

HTML5: The Path to Cross-Platform Mobile Development



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Because HTML5 represents a new standard for creating web applications for mobile devices, developers must understand both its potential and its pitfalls.

The mobile web is exploding. Users—whether consumers or employees—expect connectivity the way they expect electricity. Whether it's Wi-Fi or broadband, they expect to be able to upload and download information wherever and whenever. They expect to be able to text, e-mail, talk, shop, and research, 24/7. For IT, this behavior and capability has implications in a wide variety of areas, including data center access, information security, network bandwidth, and application development.

Because of these expectations, the mobile application developers creating these applications face multiple challenges. These include, but are not limited to, cross-platform development issues; browser issues (in that HTML5 spans both mobile and desktop devices more extensively than previous versions); business models, encompassing online application stores and other monetization issues for mobile applications; and the chasm between consumer and enterprise applications.

To accommodate all these issues, mobile application developers must have a sense of where the latest development capabilities fit within an appropriate strategy. With the forthcoming standardization of HTML5 and its associated technologies, such as Cascading Style Sheets (CSS3) and JavaScript, developers have a technology that will help them address the aforementioned challenges as a strategic whole, rather than with piecemeal tactical efforts.

The Coming Battle: Apps vs. Browsers

One of the most intriguing facets of a mobile application development strategy relates to the question of developing apps for specific devices or developing browser-based applications to run in those devices' browsers (see Figure 1: Decision Drivers). Initially, the arguments for native apps were more compelling, especially in terms of user experience, offline usage, and security (however, browsers are becoming increasingly more secure).

In actuality, there are three categories of mobile applications: native applications, web applications, and hybrid solutions, which combine the best of both (see Figure 2: App Development Comparison). Arguably, native applications have garnered extensive attention, especially with the success of the Apple® iPhone mobile digital device and iOS operating system. Developers can create targeted, specific applications that have distinct advantages, which may include:

- Tighter integration with the devices' operating system, which helps to boost performance.

- The use of the devices' built-in features, including camera, geolocation, address book, push notifications and more.
- The use of applications offline.
- The tendency to be more secure than previous operating system versions.
- The use of an online application marketplace which has generally, though not always, tested and confirmed their compatibility.
- The marketplace which provides a tested venue for both discovery and payment.

Web applications offer other potential advantages, particularly for developers:

- They can be run in the phone's browser.
- They can run across a variety of devices with cross-platform compatibility.
- Their base code can be used to support all devices, including those running the iOS and Android™ operating systems.
- They are generally simpler, less expensive to develop, and easier to update.

Hybrid mobile apps are a mix between these two types of mobile applications, essentially a native downloadable application that runs all or part of its user interface in an embedded browser component.

Using a framework, developers can create cross-platform applications that use web technologies (such as HTML, JavaScript and CSS), while still accessing the phone's features. They can be downloaded from the web, or packaged within the native app. Using hybrid apps allows companies to reap the benefits of native apps, while ensuring the longevity associated with web technologies, because the applications can be updated more easily. The hybrid approach aids developers targeting multiple operating systems.

Another approach to developing mobile apps is to use cross-platform tools, which use both a common environment and often proprietary interfaces to develop applications and deploy them on multiple platforms such as Apple iOS, Android, Windows® Phone 7, BlackBerry® and even HTML5 or hybrid apps. Cross-platform tools fall into two categories: Mobile Enterprise Application

Platforms (MEAP) or Mobile Consumer Application Platforms (MCAP). They provide a wide variety of traditional tools:

- Graphical user interfaces (GUIs).
- Third-party gateway application programming interfaces (APIs) such as Facebook, Twitter, location-based services, Google® OpenSocial™, SAP®, Oracle®, and Salesforce.com®.
- Workflow management.
- Version control management.
- Application management.

While analysts expect the app market to reach as high as \$52 billion by 2015, they also foresee a high degree of co-existence between native, web, and hybrid apps. Eventually, however, browser-based applications will outpace native applications for a variety of reasons. In its June 2011 report, "The (Not So) Future Web," the research firm Gartner estimates that by 2015, 60 percent of enterprise mobile applications and 40 percent of consumer mobile applications will be web applications.¹

