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Fitting Mobile in the IS Curriculum

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ABSTRACT

Mobile computing has increased dramatically in the past few years. Many businesses are either pursuing or considering mobile computing as either a tool to improve their own business processes, a strategy to link to customers, or both. This trend suggests an increased demand for graduates who are able to develop systems for a mobile platform. Some schools are already experiencing this demand from employers. This paper discusses the options and challenges associated with integrating mobile computing into the IS curriculum.

Keywords

Mobile, Education, Curriculum.

INTRODUCTION

Over the last few years, mobile computing has increased in importance in the market place and for many people, a mobile device has become the primary way in which they interact with online information resources.

According to a study by the venture capital firm Kleiner Perkins, shipment of mobile devices outstripping PC and notebook shipments since Q4 2010 (Murphy and Meeker 2011).

It seems likely that in the not-too-distant future, mobile devices will be a major part of the computing industry, and most software developed will be influenced at least in part by mobile considerations. In fact, some companies are beginning to consider mobile-first strategies where systems are built to be mobile from conception to implementation.

These changes have not gone unnoticed by academia either. One of the trends identified in the recent revision of the IS Model Curriculum (ACM, 2010) was that of "Ubiquitous mobile computing – Global organizational life using a variety of devices has become dependent on mobile and ubiquitous platforms" (p. 7).

Several computer science programs around the world have started integrating mobile technologies in their programs, and a number of approaches have emerged. Many programs use mobile in the traditional CS1 course to motivate students to learn the material using a platform they are excited about using (Q. H Mahmoud and Popowicz 2010; Qusay H. Mahmoud 2011). Some programs also use mobile as a way to motivate students to choose a major in the field (Kurkovsky 2009) and other programs add mobile aspects to upper-level or advanced courses, such as courses on mobile web development (Al-Khalifa and Al-Rajebah 2011).

In this research in progress paper we discuss how the trends towards an increasingly mobile future might be reflected in the undergraduate IS curriculum, and some of the challenges faced in making such a move. This paper is based on the discussions around redesigning the IS curriculum at UW Oshkosh, which are taking place this spring (2012).

