

# Going Mobile: A Guide to Mobile Website and Application User Preferences

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## **Abstract**

Mobile devices are rapidly gaining popularity. There is an increasing demand for individuals who can develop quality mobile websites and applications. In the world of mobile, the most important consideration is the end user. Who is the application or mobile website trying to target and what do they want?

This study was designed to determine what users value and whether current developers are accurately reflecting these values. Determining this was accomplished through surveys of mobile users, interviews with mobile web developers, and analysis of successful websites and apps through case studies. The survey included questions to determine what qualities mobile users find valuable. The interviews with mobile developers determined what qualities web developers value when designing, and whether the end user is a significant determinant for design. Lastly, an analysis of top mobile websites and apps searched for trends in successful site and app design based on user responses.

The study found that users rarely utilize their web browser, preferring native applications to a mobile web site. Simple, intuitive, and clear navigation and layouts are preferred by users. Web developers seem to recognize the importance of the end user and often place themselves in the shoes of the user to determine design. Speed and responsiveness are important considerations for developers. Often, the client inhibits efficient design, but can be swayed when the benefits of a more usable app are explained. The most important consideration for a developer is following the current standards of design.

## Chapter One: The Rise of Mobile

The last five years have seen dramatic developments in the way users interact with the web. One of the most prominent changes has been the introduction and widespread adoption of the “smartphone.” As defined by PC Magazine, a smartphone is

a cellular telephone with built-in applications and Internet access. Smartphones provide digital voice service as well as text messaging, e-mail, Web browsing, still and video cameras, MP3 player, video viewing and often video calling. In addition to their built-in functions, smartphones can run myriad applications, turning the once single-minded cellphone into a mobile computer (PC Magazine).

Currently, about 40 percent of mobile phone users own a smartphone according to Nielsen Media Research, and they expect smartphones to overtake feature phones—phones with capabilities greater than voice calling, but not as versatile as a smartphone—in sales by the end of 2011 (Kellogg).

Because of this increase in usage, it is increasingly important to configure websites to be “mobile-friendly.” This is accomplished first by modifying the content of a site based on the device being used to view it. Users do not want to be forced to zoom; they want the content correctly sized from the beginning. Smartphones have a smaller screen and generally lower resolution. Mobile websites should highlight important information rather than display a minimized view of the whole web page. Imagine a person wanted a map of California. He or she could buy a world map and use a magnifying glass to look closely at California, but it would be more convenient to have a legibly sized map of California.

Apart from resizing content, web developers and designers must also determine what their end users value. This should drive the design. The old adage, “the customer is always right,” applies to web development as well. Web designers need to keep the end users in mind when designing for mobile devices, and cater to their needs. This study sought to prove that

stripping away unnecessary features and providing a simple user interface that retrieves information quickly is paramount. This is what users want, and this is what a mobile website or app needs to accomplish.

Mobile users may use a variety of applications (apps). An app is a program that performs a certain function and provides a service. Apps can either be downloaded onto the device or accessed on the web. Those downloaded directly to the device are called “native apps” because they are created specifically for that device. An iPhone app will not work on an Android device because it is made specifically for the iPhone. Web apps share similar qualities to native apps, but live on the web.

Both of these types of apps can be organized into ten groups: news, entertainment, utilities, games, productivity, search tools, social networking, sports, travel, and weather. Though each category focuses on a specific area, successful apps in all categories, with the possible exception of games, share similar qualities that contribute to their success.

When mobile users access a website, native app or web app, they want to find what they are looking for instantly. Whether this be information, news, or a friend’s profile, speed and ease of use are supreme. These principles are even more important with mobile apps. Apps must be especially fast and convenient. To justify downloading and installing an app, a user must believe it will be worth the extra setup as opposed to going to the actual site every time. For this reason, the app should improve speed of use or add simplicity. Take for instance, the Facebook app. Facebook can be accessed through a mobile browser or using the app. To replace mobile browsing, the app has to add value. It does this by removing some of the dispensable features and giving the user what he or she wants – the essentials. There is a distinction between a static website that is formatted for mobile and an app. A website like Yahoo! provides services including news articles, email, and an Internet search function. These services validate a need for an app. A website for a law firm likely includes information

that rarely changes, so an app is not necessary.

The purpose of this study was to determine what users value in mobile websites and apps, and whether mobile developers are accurately reflecting this when designing. Determining this was accomplished through surveys of mobile users, interviews with mobile web developers, and analysis of successful websites and apps through case studies. The survey included questions to determine what qualities mobile users find valuable. The interviews with mobile developers determined what qualities web developers value when designing, and whether the end user is a significant determinant for design. Lastly, an analysis of top mobile websites and apps discovered trends in successful site and app design based on user responses.