Figure 1: Decision Drivers

Drivers	Native Apps	Mobile Web/HTML5	Cross-Platform Tool
Quality of User Experience	Excellent	Very Good	Excellent
Application Sophistication	High	Moderate	High
Addressable Audience	Limited to Smartphones; Compromises with Multi-Platform	Large, Supported by Smartphones and Feature Phones	Large
Cost per User	Typically Medium to High	Typically Low	Low to Medium Development Medium to High Licensing
Agility	Medium to Low	High	Medium to High
Technical Risk	High	Medium	High
Operating System/Platform Vendor Risk	High	Medium to Low	High
Operational Issues	Operationally More Flexible	Requires Network Connectivity but with HTML5 Can Operate Offline to Some Degree	Operationally More Flexible
Security	More Flexible*	Inflexible, Expected to Improve	More Flexible
Supportability	Complex	Simple	Medium to Complex

*Mobile web applications can be more secure, but in practice, they tend to offer a less-flexible range of security and authentication options than do native applications. Native applications can more easily perform CPU-intensive custom encryption and may exploit more sophisticated authentication techniques, such as face recognition.

Source: Accenture

Figure 2: App Development Comparison

	Device Access	Speed	Development Cost	Online Application Store	Approval Process
Native	●	●	○	●	Mandatory
Hybrid	●	◐	◐	●	Low Overhead
Web	◐	◑	◐	○	None

Excellent Fair

● ◐ ◑ ◒ ○

Source: Accenture

The Importance of HTML5

The fact is that while native apps grab more attention, users on mobile phones make extensive use of the devices' browser. While mobile web applications may currently have drawbacks, new web-specific technology like HTML5 can mitigate them. In order to stay ahead of this shift from native development to web development, mobile application developers need to understand what HTML5 delivers in terms of viability.

Even though the standard is still in development, analysts predict a strong future. In its April 2011 report, "The State of Application Development in Enterprises and SMBs," Forrester Research Inc. notes there is strong developer interest in core technology associated with HTML5, such as CSS3, and HTML5 audio and video tags, with 60 percent of developers expected to use it by end of 2012.² In "Predicts 2012: Ramifications of the Transition to HTML5," the research firm Gartner predicts that with the arrival of HTML5 and CSS3, many advanced features that drove the adoption of Adobe® Flash® and Microsoft® Silverlight® will be able to be delivered solely via the standard, nonproprietary web technologies offered by HTML5. This will lead to a situation where web developers will use HTML5 instead of Flash or Silverlight platforms for many future websites.³

Also, as the mobile web expands exponentially, developers are discovering increasingly compelling arguments on the side of browser-based applications, especially in terms of total cost of ownership (TCO) and time-to-market (TTM). In its September 2011 report, "Apptrepreneurs and Enterprise Application Development," Gartner estimates that by 2015, the number of available titles in app marketplaces will grow tenfold, but 99 percent will fail to recover their development costs.⁴ Several issues contribute to calculating this TCO. Most native application environments require more sophisticated skills than HTML5; Apple iOS requires coding in Objective-C, for instance, while Android and BlackBerry® apps are developed in Java® and Windows® Phone apps are developed in C#.

On the one hand, this means that development resources may be rarer and more expensive, which affects the overall development costs. But it also means that to serve multiple platforms, IT must have development capabilities in four different areas. For the foreseeable future, the mobile device market will likely remain fragmented, especially with the increasing popularity of tablets. A mobile web development approach using HTML5 delivers a way to accommodate development efforts across the widest spectrum of platforms as possible, thus amortizing the cost of development.

It's generally simpler to migrate existing HTML-based web applications to mobile web applications, which reduces their TTM. While native applications have to go through a certification process for posting in an online application marketplace, HTML-based applications can skip that time-consuming process.

There are other advantages to HTML5, based on new capabilities introduced in its latest revision. These updates address some of the advantages that native application development tools have, bringing HTML5 on a par with those options. These may include:

- Improved design rules accommodating screen size and potential interface limitations.
- Improved support of digital media, such as video and voice, with reduced need for extensions or plug-ins.
- Improved support of common hardware accessories, such as GPS.
- Improved interaction with hardware for better response time.
- Improved support of caching for simpler application usage while offline.
- Improved support of native graphics (SVG and Canvas).
- Support for the open-source SQLite database and independent threaded processes ("web workers") to enable more sophisticated applications and better offline capabilities.
- Better substitution of markup language rather than scripting.

However, not all of these features are supported in all browsers, a process that continues to mature.