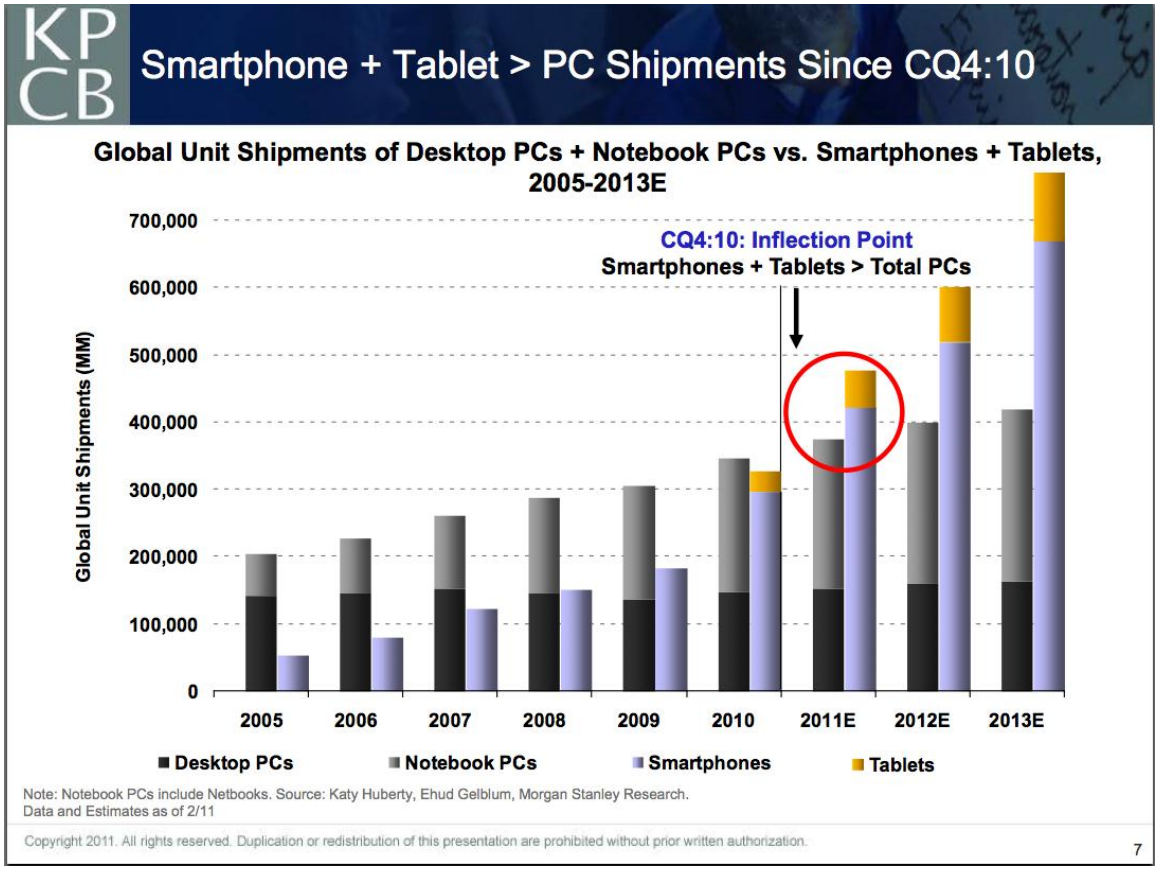

Figure 1. Shipments of mobile devices have outnumbered PC shipments since 4th quarter 2010.

MOBILE PLATFORMS

The current mobile marketplace is very dynamic in terms of the platforms that are available to target for development. Currently, the most important platforms are clearly Android and iOS, but Microsoft's Windows Phone 7 could potentially grow rapidly with the new partnership between Nokia and Microsoft, while Blackberry's RIM platform still has a significant market share in some parts of the world.

There are currently three broad strategies to pursue for developers targeting mobile development:

- **Native platform development**. This strategy involves using the SDKs and IDEs that are provided by the owners of each platform. Developers using this approach would use Apple's Xcode and iOS SDK to target the iOS platform, Visual Studio and ASP.NET to target Windows Mobile, and Eclipse and the Android SDK to target Android. We believe that for programs serious about developing skills in mobile application development, it is important that students learn and understand one or more native platforms. Vendor support is also likely to be more sustained on the native platforms compared to the cross-platform frameworks.
- **Cross-platform frameworks**. A number of third-party frameworks allowing development of a single application that is then somehow compiled into a native app for several platforms. Two notable examples of this approach are PhoneGap (www.phonegap.com) and Appcelerator (www.appcelerator.com). While these frameworks typically offer faster development cycles and allow developers to take advantage of current skills, the apps produced may not be able to take full advantage of the capabilities of the underlying operating system or hardware and may prove to be inefficient for more than the most basic programming routines.
- **HTML5, CSS, and JavaScript**. Rather than rely on native apps, many developers create sophisticated web apps using standard web technologies like HTML, CSS, and JavaScript. This approach is likely to gain favor in coming years, as HTML5 matures and allows for features so far only associated with native development, such as access to device sensors and on-device storage.

Both for developers and educators, it will be difficult to choose which technical platforms to support, but this choice can be critical, and should be considered carefully. Table 1 below summarizes some considerations for which platform to choose based no the curriculum model considered.

MODELS FOR CURRICULUM INTEGRATION

In this section we present several different approaches for how mobile computing might be integrated into the Information Systems (IS) curriculum. They are organized in order from relatively low to high levels of coverage and integration in the curriculum.

Not covered at all

At one end of the spectrum, IS programs may choose to not provide any special coverage of mobile in the curriculum. In one view, mobile development holds little that is particularly special or unique – particularly from a technical perspective. Therefore, a sound foundation in traditional IS topics is sufficient for the student to move to the mobile platform should their employer or the market demand it. Furthermore, chasing the latest technology may, in fact, limit foundational skill development as breadth is pursued over depth in core knowledge areas.

High-level as part of an IS strategy or architecture class

Students can be given an appreciation of the capabilities of mobile devices and how they fit into the overall IS strategy in the context of an IS strategy or architecture class. This approach would seem to fit with the 2010 Model curriculum Enterprise Architecture (2010.3) course. The model curriculum report describes this course as focusing on "… explores the design, selection, implementation and management of enterprise IT solutions. The focus is on applications and infrastructure and their fit with the business." (p.43)

Module in an application development course

Once students have been exposed to programming skills, an application development course could conceivably include a module for a few weeks where the students' skills are applied to developing mobile systems. In this approach, it would be important to choose a platform where the students' skills can be applied directly. For instance, if the application development course is based on the Java, then Android would be an obvious choice to illustrate mobile development.

