This paper is a publication of the ECAR Mobile Strategy and Application Development (ECAR-MSAD) Working Group. ECAR working groups bring together higher education IT leaders to address core technology challenges. Individuals at EDUCAUSE member institutions are invited to collaborate on projects that advance emerging technologies important to colleges and universities. ECAR-MSAD works to develop and promote collaborative mobile strategies across higher education institutions.

A dean of a well-known school of engineering was told by his IT team that his website worked on mobile devices. He then proceeded to boast this fact to his department chairs in a broader campus discussion, at which time the group brought up the site under discussion and shrunk down the screen to the size of a mobile device. The site “adapted”—but shrunk down to a completely unreadable view, making it clear to everyone in the room that the site was not, in fact, using responsive web design.

Introduction

In higher education, nearly every user interaction that takes place on a desktop or laptop browser is also attempted using phones, tablets, watches, and more. From visiting websites to registering for classes, finding campus locations, and checking grades, people interact daily with institutions using mobile devices—often while on the go—whether the information is optimized for those devices.

Even if you already have a robust mobile strategy¹ and a robust web strategy, you want to be sure to have a mobile-friendly web strategy. As students, faculty, and staff increasingly access campus information via mobile devices and tablets²—often before they arrive on campus for the first time³—the need to ensure that campus information and services can be easily and effectively accessed grows. The expectation that any device can effectively access institutional online resources is spreading rapidly. First impressions are being made when our sites are accessed from these devices, and we need a responsive solution to efficiently and proactively provide an effective user interface, irrespective of device size and type.

What Is Responsive Web Design?

Responsive web design (RWD) applies standards-based technologies to create websites that transform to fit the user’s needs and capabilities, considering aspects such as screen size, pixel density, context, bandwidth, and battery life, among others. Although many of its underlying technologies are not new, the term “responsive web design” wasn’t coined until 2010.⁴ Since then, it has become the de facto standard...
for building websites, gaining support from industry leaders such as Google. RWD is considered a future-friendly approach because it doesn’t rely on “hacks,” which often break as browser features improve, or on device databases that require ongoing maintenance to avoid becoming stale.

With RWD, each URL provides the same HTML to all visitors and leverages “media queries” in cascading style sheets (CSS) to design the content so that it renders optimally for the visitor’s device size. Content collapses to fit on small devices and expands to make the best use of more real estate on larger devices. It allows web developers to create a single site supporting all types of devices instead of having to create different views for phones, tablets, desktops, TVs, wearables, etc.

A well-designed responsive site is transparently optimized for viewers. Someone viewing a responsive site does not have to know anything about responsive design. All they know is they’re having a great experience that feels catered specifically to their device.

**Why RWD Is the Strategic Choice for Higher Education**

Today’s prospective, digital-native students begins researching campuses on the device in their hand, while in line at the grocery store or coffee shop, or while waiting in the guidance counselor’s office for their college selection session. Will you welcome students with awkward scrollbars and pinching activities or with an experience that feels modern, fluid, and fun? Users’ opinions are formed with the first experience. Can you afford to market a degree that is represented by dated, deprecated technology delivered with a poor experience? If you can’t communicate a technology-savvy brand with students on the devices they prefer, you may be losing out.

There are costs associated with implementing RWD, such as spending more effort on planning a website, more effort on the user experience, and more effort on the coding. However, not implementing has costs as well. The best web developers currently see mobile as an extension of their environment, not as a separate effort. Mobile-friendly app stores often will not link to websites that are not capable of RWD. Most higher education native mobile apps eventually deposit users on their campus gateway sites for detailed data; do you want your prospective students to feel as if the experience was seamless and smooth or clunky, slow, difficult, and outdated?

Educational institutions that implement RWD should include it as part of their overall mobile and web strategy to achieve an efficient method of information delivery to their numerous audiences on the web. Each higher education institution has a diverse community that comprises many audiences: prospective, incoming, and current students; alumni; parents; faculty; staff; researchers; visitors; et al. RWD is the most effective way to deploy content to these users, given the explosion of mobile, tablet, and other device screen sizes, which, by 2014, had grown to more than 150 sizes for the Android OS alone (see figure 1).
The institution provides a broad online content repository in the form of admission requirements, events, news, sports outcomes, dates and deadlines, academic program requirements, research breakthroughs, and more. The crux is that each visitor cares about some subset of this content and wants to access it on-demand, anywhere, using any device. The problem is not solved by a university’s providing standard computers for students and employees because that ignores the devices used by prospective students, parents, employees at home, collaborating researchers at other institutions, alumni, fans, and any others without usable access to the institutional content. Developing a custom mobile site for each type of device cannot economically scale to the rapidly growing number of devices and implies future work as new devices emerge on the market. RWD offers the most cost-effective way to meet this demand by using a single site with a flexible interface to cater to all types of devices, including tomorrow’s.

