advantages:
- No zooming required
- Improved accuracy
- Easy to follow
Challenge #3: Screen Size

Traditional websites contain too many horizontally ordered elements:

Identified solution: Use one-column layout for all data
Pagination

Pagination is a common practice encountered in traditional websites created for the Desktop. However, it does not translate well to the mobile computing paradigm.

Studies have shown that smartphone users prefer to access all content on a single page by scrolling as opposed to multiple pages connected by hyperlinks.
Avoiding pagination by using a single page layouts

**Advantages:**
- Does not require difficult link selection
- Scrolling is easy on touchscreens
- Fast
- All data in one place
Desktop computers have practically unlimited processing power at their disposal in the context of website rendering. By contrast, mobile devices are severely limited and cannot render computationally intensive websites without degrading the user experience.

**Solutions:**
- Simplify the layout of the website. Fewer elements equals to less processing.
- Avoid active components, such as Flash and JavaScript objects.
Mobile devices outside of Wi-Fi range are severely limited in terms of internet connectivity. 3G and other wireless networks are relatively slow and are often impose transfer caps. These circumstances require website optimization in order to reduce the total amount of data transferred for each webpage.

Identified solutions:
• Combine multiple files into a single file to reduce the number of http requests.
• Use media resources downsized to a reasonable resolution for each particular device.
• Use CSS Sprites to reduce the number of image files.
• Split the content into chunks and serve each chunk dynamically with AJAX
HTTP Requests

HTTP Requests are “orders” submitted by the mobile device to the webserver requesting particular files. Every time a user accesses a website between five to ten files are transferred, each requiring a separate request. HTTP Requests carry a significant overhead and should be minimized to decrease the network load, and improve the website loading time. When possible, multiple requests should be combined into a single one.
Using AJAX for dynamic content download

Welcome to Nevada Climate Change Web Portal!

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One of the major goals of this project is to create a reusable, extensible infrastructure for geospatial data (such as climate information) that can be used by various organizations. By providing a pre-existing method of data collection, storage, and retrieval to climate scientists, the project will significantly ease the process of collecting and analyzing climate observations. Ultimately, this infrastructure will free scientists to focus on their climate and geospatial data, not on the collection methods.

The data management of this project is designed to be neutral; that is, the data management personnel are not concerned with the

AJAX Request