A single Shallow and wide course

This course would cover all aspects of mobile development and strategy. It would provide students with exposure to multiple different native platforms, cross-platform frameworks, as well as HTML-based development. Coverage of each platform would necessarily be shallow, but would allow for good discussion on how to choose a mobile platform, mobile strategy, and general mobile design considerations. Using third party tools such as Appcelerator or PhoneGap might be a good way to have students actually implement small apps in this type of course. There are even resources available. For example, Course Technology has published a textbook that follows this approach (Duffy 2013).

A single in-depth course

This approach is similar to the shallow and wide course described above, but here, a single platform is chosen (most likely one of the native ones), and mobile development principles are demonstrated exclusively within this platform. By going in-depth on a single platform, students would be able to create more sophisticated apps, and take better advantage of the unique capabilities of the mobile devices on that platform.

Track-based

For IS programs, serious about developing for the mobile platform, a track of several courses could be created to cover many different aspects of mobile in significant detail. By having several courses, students are allowed significant time to understand and develop skills for the unique aspects of mobile development. The track could have courses covering aspects of interface design, mobile strategy, mobile architecture, and mobile application development.

Integrated throughout

As the trend towards mobile computing continues to accelerate, some programs may choose to weave mobile considerations into most aspects of the program. The infrastructure class would focus on aspects of wireless networks and cloud computing services to empower mobile devices. The database class would use tools and database models optimized for use on one or more mobile platforms. The strategy class would consider how firms consider the strategic implications of an increasingly mobile world.

Curriculum model	General notes on platform choice	Native platform	Cross-platform	HTML5, CSS, and JavaScript
Not covered at all	No platform needed	N/A	N/A	N/A
High-level as part of an IS strategy or architecture class	Mobile appreciation only. No development platform needed.	N/A	N/A	N/A
Module in an application development course	Mobile platform should extend what is taught in the class.	Choose a platform close to what is used in class (e.g. Android in Java course, Windows Mobile in .Net course).	Choose a framework close to what is used in class.	Only if the course is web-based.
A single Shallow and wide course	Introduce all platforms.	Yes	Yes	Yes
A single in-depth course	Pick a single platform.	Yes. Choose based on other courses in curriculum and/or available resources	Maybe. But cross-platform functionality not important to illustrate mobile concepts.	Maybe, if students have prior exposure to web technologies.
Track-based	Can choose to focus on one or choose different platforms for different courses.	Yes. Choose a single native platform for several classes.	Maybe. Illustrate the capabilities as a module in a single class	Maybe. Illustrate the capabilities as a module in a single class
Integrated throughout	Choice of platform will affect many other courses in the curriculum (database and infrastructure classes in particular).	Yes. Choose based on other courses in curriculum and/or available resources	This may be a good choice depending on the overall learning objectives of integrating mobile.	Currently, not the best choice, but as HTML5 matures, this may prove to be the platform of choice.

Table 1. Choosing development platform in the different curriculum models.

CONCLUSION AND CHALLENGES

Conclusions are difficult determine at this point. It is quite likely that within a few years many of these approaches will be implemented in different educational institutions. Of course, by then, we may be chasing a new technology. One of the perennial problems in IS education is that the explosion in technologies and methods tends to lead to curriculum bloat as institutions of higher learning attempt to provide the student with a firm foundation in any of the many career tracks that have emerged. This challenge is further exacerbated by the limited number of courses an IS major in an AACSB accredited business school is typically limited to (ACM 2010, p.29).

Given the lack of information available it seems prudent to conclude with questions that education professionals may consider rather than with a recommendation. Some issues we have identified and discussed to some extent include:

- What disappears from the curriculum when we add mobile?
- Is a mobile addition to the curriculum necessary to keep it fresh?
- Is mobile so different that it requires special coverage?
- What is the availability of teaching materials?
- Which approach is more beneficial to students in terms of their future career prospects?

- Will the addition of mobile to the curriculum attract more students?
- Access to necessary technology? iOS requires Macs, WP7 requires Windows and Visual Studio.

Future work (this is research in progress, after all) that may inform this discussion could include:

- Seek input from employers through surveys and face-to-face meetings
- Study national and international trends in the industry and among other educational institutions.
- Seek input from current and prospective students through surveys and focus groups.
- Implement mobile in the curriculum at UW Oshkosh, and observe the impact using action research.

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