Usability for the new PC: Mobile Devices

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Introduction

The mobile phones that we carry with us all the time have evolved a lot with time. They have become increasingly sophisticated and have been performing tasks that the desktops use to perform. Mobile devices are now extremely powerful and, in addition to making phone calls, are capable of performing a variety of other functions. One very important function is the ability to access the Internet. These devices are now being used to conduct online banking transactions, perform e-commerce activities, browse through informative web portals, take advantage of gaming and other sites from where ever we are.

The mobile devices are been regarded as tiny computers but the idea that content can be just shrunk to fit is wrong. Web design for mobile devices requires major change. While it appears possible to use existing usability techniques for the development of mobile applications, some unique characteristics are required to create usable mobile applications. A usable interface to any application is critical. For example, properly designed web sites help ensure users find what they are looking for and successfully perform online transactions. But given the uniqueness of the mobile environment, good interface design is difficult to achieve. An obstacle that these users face is that access to the Internet or any application is through a tiny interface. This is in contrast to a large, flat-screen monitor of a desktop computer. fonts and color scheme needs to be adjusted to be legible on smaller screens, contrasts and resolutions need to be sharpened, complicated design features need to be removed or simplified, and the information needs to be shifted so that the most important elements can be viewed together. Unfortunately, many websites are neither designed for nor suitable to be accessed from these small devices.

But an even greater challenge to designing successful mobile applications, and their interfaces, is dealing with context. Before users performed tasks on computers that remained stationary. But people can now be anywhere at any time while using the mobile application, unlike the traditional wired scenario. Mobile usability is dependent on programs being built for “on the go” situations, such as during commutes, out with friends, or waiting before a meeting. Most users will still resort to their computers for large amounts of reading and research, so mobile applications should be fashioned accordingly.
There are a lot of limitations when designing for these devices that make it difficult for developers to create usable applications. A new set of usability constraints that are unique to the mobile domain needs to be considered.

**Limitations when designing for mobile devices**

**Dealing with Physical Constraints**

The screen size is small. On a desktop or laptops users can open more than one window at a time helping them to multi task. But when it comes to mobile devices small screen size restricts the amount of data that can be displayed at one time. It is also difficult to read text and view graphics on small screen.

**Designing for a varied platform**

With every different device there are different limitations to consider. The type of device on which a mobile app will run is a major design consideration. We need to deal with significant variability in their screen sizes and physical user interfaces. Some phone like Blackberry may have a small screen with a physical keyboard or other like iPhone which have larger touch screen and a virtual keyboard. Therefore, the interaction design for each of these devices must be quite different. The ones with bigger screen require large buttons to facilitate touch screen interaction, while others requires smaller navigation elements, so that they fit on the smaller screen.

**Data Entry Methods**

Mobile devise have awkward Input. They do not use a mouse like pointer and this makes it difficult to click on menus, buttons and hyperlinks. Scrolling is also more tedious and error-prone. Even entering text is much slower. Small buttons and labels limit users in entering data efficiently. This reduces the input speed and increase errors.

**Connectivity**

On most mobile devices, speed is a major factor. The slow and unreliable wireless network connection with low bandwidth is a common hindrance for mobile applications. Also strength of signals and data transfer speed in a wireless network may vary at different time and locations. This issue largely affects data downloading time and quality of streaming videos and music. Therefore, developers need to deal with various network considerations when designing mobile apps.
Different Display Resolutions

The display capability of mobile devices supports much less display resolution (normally 640*480 pixels or below) if we compare with desktops. This low resolution can decrease the quality of multimedia information displayed on the screen of a mobile device. Also different mobile devices have different display resolution.

Limited Processing Capability

Computational power and memory capacity of mobile devices are still very less than that of desktop computers. Some applications that require a large amount of memory or fast processing speed, such as an application 3D graphics may not be practical for mobile devices. Due to this limited processing capability of mobile devices, developers may have to disable some functions. They have to go for less resolution for the images being used.

User’s attention is limited

Most mobile devices are currently used while the user is ‘on the go’ or multi-tasking in some form. They may be watching TV or sitting in a business meeting while using their mobile. This means that mobile app user will have a very limited amount of attention and can’t give their divided attention to that mobile app. In such a real world environment, a mobile app must overcome competition for a user’s attention. For example, if a developer is developing a news app, it’s important to take into consideration why a user would use his app rather than just grab the newspaper next to him. Also, because the app runs on such a small screen and carries less auditory impact, it is less able to hold user’s attention than a desktop or Web application.

Users engaging in other activities while using mobile devices

The developers also need to consider that users may be doing other activities along with using their app on the mobile device. This is the case most of the times. Unlike when a user sits in front of the desktop using his two hands, while using a mobile he may be busy doing other things which is using his one hand. For instance, a person may be trying to use the mobile app while also trying to carry groceries, walk a dog, or carry a cup of coffee. If users discover that it is difficult to use the mobile app in such situations, they may avoid using it. Thus, single-handed operation is a major consideration for mobile apps.
Lacking some functionalities

Most of the smart phones may not support Flash content. Thus, if a user attempted to access such site that requires flash or other technologies may just return a blank screen or other errors.