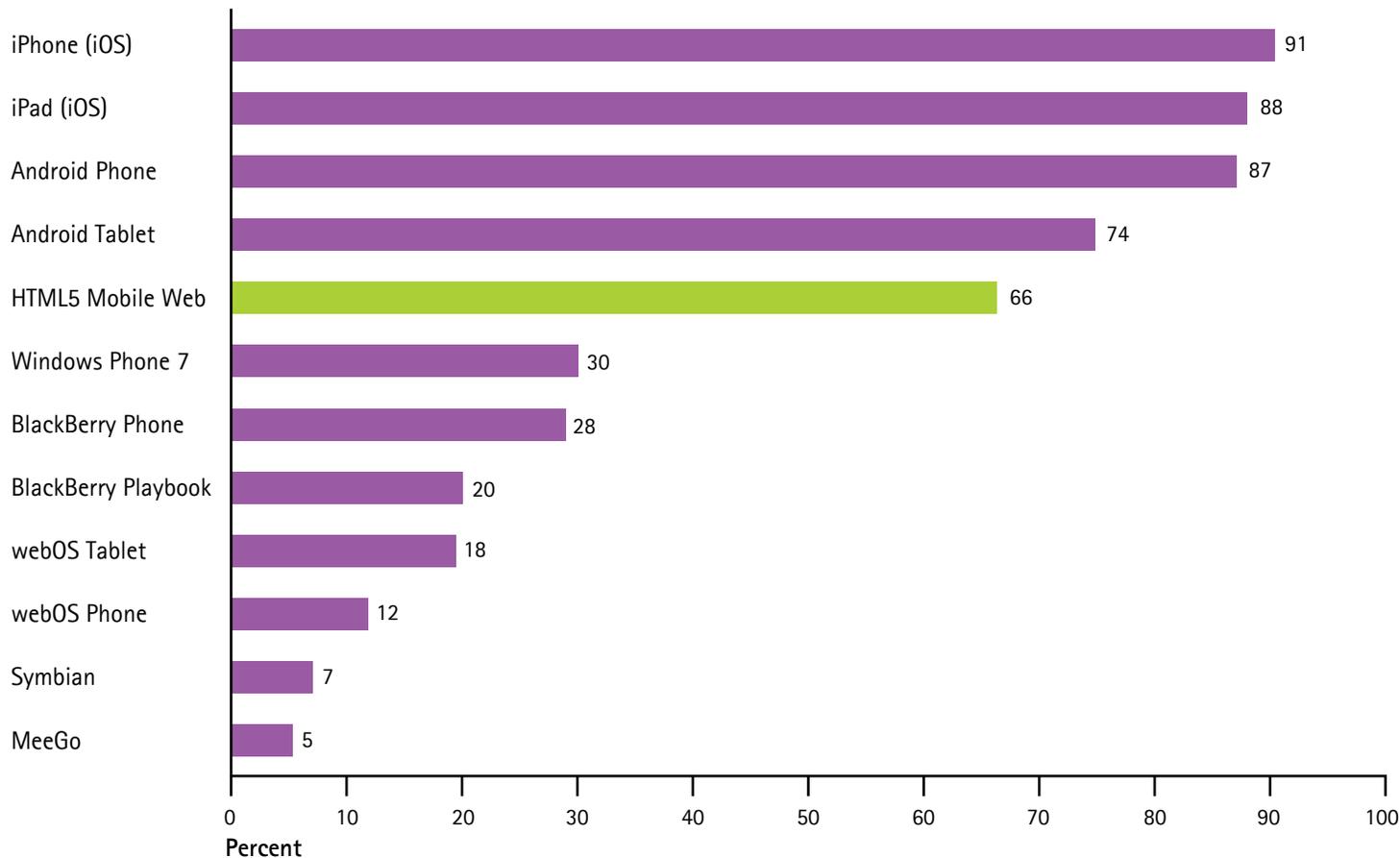
Even with the support limitations, the updates in HTML5 result in a number of capabilities. For instance, developers can leverage the CSS3 features that are part of HTML5, such as media queries, text overflow, word wrap and relative element sizing, to automatically adjust the application page layout to the device on which it is displayed. In addition, this simplifies the burden of

Android platform developers who add their own proprietary user interface layer on top of the standard operating system. By using the HTML5 user interface capability, it is often easier for developers to confirm that their applications work properly on a wider range of devices.

