

Application Development, Distribution and HCI for a Post-PC Era

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Abstract. This paper presents how the upcome and ubiquity of the web as well as mobile devices has changed development, distribution and HCI (Human Computer Interaction) of applications. It also outlines key differences in user expectations for this new type of apps and how future trends will influence application developers and service providers.

Keywords: Mobile Apps, Ubiquitous Computing, Post PC Era, Application Development

1 Introduction

The previous decades have seen the deployment of PCs almost on every desktop. They replaced large and expensive mainframes where many terminals connected to one computer. This made it possible to have one computer for every user. The current trend seem to merge the two usage patterns as cheap smartphones, tablets and other wearable computers have given one user multiple very personal devices. This all while web services (cloud services) try to bridge the need for having the same data and features on all devices. By disconnecting data and services from one physical computer the PC loses it's importance in every day life and allows mobile and more specialized devices to take it's place.

In this paper we will first highlight the three key areas of applications: Development, HCI and Distribution and how they have changed. Afterwards will be a discusson on the effects for this changes and a short outlook how ubiqutus computing will develop in the (near) future.

2 Related Work

In this paper we will concentrate on the aspects of mobile devices because they already outsell PCs as described in [1] and so lead the way into a post-PC era. [1] also highlights the upcoming challenges when targeting mobile platforms. For example having to deal with multiple platforms each with their own ecosystem (while in the last 20 years of the PC industry there was almost a "one-platform industry" [1]), dealing with limited CPU and battery life and serving a market in which flashiness can make the difference between failure and success.

A good overview of available devices and interaction possibility is given in [2, pp. 158-215] which lists a total of twenty interface types and introduces the unique aspects of each. It discusses how mobile devices have become an integral part of everyday life and have already taken over parts of our cognitive functions as they provide instant access to a vast amount of information through always-on internet connections. The book also refers to the basic design issues found with mobiles: Small screens with limited control space, slow text input and privacy considerations.

The business side of mobile app distribution is discussed in [3] which tries to highlight key points for a successful and profitable business model in the new mobile market where apps are no longer deployed on their own but have to live in a centralized platform market. They also analyze their survey which tried to better understand the consumer's willingness to pay for applications which showed the importance of a strategic pricing schema and leveraging network effects.

3 Development requirements

One of the most important requirements for apps in a post-PC era are rapid release cycles. While for PCs the typical life cycle of software versions were measured in years, nowadays the popularity of web applications made it common to roll out features as soon as possible. Users expect to receive regular software updates with a smooth update process, while developers benefit from the immediate feedback. All popular mobile platforms provide an easy update mechanism, or even the possibility to let users automatically update all apps. So developers only need to adapt their development workflows to satisfy this need. This is one of the reason agile software development methods are on the rise where releases are rolled out more often, but with less new features.

A more technical challenge is the need to support multiple platforms. While the PC had for most of its time one major platform new mobile devices are much more diverse with every platform trying to separate itself from competitors by having native development tools, their own usability guidelines and promote a unique look and feel which app developers and designers have to follow.

4 Human Computer Interaction

Mobile devices have much more interaction possibilities than a typical PC had. On the one hand this will present a challenge as users expect apps to react to certain input (like orientation changes, current location, proximity (for example to disable the screen when making a phone call, or to communicate with other devices: NFC)), on the other hand it will give developers and usability experts much more possibilities to make their application unique and give a more natural interaction possibility. It is even likely that more and more interaction possibilities will become mainstream like Air-based gestures, or Augmented/mixed reality. [2, pp. 158-215]

Many new challenges will arise with these possibilities, like dealing with devices with different features, since not all devices will support all sensors or usability patterns. Currently the biggest struggle is to deal with limited screen space or different form factors [4]. Apps are expected to work on mobile phones with a small 2 inch screen up to tablets or even TVs.

5 Distribution

While most applications on the PC were distributed directly by the developer to the users on mobiles and other portable devices it is more often than not required to use centralized markets or app stores provided by each platform. This eases deployment and especially app payments for developers but makes them dependent on the platform vendor. It is especially hard to synchronize product launches across platforms as each one has different release schedules and approval processes.

Probably there have to be new business strategies to adapt to each platform [3]. Like strategically pricing the app for the given market, providing free trials or deciding between a paid or advertising based revenue stream.

6 Future Trends of Ubiquitous Devices

As mobile phones are already outselling PCs and tablets sales in the USA are higher than those of notebooks the near term trend is clear. By the sheer numbers of mobile devices they will play a big role in application development. Even if not as a primary platform for all applications, users will at least require integration of basic functionality and data.

In the long run even more platforms and ecosystems are possible. As technology progresses and people will be more comfortable with having devices all around them more and more form factors will emerge. First versions of wearable computers like watches, e-textile, augmented reality glasses are already either in development or already on the market.

7 Implications for Application Developers and Service Providers

This trend leads to a development model where mobiles are an integral part of every application. Since most of the time mobiles and tablets are limited in screen real-estate and have to focus on key features instead of providing every possible functionality a very common approach is to develop for mobile platforms first. Usually this way a very early version of a software with it's core features is developed much faster and can sometimes be used as a web application from a desktop before a full featured version is developed. The main advantage is that developers can focus on the core features of a software which distinguishes it most from competitors.

Service providers have to make sure that their services can be accessed from all important platforms, since every platform which is left out might limit the attractiveness of a service. For example people might switch between platforms or want to recommend services to friends who might use another platform. The more adapted an app is to each platform and it's guidelines and best practices, the better the user experience and thus the more recommendations and referalls an application will get. Most service providers will have to find a balance between developing for every mobile platform seperately to get the best user experience possible and centralizing app development with cross platform tools (or server side features) to avoid an explosion of the cost for developing and maintaining the apps.

7.1 Web: One Platform to Rule Them All

A long time it seemed like the Web with HTML5 and JavaScript will be the one platform to be available on all devices. As it turned out, apps which are only based on HTML5 can not keep up with native toolkits in terms of responsiveness and feature integration. Although support for modern web technologies like CSS3 transitions, SVG graphics, etc. have improved tremendously in supported features and their performance, there is still a trade off between a native look and feel for each platform and one mutual code base for all platform. Most of the time, depending on targeted audience and the core features of an app, a compromise must be made between implementing all features natively or providing some features on web techlogies while still developing native code for integrating with specific features of a platform.

8 Conclusion

As we have seen, developing for a Post-PC era requires to target an ever changing landscape. New platforms, usage patterns as well as design and interaction patters are constantly emerging. The most important lesson is to quickly react to changes, and improve the agility of software development processes. To lesson the burdon of developing for multiple platforms one can use Web technologies as a common denominator between all platforms. This has to be used very conservative as there is always a trade off between saving development cost and native look and feel as well as responsiveness.

References

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