## Chapter Two: Types of Mobile Support

Mary Meeker of Morgan Stanley, an Internet analyst once dubbed “Queen of the Net,” has predicted that mobile browsing will overtake desktop browsing by 2013. She notes “that mobile Internet usage is ramping up substantially faster than desktop Internet usage did, a view she and her team arrived at by comparing the adoption rates of iPhone/iPod touch to that of AOL and Netscape in the early 1990s” (Ingram). Yet despite the prevalence of mobile devices, companies do not seem to understand what the trends indicate: the age of the desktop browser may be coming to an end.

In October, 2010, Adobe Scene7 performed a large market survey on mobile web browsing. Scene7 claims,

Businesses that invest early in mobile will benefit, as current consumer expectations lag the technology, as corroborated by our survey. For instance, most respondents are not differentiating between mobile- and PC-optimized websites and they appear largely satisfied with the small-screen experience. With consumers not yet driving expectations for mobile, it’s a great opportunity for businesses to get ahead of the curve, staying tuned to changing behavior and user demands (Adobe).

When a feature becomes well-established, the “wow factor” is removed. Conversely, utilizing a unique feature before it becomes commonplace can help secure customers, thus accomplishing the goal of nearly every website.

Mobile users do not simply visit sites, they are constantly downloading and even buying physical goods. In Adobe’s survey, 43 percent of the respondents purchased movies, music, or games (entertainment) from their mobile device within the last six months. Thirty percent purchased physical goods like jewelry, shoes, or clothes within the last six months (Adobe). The fact that mobile users are becoming more comfortable with processes that have

traditionally been the realm of desktop browsing reinforces the idea that mobile devices are taking over.

Making a website “mobile-friendly” requires extra thought and effort, which can mean more time and money for a business. Some businesses have begun to realize that the extra effort is well worth increasing customer awareness and satisfaction through mobile device support. In a 2010 study conducted by the Acquity Group, only 12 percent of the top 500 Internet retail businesses had “mobile-friendly” websites (up from 4 percent in 2009). In their 2011 study, the Acquity Group reports a 210 percent increase in mobile device support, as 37 percent of the previously surveyed retailers now have a mobile site. The percentage of top retailers with a mobile site has tripled every year since 2009, indicating that there is a need for web developers who can bring the remaining companies into the new age of mobile (Acquity).

## Html and Css: The Basics

Before discussing mobile web design, it is important to cover the basics involved in all web design. To make any website, mobile or otherwise, web designers must know how to build a website using hypertext markup language (html) and cascading stylesheets (css). Html is a way to describe a webpage that uses tags to indicate specific types of content.

```
1 <html>
2   <head></head>
3   <body>
4     <h1>First heading</h1>
5     <p>First paragraph</p>
6   </body>
7 </html>
```

**Figure 1: A Basic Html Page**

Figure 1 shows a basic html webpage. Everything contained within the html tag indicated by the <html> is part of the page. The head tag contains non-visible information and links to relevant documents. Everything within the body tag is part of the visible content.



The h1 tag indicates a level one heading and the p tag indicates a paragraph. Each tag is opened and closed, which is indicated by a slash before the tag name. An example of this is the </body> which closes the body tag. Html also utilizes special identifiers (ids) or classes. Ids and classes are names assigned to a particular element that can be called upon to target a more specific part of a web page.

One means of targeting these html components is css, which links elements, ids, or classes with stylistic properties like font-size, color, background-color, and many others. The css is what determines how a page will be displayed. Css can use inline, embedded, or external stylesheets.

```
1 <p style="color:red;">Paragraph</p>
```

**Figure 2: Inline Css Style**

Figure 2 is an example of an inline style. It only applies to one specific element. The entire piece of code must be copied in order to apply the style to multiple elements.

```
1 <head>
2   <style type="text/css">
3     p {color:red;}
4   </style>
5 </head>
```

**Figure 3: Embedded Stylesheets**

Embedded stylesheets, as in Figure 3, apply only to the html document they are contained within. The stylistic properties in the embedded stylesheet do not affect other pages in a website.

```
1 <head>
2 <link rel="stylesheet" type="text/css" href="styles.css" />
3 </head>
```

**Figure 4: External Stylesheets**

Lastly, external stylesheets, as in Figure 4, allow multiple pages to use the same styles, and are therefore more useful and efficient to use. This creates a link to a document called “styles.css,” which contains stylistic properties that apply to any page that links to it, unless the style is overridden.