For all these reasons, developers report increased interest in using HTML5, whether in conjunction with native development tools or instead of them (see Figure 3: "Very Interested" in Developing for Each Platform). In the Global Development Survey of more than 1,200 developers in November and December 2011, Evans Data showed 75 percent of developers polled said they currently use or plan to use HTML5 for app development.⁵

Indeed, a number of forward-thinking companies are already using HTML5 in their development efforts. These include companies focusing on development (Sybase Inc., Antenna Software Inc., Oracle Corporation, Adobe Systems Incorporated), content (The New York Times Company, BBC, Pandora Media Inc., The Financial Times Ltd.), and technology (Google Inc., Facebook Inc., Salesforce.com Inc., Accenture).

Figure 3: "Very Interested" in Developing for Each Platform
Developers see need for mobile app and mobile website



N=1,956 responses

Source: Appcelerator/IDC Mobile Developer Report, November 2011

Key Challenges of HTML5

Even with these capabilities, it's important to note that HTML5 is not a portability panacea. Developers need to be aware of its limitations. For instance, it is still an emerging standard. It may take one to two years before the standard is completely codified, during which time features could change. As a result, not all mobile browsers currently support all of its features until the standard is completely codified.

Nor does the HTML5 standard define access to many of the platform APIs necessary to accommodate highly advanced mobile applications, particularly those that interact with certain hardware features of the phones. Applications that require the use of sensors, scanners, even calendars, may not be easy to develop with HTML5. It's possible that JavaScript conventions and standards will emerge in these areas, but this will take many years and provide access to only a small subset of the operating system APIs.

While HTML5 may make development with proprietary user interface layers simpler, there may be some issues with what users actually see. For example, smartphone manufacturer HTC Corporation offers its Sense® UI, which changes the layout of some controls that are rendered by the browser. The result is that edit boxes styled one way may be automatically rendered in a uniform style which may not necessarily fit the original application design.

Finally, it may become easier for native applications to accommodate HTML-based interfaces. These devices may make use of hardware acceleration to incorporate HTML5 and CSS3 features, but make them run faster with better graphics. At the same time, because HTML5 is designed for cross-platform capabilities, its applications will never have a place in native app marketplaces, which is a detriment for monetization, discovery, and distribution.

Preparing for HTML5

Even though HTML5 is still in its early stages, and arguably fragmented, it will nonetheless have a broad impact across the industry as it matures. Many harbingers point to HTML5's success in the marketplace, which is why developers should incorporate it into their mobile application development strategy.

Recent examples point to increasing acceptance of mobile web technologies as a viable cross-platform strategy. One example is Facebook Inc.'s HTML5 mobile apps platform launched in October 2011 where applications developed for Apple iOS and Android platforms run using an internal web browser within the applications. This allows developers to circumvent Apple Inc. and Google Inc.'s online application store fees. Another example is Microsoft Corporation's recent introduction of its new Windows® 8 platform with a demonstration of apps built using HTML5.

Yet another sign of HTML5 momentum is the strong backing of the standards group World Wide Web Consortium (W3C) from a variety of industry players, including Google Inc. and Apple Inc. W3C consists of 51 member organizations and works closely with the major browser developers to ensure compatibility. Thus, the HTML5 family of standards represents the future of the web platform, which is inevitably approaching as a result of broad and deep support from vendors, developers, and open-source projects.

As for crafting a mobile application development strategy that will accommodate both native and web applications, developers must look at their business needs. Which platforms can support them best? If a company is moving toward a bring-your-own-device strategy, it may be prudent to start moving closer to cross-platform application development in order to accommodate as many employees and

consumers as possible. Developers may also want to consider currently available cross-platform tools that can do cross-compilation and run on multiple platforms; such applications can be compiled to run on the web quickly.

While web-based applications may never replace native applications, they will retain an edge in business applications, mass-market services, and cross-screen experiences (that is, applications that span mobile, television, and desktop devices). That means developers can use HTML5 not only as a tool for developing mobile web apps, but also as the basis for a single coding platform that encompasses multiple devices. As enterprises increasingly expose their back-end processes for mobile access, they can embrace mobile web and HTML5 as a "future proof" cross-platform strategy. Developers will be looking for technologies like mobile web and HTML5 that reduce, rather than compound, the complexity of such access.

In the short term, Accenture recommends developers adopt the hybrid app approach, building up their HTML5 expertise. That will help in the long term, over the next two to five years, because most major handset OEMs and platform/OS vendors are committed to HTML5 roadmaps. With each new OS release, upgraded browsers are incorporating HTML5 features. As more advanced features become available, application developers can leverage their HTML5 expertise to help harness the advantages of web technologies, while at the same time retaining the benefits of native experience, control, and performance.

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Endnotes

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