Delivering an Amazing Web Experience on Every Device: Responsive Design

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Summary
UCSD’s deployment of responsive design transformed thousands of web pages to optimally function on any device on the market today-- and makes them future-proof for devices yet to be developed.

Our redesigned campus site launched using responsive design in January, 2012. Since then, we’ve applied responsive design to 30+ academic and administrative websites in the campus Content Management System (CMS). In addition, our Web Application decorators were retrofitted to be responsive-- so applications now adjust and conform to any device.
As opposed to frameworks that are designed to only support mobile devices, responsive design lets developers build one set of code-- and their site or app looks great on everything from high resolution desktop screens-- all the way down to the smallest phone.

Project Description

The age of the desktop being the dominant computing platform is over!
Computing began in the 60’s with the mainframe. In the 80’s the desktop dominated. In the last couple years, phones and tablets have overtaken desktops and laptops in terms of sales. They are becoming the most important devices we use to access information over the internet.

The millennial generation is the primary audience for our campus websites and applications, and they have a deep connection with mobile devices. Most haven’t known life without them. Higher Ed needs to be prepared to deliver content to this audience on the devices students are using.

The challenge for IT has been how to keep up with this new era of computing given budget and resource challenges.

UC San Diego was an early adopter of mobile technology. In 2009, we contracted with Stanford undergraduate students to develop an iPhone app using existing data feeds and web services. We were one of the first public universities with an iPhone app. It was pretty cool at the time.

The Stanford students started a company that was bought out by Blackboard. And as mobile technology advanced, other mobile platforms came onto the scene such as Android and Microsoft. There was a need to be agile in this space as the technology was evolving rapidly!

The vendor was slow to respond so we decided to pull development in-house and replace the app with the Mobile Web Framework (MWF) platform, originally developed at UCLA.
MWF is awesome! It even won a Sautter Award in 2011!
The Mobile Web Framework is great. It allowed us to migrate off the vendor and utilize a device agnostic solution to build mobile web apps in a distributed way on our campus.

All told, we now have 18 mobile apps built by 5 different IT departments that makeup m.ucsd.edu.

That’s great for the 18 mobile apps but what about the thousands of web pages we have in the CMS?
In the summer of 2011, we embarked upon a project to redesign the campus website to bring it in line with the latest campus branding standards.

When diving into the analytics, we noticed a tremendous increase in traffic from mobile devices and tablets to the UCSD home page:

- Over the past year, mobile traffic increased at about a ½ percent per month.
- Mobile views were now over 10%. That’s double from last year, and over 1,700 views per day.

The birth of Responsive Design
Making our new home page look great on all devices was a high priority, so we began exploring our options. A technique called responsive design was gaining traction.

It began simply as an idea from Ethan Marcotte, who wrote an article in May of 2010 about how we could use existing web technologies in a way that allowed web pages to adapt to the resolution of the device used when viewing site.

Responsive design started out as more of a theory but as adoption began, examples were beginning to emerge.
Responsive Design allowed web developers to:

- dynamically shift where elements are placed on the page
- scale images to different resolutions
- expose or hide certain elements at different resolution breakpoints.

Knowing we’d be one of the first universities to implement responsive design, there was a hesitation to use it on an especially high profile website such as the campus home page. **We didn’t have budget to bring in outside developers or experts**, but the team felt a sense of passion and commitment to utilizing this cutting edge approach. We understood we’d need to “learn on the fly” and the project team was committed to spending the extra time off hours. It was exciting to be an early adopter!

We developed design mockups for how the pages would look at each breakpoint. We targeted screen resolutions and devices that were most prevalent based on our analytics. The designs were vetted and approved by the Campus Web Steering Committee.

At the coding phase, we started thinking ahead. Not only did we want the campus website to leverage responsive design but we felt all websites in the CMS should be able to take advantage of our work on this project. We found open source frameworks began emerging to ensure standardization and cross-browser compatibility. After some research, we selected a framework called HTML5 Boilerplate. **The use of a framework could jumpstart responsive development for the campus site. This in turn would be applied to the CMS templates used by UCSD academic and administrative units for their websites.**

The next step was to build the CMS templates. We use Hannon Hill Cascade Server for our CMS. **The CMS vendor didn’t have much experience with clients using responsive design so we certainly blazed some trails.** We translated our initial HTML & CSS markup into the CMS templates. With some trial and error, we were able to build the templates to work with responsive design.

**We were recognized!**

In January, 2012 we launched the new campus website using responsive design. **It received quite a bit of interest and was featured in a couple online Higher Ed Journals.**

After launch, we spent time collaborating and working with other universities discussing how they could leverage responsive design for their redesign projects.

**We spoke with UCLA, Texas A&M, Notre Dame, and University of Nebraska to name a few.** We collaborated on techniques, processes and even shared code.
Rolling out Responsive Design to the Rest of the UCSD Campus

Since implementing responsive design on the campus website, we’ve been deploying it across many of the sites in the CMS. One of the lessons learned was building CMS templates from the ground-up to use responsive design was easier than retrofitting templates that were built without responsive design in mind.

That said, we were able to work out the kinks and in March, 2012 began rolling out responsive design to as many web properties as possible.

Our goal is to have all the sites retrofitted before the end of the summer. Of course, any new site that comes on board to the CMS from this point forward is responsive by default. **Responsive design is now part of any web development project we do.**

For example, we used responsive design on the redesign of the online Faculty/Staff Directory. We used responsive techniques to hide and show different elements at various breakpoints. Some of the things we did were

- **When touched, the phone number calls the person at the mobile breakpoint.** This is hidden at all other resolutions.
- **The office location of the person listed links to our mobile campus map.** Using the phone’s GPS, personalized walking and driving directions can be accessed to that person’s office building. Again when browsing on the desktop, this feature is hidden.