This trend toward RWD has already prompted significant movement in the educational sector. In 2014, of the 100 top Business Week higher education institutions, 43% are deploying their flagship .edu website using responsive web design. Where specialized functionality is required (e.g., for Google Glass to make the campus more navigable for people with sight disabilities or for other specific devices, such as in the case of unique research or field work), utilizing a strategy of “native as needed” can call for an institution to leverage mobile-specific web frameworks or native apps downloaded from vendor app stores. Although there may be times when it is necessary or strongly desired to build a native environment for a particular device, most content typically doesn’t need to have such treatment.

**Critical Success Factors for Delivering RWD**

Three critical success factors are required to consistently produce RWD websites:

- **Look and Feel**: Without a consistent design and navigation providing continuity and brand recognition across your site, you risk confusing or, worse, losing your audience.

- **Usability**: RWD is designed so that content is equally available across devices. Poor usability means that users won’t be able to find or consume your content.

- **Performance**: Poor performance will be perceived as a site that is outdated, if not broken. Content that isn’t digestible by mobile devices—e.g., when websites try to send large images over a “small” data pipe—will cause your users to only see your web pages spin and spin rather than being able to get to the content.
RWD fundamentally shifts the web development landscape. It requires expanded skill sets and closer communication, forcing web teams to rethink how they develop sites and interact with one another. Understanding RWD is not just about things working—it’s about them working smoothly all the way through the experience.

**Consistently Delivering High-Quality RWD Sites Requires a New Team**

When implementing responsive design, gone are the days of web designers, developers, and writers working in isolation; instead, an effective team is an integrated team:

- **Web Designer**: Pixel-perfect mock-ups and wireframes do not fit the responsive design paradigm; instead, web designers must consider an ever-changing screen size and work closely with web developers to create designs that reflow based on the visitor’s device.
- **Web Developer**: A programmer who is expert in web applications, the developer implements the brand the designer has created.
- **User Experience (UX) Designer**: The reduced screen size and capabilities of mobile devices present challenges around site content and navigation. A UX designer guides design decisions and coaches content owners on their expectations to ensure an experience that behaves well on all devices.
- **Web Writer**: Print material, and even material written for desktop sites, does not necessarily comport to a responsive context because of the reduced screen size on some devices. A web writer reduces and transforms content to make it effective and consumable on all devices.
- **IT Cloud Provider**: When working with cloud providers, IT departments need to be aware of the provider’s commitment to RWD at the onset of a new agreement, including RWD as a requirement in RFPs and a clause in their contracts.

Relatively few universities have large teams dedicated to developing websites. To build your new web team, it may be necessary to identify people across campus who have the skills to fill in gaps.

**IT’s New Relationship with Campus Content Stakeholders**

RWD has changed the way teams work with content stakeholders. Because of the smaller screens on mobile devices, decisions around content are key. The goals of the site should be defined first, providing a lens for content creation. Only after content is created should coding begin. This allows for an iterative development cycle where developers build and test across multiple platforms, browsers, and devices. Ideally, having resources to assist the stakeholders with user experience and information architecture during this process will deliver the best results, ensuring that end users will be able to locate information and complete tasks on all devices.

**The Nuts and Bolts of RWD**

Three concepts lie at the core of responsive design:

- A fluid grid where the layout is defined proportionally rather than with fixed dimensions
- Flexible images and video that scale to fit within the grid
- CSS rules designing layout and typography for devices based on their size

Together, these concepts allow a browser’s rendered web page to adapt and transform, based on the dimensions of a device.
Modern versions of all major web browsers support responsive design; nonetheless, challenges exist around implementing it successfully. Responsive layouts render differently at different screen sizes, meaning designs cannot be represented by a static mockup. Once designers embrace this flexibility, they must also learn its limits, as not every combination of layouts is possible. Issues also arise in the responsive context for some seemingly simple elements. For example, images properly sized for a desktop monitor are excessively large for a mobile screen; deep navigation menus may be cumbersomely long on smaller screens; and tables do not collapse well because they lose their tabular meaning.

Responsive design has matured substantially from its early days. Today, a number of frameworks exist that jumpstart development and solve responsive challenges. Frameworks are usually pretested across a wide range of devices and platforms, minimizing errors and rework and allowing developers to focus on applying rich interfaces rather than implementing the nitty-gritty of responsive design. Additionally, frameworks may provide training, documentation, and communities of practice. Frameworks are not silver bullets, though. Their sheer number can overwhelm the selection process. Once a framework is selected, developers require time to learn it, and the institution becomes bound to its continued success. Further, frameworks often come with added overhead, and sites using common frameworks sometimes receive criticism for feeling too similar to others.

As the web platform continues to grow, so too will the practices around responsive design. Currently, responsive design focuses on device dimensions, but browsers are now exposing additional details such as network telemetry, ambient light, and battery life. With this information, responsive sites may soon also adjust media quality and colors and exhibit other behaviors to best fit a user’s needs and a device’s capabilities.

Although there are several approaches to developing a responsive website, any approach should follow several best practices for keeping the site organized and usable.