These limitations with mobile devices means that developers of websites and mobile applications must pay particular attention to ensure that users will still have the similar experience when visiting their website on the phone which they would have using their desktops.

Mobile Usability Guidelines

Understanding the users

Developers should perform task analysis. They need to know who would be using their application and should know what is the mobile task that the users need to perform. They need to know the kind of environment the users would be in when using their app. Finally they need to know what the users expect out of their application.

Keeping it Simple

The best way to make the app user friendly is to make sure it's not complicated. Developers should keep in mind that most mobile users will not be willing to fill out long and time-consuming forms. Keeping everything to a minimum is a simple and effective solution. Since effective mobile interactions have everything to do with great usability and nothing to do with overcrowded designs, it is essential to keep the mobile designs as simple as possible. Because of the lack of space on the screen and because Internet connections are often slower, websites for smartphones should be designed without large images and flash content. It is also important that visitors to the site should have immediate access to the most crucial and essential information. Because time is often more critical to a mobile device user. Reducing the number of operations needed to perform regular tasks is a key factor in the ease of use of mobile devices.

Google provides a great example of this philosophy with their Google Maps mobile app, which is separate from the Google search app. Thus, they can provide various capabilities, while limiting the functionality they incorporate into a single mobile app. This approach offers several advantages. First, it allows users to understand the utility of each app easily enabling them to more quickly choose the app they need among the collection of apps on their phone.
Also, single-function apps have a simpler user interface, which reduces clutter and lets users access key functionality quickly and easily.

**Reducing the amount of content**

Not everything shown on a PC screen can fit reasonably onto a mobile web page, where space is short and every pixel counts. It's important to reduce the amount of content shown on the mobile version. This makes them easier to read and move around, as well as quicker to load on devices that can sometimes have slow Internet connection speeds. Only important content or features should be present. Low priority content that can be removed for example content that are typically found in the right hand columns of standard web pages. Also navigation shouldn't be repeated since the screen space is precious on smartphones and navigation components can consume a large chunk of this area. Therefore navigation should only be displayed on the homepage. On other pages, having a link back to the homepage would be convenient for visitors. A breadcrumb trail is an effective substitute for repeating the navigation on every page. Color rendering can be used instead of content. When used right it gives a to provide information without the need to use additional spacing. There has to be a definite contrast between a background color and text. Information that is conveyed using colors should contain a contrast between any of the other elements within the website design.

**Simplifying User Input**

Users make far more errors and are significantly slower when typing on even the best mobile keyboard than when using a full size PC keyboard. This implies that users don't want to have to type as much on mobile websites. Because of the lack of a proper keyboard, users should be able to make selections instead of putting in input. Also, giving users the option of browsing through a website is often easier than forcing them to search the site for some particular information or item. Due to the small screen when presented with a search box, visitors of the website often make typos and this leads to inappropriate search results.

This can be done by accessing their data from the phone. For example allowing users to use stored details from their contacts when having to fill an address. Other things like asking for a PIN instead of a password and using QR codes are some alternatives of entering data into the device. Speech input is a great alternative for devices too small for buttons. Sound can also be used for output, taking the place of text or graphics.
Design for speed and recovery

For mobile devices and applications, time constraints need to be taken into account in initial application availability and recovery speed. When time is critical, waiting a few minutes for an application to start may get the user frustrated. Given the different contexts under which mobile devices are used, users may need to quickly and securely save any work already performed and resume it later without any loss. The Design has to be made for limited Attention. Users of mobile devices often need to focus on more than one task. This can be accomplished by designing for hands free interaction or even eyes free interaction. When possible, it might work better to use sound or tactile output to present information instead of visual displays.

Consistency

Consistency takes on an additional dimension with mobile applications. It is not only important to have consistency for the particular device but consistency across multiple platforms and devices for the same application. Users of mobile devices may need to switch between their desktop machines and different mobile devices frequently. For example, a user may want to transfer a document from a home desktop computer to his mobile device, to read it while he is travelling. In this situation, consistency should be maintained between desktop and the mobile.

Having vertical scrolls

Scrolling vertically on mobile devices is challenging but scrolling in two dimensions is even more difficult and frustrating. So developers should keep in mind that mobile devices have a limited width and they should design the website or the app so that the users will not have to scroll horizontally. This implies that wide web pages are difficult to view on small mobile phone screens. Therefore a single column page can be created useing up the whole width of the screen. To add additional content the page should expand downwards rather than across. If this isn't done the text would be unreadable until users zoom in to the part of the screen they want to view. But zooming in isn't ideal because it adds an extra step and zooming in and out isn't easy to do on all phones.