Going through this process allowed us to recognize responsive design could not only be used for websites but for web applications. Moreover, we could take advantage of the features of the phone with our apps. And still all from one set of code.

Similar to what we did for the CMS templates, we retrofitted our application decorators to be responsive. **Careful thought was also taken to make sure all of the templates conformed to Web Content Accessibility Guidelines (WCAG 2.0).** We made these tools available as a self-service to
campus IT units and began marketing their availability. We knew the more resources leveraging our solution, the better.
Faculty/Staff Directory—Mobile View

The above shows the two different views of the Directory. The screenshot at the top shows what displays when viewing from your desktop. The second screenshot shows how the screen looks on a mobile device. Note the phone number and location turn into links on the mobile view. The phone link dials the number and the location link plots the building on the mobile campus map.
What about the Mobile Web Framework?
There are advantages of continuing to support the Mobile Web Framework to develop Mobile web apps.

Slower connection speeds that exist for mobile devices continue to be an issue. The Mobile Web Framework comes packaged with certain features such as image compression that allow for optimization. On the contrary with responsive design, mobile devices will download all the assets including high resolution images and scale them down for the phone.

Technologies are emerging, however, to address performance, including server side components to deliver “right sized” elements depending on the device accessing the site or app.

Technologies
- **HTML5 Boilerplate**: Provided some core HTML, CSS, and JavaScript to jumpstart the coding of the new designs, including responsive design. It provided fallbacks for older browsers and Internet Explorer.
- **jQuery**: abstractions for low-level interaction, advanced effects, theme-able widgets, interactive web applications for decorators
- **JSP**: rapidly develop and easily maintain dynamic web pages, platform independent for applications
- **Spring MVC**: enterprise java app framework, clean division between controllers, models, and views, open standard for applications
- **SiteMesh decorator framework**: clean and effective way of separating web content from look and feel for applications

Timeframe

**Campus Website Redesign with Responsive Design**
- **8/2011**: Discovery: Defined requirements, got approval
- **10/2011**: Project Kickoff: Developed wireframes, design mockups, technical requirements, and identified project team
- **11/2011**: Coding: developed HTML & CSS, built CMS templates, redesigned key apps to coincide with new design.
- **12/2011 - 1/2012**: Testing: cross browser and device testing
- **1/2012**: Go Live

**Responsive Campus CMS Templates & Application Decorators**
- **9/2011**: Project Kickoff: Developed wireframes, design mockups, technical requirements, and identified project team
- **11/2011**: Coding: developed HTML & CSS and worked in concert with Campus Website Redesign project.
- **12/2011 - 1/2012**: Testing: cross browser and device testing
- **1/2012**: Go Live

**Success Factors**
The following summarizes the key success criteria we set forth at the outset if the project.

<table>
<thead>
<tr>
<th>Success Factor</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deployment of campus site that is optimized for all devices from one set of code</td>
<td>✔️</td>
</tr>
<tr>
<td>Responsive CMS templates that can be used for all websites in the Campus CMS</td>
<td>✔️</td>
</tr>
<tr>
<td>Responsive Application Decorators that can be used by all campus web developers to make their web applications responsive</td>
<td>✔️</td>
</tr>
<tr>
<td>Increased customer satisfaction</td>
<td>✔️</td>
</tr>
</tbody>
</table>

**Predicted Cost Savings**
The following shows predicted costs savings of using responsive design vs. building a separate mobile view of each site and application.

<table>
<thead>
<tr>
<th>Websites</th>
<th>Application Count</th>
<th>Predicted Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>250</td>
<td>$1,056,000 *</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Assuming 80 hours per mobile site at $40 per hour</td>
</tr>
</tbody>
</table>

*Assuming 80 hours per mobile site at $40 per hour*
Customer Satisfaction Responses

“VERY nice results. This should serve as a great prototype for the rest of us.”

-- Vice Provost, Libraries, Computing and Technology
Michigan State University

“Nice job on the redesigned site - it looks great! Brandon, one of our developers copied here, is interested in discussing the technical details behind the site - frameworks used, etc. Would you be willing to share details/possibly have a conversation with him?”

-- Sharif Nijim, Enterprise Architect at University of Notre Dame

“I like the new steam-lined design. It is an interesting shade of blue. I like it. I think it is great that you mined the talent that is the staff at UCSD instead of outsourcing the design and production.”

-- Robin Ross, UCSD Human Resources Specialist

“I Love It! Browsing using iPhone and iPad is so, so much better!! Great job!”

-- Marisela Sevilla Garcia-Centeno, Manager, UCSD Cashiers Office

“Congratulations on the new redesign! I think that is a huge improvement to the home page. I am happy that a decision was made to implement a responsive design, it is really essential in this world of mobile computing.”

-- David Drabik, Student at UCSD

“I love your new website http://www.ucsd.edu/. The responsive design is great and the documentation at the campus web office is very well organized and helpful. http://cwo.ucsd.edu/”

-- Scott Gruber, Web Developer, UCLA International Institute
Recognition
The following provides some links to recognition we received by various online resources.

Q&A Performed with Doug Gapinski in regards to our use of responsive design.

Featured on Media Queries website which showcases top examples of responsive design

http://mediaqueri.es/ucs/
Featured on CMS vendor website for our use of responsive design