If two styles conflict, the way a style is declared will determine which style is used. The “cascading order” is: browser defaults, external, embedded, inline. This means that a style that is inline will override any other type of style, and a browser default style can be overridden by any type of style.

## **Best Practices**

When designing for the mobile web, developers should follow “best practices” set forth by the W3C (World Wide Web Consortium). The W3C “is an international community that develops open standards to ensure the long-term growth of the Web” (W3C). The W3C gives advice on different topics such as pop-ups and new windows, navigation, device capabilities, and page content.

Mobile devices do not have the capabilities of desktop computers. The rate at which the device can download parts of the website, called “bandwidth,” is significantly slower than a desktop computer. Some important considerations include removing items that slow page loading to compensate for lower bandwidth on mobile devices, simplifying navigation, limiting scrolling to one direction, and condensing content for quick scanning. All of these help speed up web page downloading to improve the users’ experience.

When it comes to content, “Users in a mobile context are often looking for specific pieces of information, rather than browsing. Content providers should consider the likely context of use of information and, while providing the option to access all information, should offer appropriate information first” (W3C). The visitor is the customer, and should be the central focus of the website, especially for a mobile-friendly site. The W3C says,

“Mobile users often pay for bandwidth, so offering them content that is extraneous to their needs, especially advertising, costs them time and money and contributes to an unsatisfactory experience.” The “extraneous” content should be stripped away to give the user the most efficient and pleasant experience.

## Types of Mobile Support

In the Smashing Magazine article, “Picking a Mobile Support Strategy for your Website,” Matt Lawson describes four types of mobile support. In order of increasingly complexity, these four methods are: a tweak to your existing site, adaptive layout (media queries), a dedicated mobile website, and native apps.

To convert a website from desktop to mobile, developers can use css media queries, which are the preferred method and use separate css stylesheets based on the device being used to view the website. To call upon a specific stylesheet based upon the device, a max-device-width needs to be added to the link in the <head> of the html document.

```
1 <link rel="stylesheet"  
2     type="text/css"  
3     media="only screen  
4     and (min-device-width: 320px)  
5     and (max-device-width: 480px)"  
6     href="iPhone.css" />
```

**Figure 5: Css Media Queries in the Head of the Document**

This code asks if the device has a screen with a horizontal resolution (max-device-width) of 480 pixels (px) or less. If this is true, then the browser is viewing the site from a small screen like an iPhone, and the page loads the stylesheet for the iPhone (iPhone.css). Having both min-device-width and max-device-width accounts for portrait and landscape display for devices that rotate and resize content based on the orientation of the device. An example of this is the iPhone, which will display differently if held differently. If the device width is greater than 480 pixels, the link is ignored, and the design is unaltered (Marcotte).

Other resolution sizes can be added to account for iPads and other devices. In his article, “Hardboiled CSS3 Media Queries,” Andy Clarke provides additional resolutions for most major mobile devices including iPad portrait and landscape, iPhone portrait and landscape, and widescreen.

Instead of creating a separate stylesheet for different devices, media queries can be called inside of the css stylesheet, as seen in Figure 6.

```
1 @media screen and (max-width: 480px) {  
2   body {color: red;}  
3 }
```

**Figure 6: Inline Css Media Queries**

This code is placed inside of an existing stylesheet, and can be used to target elements only for specific screen widths. This is usually used to resize and reorganize elements of a web page to more effectively fit the desired screen width. After adding this extra code in the current or separate stylesheet for different sized devices, the website can now be modified based upon the device being used to view it. Changing the structure and design to adapt for mobile make the site more equipped to handle the growing mobile market.

A dedicated mobile site is a completely different website than one accessed on a desktop computer. When browsing on a mobile phone, some websites redirect to a mobile version of the site. This is often indicated by an “m” before the normal web address, like m.yahoo.com. Although this requires creating another website, it holds many advantages over an adaptive layout. Unnecessary content can be completely removed, rather than just hidden, which improves load speed. The layout can be completely customized to be more intuitive and clear. Lastly, a mobile version of the site can give the appearance of a native app but works on all devices (Marcotte).

Many go one step further and create mobile apps that users can download to more efficiently access information. To justify this choice, the company must have a service to offer

that can work as an application. Static websites do not warrant an app. As Nicole Perrin, a senior marketer at eMarketer says, “Just because you can create an app for that doesn’t mean you should” (eMarketer).