**Content Inventory**

Catalog all content, keeping the best and most relevant information, condensing areas that overlap and eliminating anything that’s not required. Commonly, the mobile experience is designed first for responsive sites, focusing a site’s content and message on a small screen and progressively enhancing it for larger screens because it is easier than forcing a desktop site into a smaller space. An obvious approach for condensing content for a responsive site is to follow the web’s most solid writing practices: crafting text that is to the point, using bullet points or other formatting to highlight main ideas, and eliminating the fluff.

**Navigation**

Once the content for the site is identified, the content should be organized into logical and intuitive categories. These categories should drive the main navigation of the responsive site. The limitations of screen size greatly impact site navigation. Where a desktop site easily accommodates multiple navigation regions, a smaller screen requires highly intuitive and organized navigation. It must be as simple as possible so that users can easily and logically reach the information most relevant to their needs. As with developing content, this practice requires immense focus to deliver visitors to the key navigation points and restraint to avoid overcomplicating the mobile navigation experience.
Maintenance

After a responsive website is built, there comes the complex task of maintaining the site and optimizing it for daily visitors. Ensuring the sustainability of a responsive site requires communication and an understanding of the differences in presenting content in the responsive context. A responsive website requires that—like existing content—new content be as effective on the smaller screens of mobile devices as it is on larger screens. Additionally, care must be taken that a responsive site does not lose sight of its goal of being responsive and, over time, turn into a collection of non-mobile-optimized content, including tables, high-resolution images, PDFs, and extended lists.

Conclusion

More and more, responsive web design is becoming a critical pillar of an institution’s overall mobile strategy. Device manufacturers continue to develop web-enabled devices in ever-expanding resolutions and capabilities. Companies including Google, Apple, Samsung, and others are looking for the “next big thing,” and many suggest wearable technology may be the next shake-up in the computing landscape. Whatever new devices come, they will likely add yet another set of dimensions and capabilities to the already vast landscape, and there is no guarantee that any particular types of devices will remain the primary delivery platforms for information. As a result, it is critical to ensure that the data and content that power our websites and applications are available so they can be consumed in many different ways.

Our job, as IT agents, equates to that of the traditional packaging, warehouse, distribution, and delivery person. We are the final link in a long chain of effort that builds our institution’s reputation and brand because our product—aside from educating students—is largely information. We need to make the consumption of our institutions’ information easy, seamless, and pleasant. This is the core value-add of responsive design: It is future friendly and optimizes websites for the devices of today and those of tomorrow.

Acknowledgments

For in-depth information on responsive web design, the EDUCAUSE 2013 Annual Conference Workshop conducted by ECAR-MSAD on Responsive Web Design features additional resources discussing the basic tenets of responsive web design, including topics such as user experience and best practices, the evolution of HTML5 and CSS3, and more. Learn more about the ECAR Mobile Strategy and Application Development Working Group.

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Notes

1. For more information on mobile strategy, the January 2013 paper Developing a Campus Mobile Strategy: Guidelines, Tools, and Best Practices provides guidelines for evaluating and selecting a mobile web framework based on an individual university’s characteristics, resources, strategies, and needs.

2. According to the report ECAR Study of Undergraduate Students and Information Technology, 2013, “Undergraduates own two to three Internet-capable devices, and ownership of smartphones and tablets jumped the most (among all devices) from 2012 to 2013.” The report also noted, “Mobile-device access to institutionally provided services, applications, and websites is up, though performance ratings are waning a bit compared with 2012.” In addition, the Pew Research Internet Project’s Mobile Technology Fact Sheet reports that, as of January 2014, “90% of American adults have a cell phone” and “58% of American adults have a smartphone.” When looking at adults ages 18–29, the percentage of smartphone owners jumps to 83%.

3. According to the Noel Levitz report 2013 E-Expectations Report: The Impact of Mobile Browsing on the College Search Process, “68 percent said they have viewed college Web sites on a mobile device.”


5. Google officially endorsed RWD as its preferred method for supporting all devices.


7. This finding is based on a study conducted in spring 2014 by Chris Ward, director of web services and mobile development at Kennesaw State University and one of the authors of this working group paper. He visited the institutional websites of the Business Week top 100 schools to determine if there was evidence of media queries and whether the page demonstrated a break point to gauge whether the site was designed to be responsive. His findings are somewhat contradicted by the 2013 ECAR report Progress in Meeting Demand for Mobile IT. In that report, institutions that indicated they were either sparsely or widely deploying mobile services (versus just planning or not deploying at all) were asked, “Which is your general approach to the design of the following institutional services, applications, and websites?” Of the 219 institutions that responded, 84% indicated they are using responsive only for their web presence, while another 3% indicated that they are doing responsive and mobile optimized; 11% said they are only doing mobile optimized, and 3% said neither. The authors of this paper have noted that there is still some confusion about what RWD entails and that at times sites that have been called responsive are, in fact, not entirely so. This discrepancy is, indeed, one of the impetuses for this paper.