Multiple Versions of the Website

Having a website that has been designed for both desktop computer and smartphone users is unfeasible because website layouts for large landscape PC screens usually do not come across very well on small mobile phones. Also screens and processing power on different mobile phones also vary a lot. For example, phones can have resolutions ranging from 128 x
160 pixels to up to 480 x 800. While many smart phones have the ability to load up full web pages less advanced phones can't and would crash trying to do the same.

Therefore, it is important to create multiple versions of the site that are compatible with most phones. One can also automatically detect whether the website visitor is accessing the site using a mobile device or a standard desktop computer. The user can then be redirected to the appropriate site depending on the platform that has been detected. Although there are a variety of different mobile devices on the market and it is almost impossible and inefficient for the website to attempt to detect all of them, there are only a few popular brands that dominate. Typically, the different models of a mobile brand have a specific screen resolution and similar capabilities. So, it is usually sufficient to consider just the most popular models. But the mobile website is only going to be seen by smartphone users with fast download speeds then one mobile version will be ok. However, if one wants a broader reach then having more versions should be considered. Facebook goes as far as having 3 main mobile versions. m.facebook.com is the main mobile site, touch.facebook.com is optimized for touchscreen mobile phones and 0.facebook.com is optimized for users in countries with very slow download speeds.

**Navigation has to be presented differently**

It's difficult to fit the navigation across the top of the screen on a mobile web page. Like it was mentioned earlier that a single column layout on a mobile phone screen is preferred, placing the navigation at the top would push the content too far down. Therefore navigations should be placed in the homepage and content should be left for later pages. This is suitable for sites on which users want to navigate right away, rather than read content. For example, when users visit ecommerce sites they usually have a specific product category in mind and want to tap through it. Also if Navigation is required on each page it can be placed at the bottom. Users can still access the navigation but it doesn't get in the way of reading the page. An anchor link at the top of the page can give quicker access. An another alternative is to place the navigation in a dropdown link at the top of the page. Developers should also provide 'Back' button on pages other than the homepage. This keeps the page design simple at the expense of the ability to navigate directly to another section of the mobile website.

**Taking advantage of inbuilt functionality**

Many mobile phones have an advantage over PCs. They come with lots of inbuilt functionality that most PCs don't have. It can be made easier for users to perform certain tasks by utilizing a mobile's inbuilt functionality. This helps in removing the need for manual steps. For example unlike PCs mobile phones can make calls. So when there are numbers
in the site or application users should be allowed to automatically ring a number when tapped. This is useful for 'Contact us' or 'Store finder' pages. Similarly, it's possible to give the user the option to select an address and automatically open it in the mobile phone's map application. Social networking mobile sites can make it easy for users to find people, places or events near them.

**Error Prevention and Simple Error Handling**

Preventing and handling errors on mobile interfaces are similar to those for desktop interfaces. But in case of mobile devices the need becomes more critical due to the more rapid pace of events in the mobile environment. Error prevention also needs to take the physical design of mobile devices into account. Smaller device sizes make the proximity of buttons to each other result in more errors. Developers need to design to help reduce such errors. Users should be provided with explicit error messages, showing them how to resolve the error.

**Reducing short-term memory load**

Given the limitations of a user's short-term memory, interfaces should be designed such that very little memorization is required during the performance of tasks. When in the mobile environment, a user has to potentially deal with more distractions than with a desktop computer. A mobile application may not be the focal point of the user’s current activities, and a user may not be able to leave his or her primary task to interact with the mobile device. Using alternative interaction modes such as sound can be beneficial.

**Testing**

Usability testing of mobile devices also presents some new challenges. Traditional, lab-based usability testing doesn't sufficiently simulate the actual operational context of a mobile app. Developers need to improve their website or application quality by providing tests on various devices with different screen resolutions, operating systems and performance. The development of effective usability of a mobile website requires constant testing of the design.

Traditional guidelines and methods used in usability testing of desktop applications may not be directly applicable to a mobile environment. Data collection can be a challenge when testing mobile devices. Because of mobile device's small size, it can be difficult to get a clear video recording of participant's interactions with a device. For this reason screen capture utility are required that outputs a video stream. Other testing methods are getting early feedbacks by using prototypes or simulators.
Conclusion

Many of the assumptions about user interactions that drive Web design do not hold true for the mobile devices. It's important to recognize that these users will not be sitting at a desk and looking at a big screen for substantial amounts of time, in a relatively peaceful environment. But would be using the app in an environment where they will be surrounded by stimuli. It is essential that users be able to open the app quickly, accomplish what they hope to accomplish, then exit quickly and return their attention to the outside world. Accomplishing this type of fast experience is essential for the success of an application in the mobile space.

Earlier people were happy simply being able to access things on their phone but now that's not enough. The requirements have gone up. Though mobile sites and apps have been improving their usability, it's still far below that of regular websites accessed from a desktop computer. As technology continues to advance, mobile platforms will continue to shrink in size and include items such as bracelets, rings, buttons, and key chains. New or modified interaction techniques may be necessary to overcome the physical limitations.
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