Determining whether an app is necessary might also include a look at the target demographic a company is focusing on. For instance, men “appear to be more active on their devices, shopping and spending more than women” (Adobe). Also, the activities of different age groups can help determine site hierarchy. The age group 18-29 check reviews almost twice as much as the 50-64 age group, so a site focused on reviews may want an app if targeting the younger age group. Many sources of market research show data on the activities, preferences, and trends in mobile browsing and apps, but specific analysis should be based on a company’s unique goals and target markets. This study will provide guidance for web developers and businesses who are interested in capitalizing off the growing mobile marketplace.

## **Chapter Three: Research Methods**

The purpose of this study was to determine what users value in mobile websites and apps, and whether mobile developers are accurately reflecting this when designing. Determining the perspectives of both users and designers required three types of research: elite and specialized interviews, descriptive research, and content analysis. Although consumer preferences are based on individual tastes, and are therefore not easily quantifiable, these methods give a descriptive look at the end-user and developer strategies and preferences.

### **Elite and Specialized Interviews**

According to “Some Ideas about Doing Research in Graphic Communication,” by Harvey Levenson, “the Elite and Specialized interviewing procedure requires asking precise, open-ended questions, but questions that are open to refinement as the research and interview continues” (Levenson 26). Three web developers were interviewed, each representing a slightly different cross-section of the market. The first was Randy Scovil, a computer science professor at Cuesta College and founder of Yes We Do Apps. The second was Nathan Mock, an iOS developer at LEVEL Studios and co-founder of Grapple, a startup social bucket list application. The last was Justin Helmer, the head of research and development at M29, a web-based software solutions provider. All three provided a unique look into the strategies of app developers.

### **Descriptive Research**

Descriptive research studies “are designed to determine the nature of a situation as it exists at the time of the study” (Levenson), and was used in two forms: a case study and a survey.

In the case study, twelve subjects were selected to test two web apps and two native apps. As case studies emphasize “understanding the reasons that an individual or a group does what it does and how behavior changes in response to the environment (Levenson),” this case

study was designed to assess the preferences of mobile users by analyzing user responses to web apps and native apps falling under two categories: simple navigation and complex navigation. Simple navigation contains four or fewer main navigation items including a search bar. Complex navigation uses five or more main navigation items. A main navigation item is a link to a new page that is grouped with others, and is often indicated by icons that segment the content into categories.

The two web apps tested were imdb.com and yelp.com. Imdb.com was considered simple, and yelp.com was considered complex. The two native apps tested were Groupon and Staples. Groupon was considered simple and Staples was considered complex.

Limiting the time allowed per site/application to one minute simulated everyday use of a mobile device, where accessing information may be time-sensitive. They were then asked to rate the ease of use, navigation, and potential improvements.

The case study was organized as follows:

1. On a scale from 1-5, how easy was this site/application to use?

1 = Hardest – The site/application was difficult to understand and use. It did not make sense to use.

2 = Harder – The site/application could be understood, but was inefficient and poorly composed.

3 = Neutral – The site/application could be understood, but some aspects caused confusion or hesitation.

4 = Easier – The site/application was easy to use, but a few aspects caused confusion or hesitation.

5 = Easiest – The site/application was easy and efficient to use. I was never in doubt or confused.

2. On a scale from 1-5, how easy was the navigation to find?

1 = Hardest – The navigation was difficult to find. It was either hidden or non-existent.

2 = Harder – The navigation could be found, but was not well placed.

3 = Neutral – The navigation could be found, but was somewhat difficult to find.

4 = Easier – The navigation was easy to find, but could have been placed in a more convenient location.

5 = Easiest – The navigation was obvious and easy to find.

3. On a scale from 1-5, how easy was the navigation to understand?

1 = Hardest – The navigation was difficult to understand.

2 = Harder – The navigation could be understood, but caused some confusion.

3 = Neutral – The navigation could be understood, and caused very little confusion.

4 = Easier – The navigation was easy to understand, but could have been improved.

5 = Easiest – The navigation was clear and needs no changes.

4. On a scale from 1-5, how satisfied are you with the site/application?

1 = Unsatisfied – The site/application provided a poor user experience.

2 = Somewhat unsatisfied – The site/application had few redeeming qualities, and needs many changes.

3 = Neutral - The site/application provided an average user experience and needs some changes

4 = Somewhat satisfied - The site/application provided a good user experience and needs a few changes

5 = Completely Satisfied – The site/application provided a good user experience and needs no changes



To accompany your personal preferences, list two things you would change about the site/application (If answer to previous question was 5, please insert “No changes needed”)

This process was then repeated for the remaining sites and applications. The sites and applications categorized as “complex navigation” were expected to yield lower results on questions one through four.

The next aspect of descriptive research includes a survey. The survey targeted both males and females the 18 to 34 ranges, as this age group is the most smartphone-saturated. According to Nielsen research Group, 62 percent of mobile users age 25 to 34 own a smartphone. Fifty-four percent of mobile users age 18 to 24 also own a smartphone (Ogasawara).

The survey asked:

1. How old are you?

- a. 18 - 24
- b. 25 - 34
- c. 35 - 44
- d. 45 - 54
- e. 55 - 64
- f. 65+

2. Do you own a “smartphone?” (If answer is “No,” you may submit the survey)

- a. Yes
- b. No

3. What are your three most-used mobile applications? (Two or more times per day)

4. What are your three most-used websites on your mobile device? (Two or more times per day)

5. If given the option to use an application or a website, which do you prefer?

a. Mobile Application

b. Website on my mobile phone

The first question allowed results to be separated into age groups. This can drive decision-making for companies that develop mobile websites and applications for certain markets which may target specific age groups. The second question provided data on the percentage of smartphone users versus non-users. Non-smartphone users are not affected by the development of mobile websites and applications, and are therefore were required to answer the remaining questions. The third question gathered information on popular or successful mobile applications and helps show what activities are normal for a mobile user. The success of a mobile application can be measured by the number of uses per day, week, month, or year. Gathering data on applications that users defined as “most-used” determined what applications are most successful in the subject group. The fourth question provided similar results about websites. Because websites include web apps, these results determined if users regularly use static websites or web apps when using the mobile browser. The last question gave insight into the preferences of users with respect to websites and applications. This can drive decisions on whether to create a mobile app or use only a web app.

## **Content Analysis**

Content Analysis for Elite and Specialized Interviews categorizes responses into two categories: user-centric and client-centric. When asked about the most important considerations when designing mobile application or websites, a response was categorized as

“user-centric” when it placed importance on the user experience over other considerations and “client-centric” when it placed importance on the client’s requests over the needs of the users.

Content Analysis for the case study quantified user satisfaction with a five-point scale. All questions yield a result of high satisfaction from high numbers. The results were filtered by the type of website or application (complex or simple navigation). The average level of satisfaction (indicated by a high or low number) determined overall popularity.

Content analysis for the survey filtered results by age. The multiple choice questions were tallied to determine smartphone usage in each age group, and preference for mobile website or application. The user-submitted results were tallied and inspected for repeat answers which indicated which applications are most popular.

## **Chapter Four: Results**

### **Elite and Specialized interviews**

Randy Scovil, Yes We Do Apps

The first person interviewed was Randy Scovil, the founder of Yes We Do Apps, a San Luis Obispo-based mobile app development company. Scovil is a professor at Cuesta Community College, and pioneered a mobile app development course. He saw that mobile was on the horizon, and decided to learn how to make apps in iOS and Android. Eventually, in January of 2010, he taught the first iOS class offered at Cuesta College. He also created an iPhone app for Cuesta College, which was the first iOS app for a California college. Scovil has become very involved in creating a community of mobile app developers in San Luis Obispo. He started a local chapter called the Cocoa Heads, an Apple coding user group, and speaks regularly to local technology and entrepreneurship groups.

Scovil explained the typical process for a creating new mobile app at Yes We Do Apps. First, he has to figure out what the app is supposed to do or accomplish. The client may have an idea, but this is usually up for change and adjustment. Another really important aspect of this is determining what the app should not do. This may be just as important. The organization is next. This includes determining what is static and what is dynamic. Some portions of an app may need very regular updates, so accessing a web database may be necessary. If possible though, a local database can perform better. The drawback is that updating this local database in the app may be difficult.

It is usually beneficial to determine what type of app is being developed. Xcode, the software used for developing in iOS, separates these into a few different project types including view-based, split-view, tab bar, utility, and navigation-based. These help to guide the user interface. The question is: What information does the user need, and how can the user

find this information in the fewest number of steps?

Scovil has found that despite the preconceived notions about the ultimate design of the app, clients typically want to be educated. They are curious about how apps are made and want to learn more about the process. Yes We Do Apps takes some time to explain the process in simple terms when the client asks.

When determining the design and user interface, Scovil has found that getting feedback early in the process is crucial. This is usually accomplished with representative screenshots and working prototypes that are submitted for approval. Because of budget and time constraints, he starts with what is feasible first. Some of the less crucial elements may be excluded and saved for future updates if necessary.

As previously stated, deciding what the app should not do can be very important. Determining what the end user wants often comes down to the easiest, and therefore less costly and time consuming components. In the end, the client makes the final decision, but they may need some guidance and advice. Some important considerations include the bandwidth necessary for the app to run smoothly and responsively. The developer may need to ask: What can the app offer if connection is limited?

Scovil was asked, “What makes an app a success?” He felt it must first be useful. It helps if it is visually appealing. It needs a distinctive and natural interface. It should be functional and focused. Navigation should be direct, not unwieldy. Lastly, it should be fast and responsive. He stressed this point, as many users suffer from “app abandonment,” leaving an app and never returning because it took too long to load.

In summation, Scovil listed what he considers to be the most important rules when making an app. First, get a clear definition of what the app needs to do from the client. Second, determine how the user will navigate and access the information. Third, determine the necessary branding and visual elements that need to be included. This includes logos,

color schemes, and other stylistic properties. Fourth, resolve various dependencies. This includes third-party APIs from Google or Facebook, the client, or users. Lastly, prototype early and often. Scovil's focus was determined to be a mixture of client-centric and user-centric. The client ultimately determines what the app will become, but the user is kept in mind as often as possible.

### Nathan Mock, LEVEL Studios and Grappple

Nathan Mock is an iOS developer at LEVEL Studios, an interactive design firm in San Luis Obispo. He is also one of the co-founders of Grappple, a startup social network based on bucket lists. He is an iOS engineer for both companies, and his experience with the two share some similarities.

Because iOS development is relatively new, the process for making an iOS app is very flexible. LEVEL generally has brainstorming sessions to generate ideas. After this, wireframes are created and the flow of the app is discussed. The designer usually has to "skin" or style the app with graphics, so Mock waits to receive the files to style the app. He then uses iOS5 prototyping to create a working prototype. At LEVEL, the design is largely pre-determined, so Mock generally does not play a role in this component of the app.

The process is similar at Grappple, but more flexible. Since the design of the site is not completely determined, the app has gone through many phases and iterations. To determine the design, the Grappple team had to place themselves in the user's position. Trying to think about what the user will think and do helps to make the interface more intuitive. The most important tasks were determined in this way, and a goal was set to minimize the number of touches necessary to complete a task.

Nathan works strictly in iOS, and has found that a native app, one created in iOS or Android, has some advantages. First, and most importantly, it is faster and more responsive.

The app is created in a modular fashion, so individual elements load faster. It is written for the particular device. Second, it can be saved, unlike a web app. Third, it can utilize gestures that are built into the device. Fourth, the distribution in the app store helps gain exposure, although this requires a developer license.

To Mock, the most important rule for making an app is to make it intuitive. Elements should act the way the user is used to, so that the user can easily understand the interface. Rather than try to reinvent the wheel and create a unique user experience, standards and conventions in mobile apps should be followed to avoid confusion. Mock's focus was considered user-centric. His positions are less involved with clients, so there are no external pressures determining the goal of the app. Fast, intuitive user experience comes first.

Justin Helmer, M29

Justin Helmer is the Head of Research and Development at M29 Technology and Design, a web-based software solutions provider.

At M29, the first step in making a mobile app is getting someone to translate the client needs into specifications. The specifications are very important in avoiding scope creep and keeping the process in focus. Next, a software development plan needs to be built. This planning should not be ignored, and should be up to 50 percent of the project. Hours and labor time need to be estimated, and the job should be broken down into components. The project lead must determine the right person for each component, and delegate tasks. Usually there is someone in charge of the hardware and development environment, a manager, and a client contact. There are tools to be used, and prior knowledge or research by the individuals on the team help to incorporate those tools. In the early stages, proofs and prototyping are critical.

To determine the design, the team looks at popular apps and decides what works

and what does not work. They talk to the client and co-workers about the design to get feedback. Generally, people know what they like and what they don't like based on their past experiences. Simplicity is the most important consideration. The app should tell the user what to do, so it should not be too flashy. There is never a single person determining all of the design. Although clients may control the design, they are paying for the previous experiences and expertise of the developer, so advice from the developer is usually not ignored. This helps to perfect the app.

Determining what is included or excluded is usually up to the client. If a feature seems irrelevant, the developer can attempt to convince the client that a feature may not be worth the money. Keeping the big picture of what the client actually wants in mind is very important. This allows the developer to offer alternatives that may be more cost-effective and useful in the long run.

The most important rules when making an app are simplicity and standards. When coding, keeping formatting consistent internally saves time and money. Every file should appear like the same person created it. Like Scovil, Helmer's focus was considered a mixture between client-focus and user-focus. The client has the final say, but Helmer believes the advice of the developer is important, and clients are willing to change their mind if the proposed change is explained clearly. Following the model of popular apps helps determine standards in navigation and layout to improve user experience.

## **Case Studies**

The two web apps analyzed were [imdb.com](http://imdb.com) and [yelp.com](http://yelp.com). Both of these websites redirect to a mobile version when accessed on a mobile device.

For [imdb.com](http://imdb.com), the average score for question one was 4.08 out of 5 possible. The lower than possible score for question one mostly stemmed from navigation issues. The average score for question two was 3.83 out of 5. The navigation was located at the top of the page,



but was too small to be seen easily. More visual weight was placed on the lower page, which highlighted featured films. The average score for question three was 4.00 out of 5. Many of the subjects clicked on the home page icon, which simply refreshed the page. The search function was used much less than anticipated. The average score for question four was 3.63 out of 5. Question one and four were expected to yield similar results, showing a correlation between ease of use and overall satisfaction. This was the lowest score of the four questions, and this trend was repeated for the other website and applications. Although the navigation was simple, its size and position made it difficult to find, causing lower than expected results.

For yelp.com, the average score for question one was 4.67 out of 5 possible. The home screen of the page was simple and separated into distinct categories, so the interaction with the site was much easier. The average score for question two was 4.50 out of 5. As expected, this was a much higher score than imdb.com. The navigation was clearer for yelp.com, whose homepage was a button list of different categories. The average score for question three was 4.67 out of 5. The categorization of the navigation allowed the user to decide a general route to take, eliminating unnecessary options. The average score for question four was 4.50 out of 5. Yelp.com had significantly higher scores than imdb.com across the board. Despite more categories, the simplicity of design did not distract from the navigation like imdb.com.

The two apps analyzed were Groupon and Staples. For Groupon, the average score for question one was 4.33 out of 5 possible. The app was straightforward, but the user experience was limited in many ways. One major issue was difficulty finding the search function. As a result, the average score for question two was 4.08 out of 5. Although the navigation was located clearly at the bottom of the screen, finding the search feature proved too difficult and lowered the score for question two. The average score for question three was 4.08 out of 5. The tabular navigation is a popular method, although the icons used should be accompanied by headings to limit possible confusion. The average score for question four was 4.08 out of 5,

placing it ahead of imdb.com, but behind yelp.com.

For Staples, the scores were much higher than expected. Although a large and complicated application, the navigation proved intuitive enough to warrant the highest scores in every category. The average score for question one was 4.75 out of 5 possible. The range of options was broad, but this did not hinder the use of the app. The average score for question two was 4.67 out of 5. The navigation was located at the bottom of the screen in a horizontal scroll bar of icons and headings. This method proved to be the most popular. The average score for question three was 4.92 out of 5 possible. The categorization of the site was intuitive and organized. The average score for question four was 4.83 out of 5. Staples scored much higher than expected. Although the scope of the site seemed broad and excessive, the intuitive navigation and segmentation of the sections made it much more manageable.

## **Survey**

The survey of users was sent as a hyperlink through Facebook, and received 165 respondents. This has the potential to skew results, as users of Facebook may be more technologically adept than the typical person. But as this survey is meant to determine the preferences of smartphone users, the findings that relate to those who own a smartphone should suffer little or no bias.

Of the 165 respondents, 84.85 percent, or 140 respondents were in the age range of 18-24. The next highest response rate was 5.45 percent for both the 25-34 and 45-54 age groups. As a result, the survey data should only be applied to the 18-24 age range. Although this limits the scope of the results, it is still significant as the 18-24 age group is the second-most smartphone-saturated, with about 53 percent owning a smartphone (Nielsen).

This study found that 66.46 percent of respondents own a smartphone. Those who do not own smartphone were asked to submit the survey without completing any more questions. The smartphone owners were then asked what three apps they used most often. Ninety-eight

people answered this question, yielding 284 results. This is just below 3 apps per person which was a result of some respondents answering with only their most-used app. The overwhelming leader was Facebook, with 54 users. This is equivalent to 55.1 percent of the 98 respondents. The second most used app was an email client—either Mac Mail, Yahoo Mail, or Gmail with 25 users, or 25.5 percent. Next was Pandora, a free or paid music player, with 18 users, or 18.4%. Next was Words with Friends, an online Scrabble game, with 15 users, or 15.3 percent. The fourth most used app was Google Maps, with 12 users, or 12.3 percent. Lastly, a generic weather app had 10 users, or 10.2 percent. The rest of the results were considered insignificant because there was less than 10 percent usage.

Next, the respondents were asked to list their top three websites, when using a mobile device. There were 96 responses, yielding 159 results. The most used website was Google.com, with 34 users, or 35.4 percent. Next was MyCalPoly.edu, Cal Poly's student portal, with 21 users, or 21.9 percent. Third was Facebook.com with 17 users, or 17.7 percent. Fourth was Wikipedia.com with 12 users, or 12.5 percent. Fifth was Yahoo.com with 8 users, or 8.3 percent. Google.com, MyCalPoly.edu, and Wikipedia.com do not redirect to a mobile version of the site. Google.com and Wikipedia.com use a simple search feature, which requires little change, but MyCalPoly.edu is a candidate for a web app.

In the 18-24 age group, smartphone users appear to spend most of their time on Facebook, checking and sending emails, listening to music, or playing popular games. They generally browse the Internet to look up information using Google or Wikipedia. Because many of the respondents were Cal Poly students, the MyCalPoly Portal is used frequently. This is likely reflective of many college campuses.

The last question asked respondents if they prefer a mobile app or visiting a website using the phones Internet browser. There were 99 responses and 82.83 percent prefer the app to the website. Younger users seem to avoid using the mobile browser. When they do, it is usually

to access a web service that can provide information. This should give some guidance to companies who may be thinking of making their website mobile friendly.

## Chapter Five: Conclusions

After all forms of research, the first set of conclusions helps determine what type of mobile support to offer, if any at all. An adaptive layout is a worthwhile investment for websites that have static content or blogs, which have dynamic content but would not be classified as a web application. The benefit of this approach is an improved user experience. Extra expenses are associated with this approach, but compared to other types of mobile support, the costs are low. If implementing an adaptive layout, the placement of important information must be considered. The mobile user will be looking for certain information quickly, and this information should be placed prominently. Many have adopted the idea of “mobile first,” or designing the layout of the mobile site first, then adding content and features for the larger versions. This decision is dependent on the target audience. If the majority of visitors access the site through their mobile browser, designing for mobile first is a wise choice. If not, it may be it is more cost-effective to adapt the layout to mobile.

A dedicated mobile website is the preferred choice for a mobile web app when the budget is limited. This allows the app to be simplified and reorganized for mobile browsing. Compared to an adaptive layout, performance is drastically improved because extraneous elements are not downloaded. This layout is cross-platform, so both iPhone and Android users can access the same app. This is an expensive option compared to an adaptive layout, and risks confusing users if the navigation is different from the normal site. If this choice is pursued, a link to the full version of the site should always be included.

A native app is the ideal choice if the budget allows. Because the app is created for the device, performance improves. This is important because users often abandon apps that take too long to load. According to the New York Times Article, “These days, even 400 milliseconds — literally the blink of an eye — is too long, as Google engineers have discovered. That barely perceptible delay causes people to search less (Lohr).” As the survey

showed, over 80 percent of those surveyed prefer a native app to a web app.

The next set of conclusions applies to developers. Based on interviews with three app developers, apps should be simple, intuitive, and follow standards.

When working with a client, his or her initial idea of the final app may need to change. Explaining the benefits in user experience and savings can help this process. Prototyping early was seen as an effective means of getting feedback from the client. Clearly defining the app and the job from the beginning is important in avoiding scope creep, or additional requests from the client that are not part of the job definition. To determine design, start with the simplest design that accomplishes the goal, then add features as the user base increases and the need arises.

The case study showed that even large apps with more complex navigation can be highly successful. The key is separating the categories in intuitive navigation that is labeled clearly. As Mock suggested, determine what the user needs to do, and limit the number of clicks it takes to accomplish the task. Including more navigation items on the home page can help optimize the flow, as the initial decision is the most important.

Clear, simple, and intuitive applications are popular and successful. Although the client may hold significant influence, the user is the real customer, so the client may need to be persuaded to change the design of the app to make it more user-friendly. The users determine whether an app is successful, so their preferences for useful, but simple and intuitive apps should never be ignored.

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