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How new Internet standards will finally deliver a mobile revolution

As the Web experience evolves, smartphones may soon live up to their name, and every business's mobile strategy will grow in importance.

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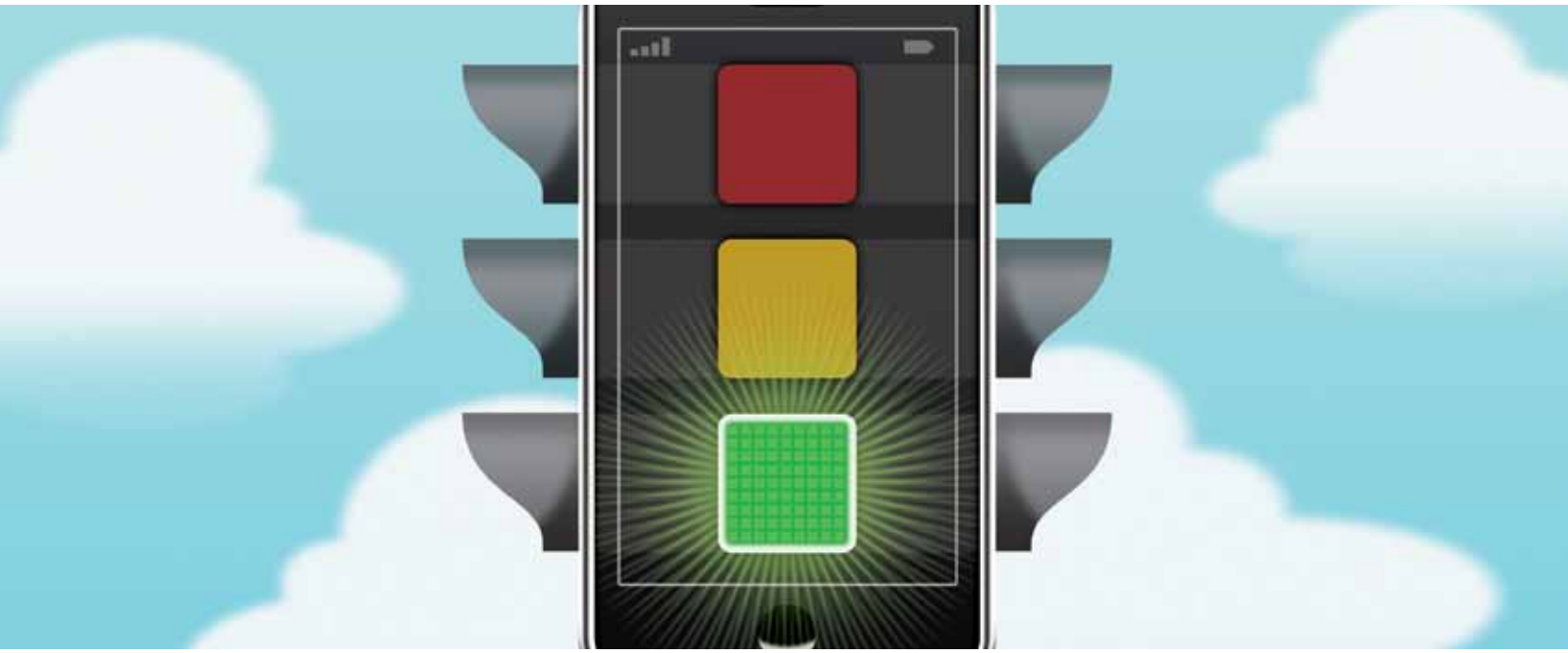

An arcane-sounding change with potentially significant implications for consumers and businesses is under way on the Web: the shift to a new generation of HTML,[1] the programming standard that underpins the Internet. Senior executives, regardless of industry, should take note; like the exponential growth of device-specific applications, this evolution of HTML will further boost the power of mobile devices, accelerating changes in the way people consume content and the potential use of smartphones and tablets as both a marketing platform and a productivity tool.

The next generation of the Internet standard essentially will allow programs to run through a Web browser rather than a specific operating system. That means consumers will be able to access the same programs and cloud-based content from any device—personal computer, laptop, smartphone, or tablet—because the browser is the common platform. This ability to work seamlessly anytime, anywhere, on any device could change consumer behavior and shift the balance of power in the mobile-telecommunications, media, and technology industries. It will create opportunities and present challenges. This article seeks to provide a primer on these changes for senior executives, who may feel the effects of the move toward "Web-centricity" much sooner than they think.

Web-centricity

In some ways, the evolution of mobile technology resembles the battle among PC makers in the 1980s. While we today take it for granted that Microsoft's Windows operating system underpins hardware from countless manufacturers, it wasn't always that way. Remember the operating systems that powered the Commodore 64, the biggest-selling PC of all time, or the Apple II? Before the emergence of Microsoft's DOS and then Windows, PC users faced a tough decision about which technology to adopt, because that determined the games and utilities they could use, as well as the general usefulness of their computers. The same occurs today with mobile devices. Users must weigh the hardware and software merits and commit themselves to a technology, whether it's a device from manufacturers such as Apple or Research in Motion, the ever-increasing array of tablets and smartphones running Google's Android operating system, or, soon, offerings from Nokia running on Microsoft's Windows Phone 7 operating system.

The next generation of HTML, known as HTML5, may narrow these differences between mobile devices. HTML5, the most significant evolution yet in Web standards, is designed to allow programs to run through a Web browser, complete with video and other multimedia content that today require plug-in software and other work-arounds. In theory, this will make the *browser* a universal computing platform: without leaving it, users could do everything from editing documents to accessing social networks, watching movies, playing games, or listening to music. Not only would any device with a Web browser have these capabilities, but consumers would also have access to all content stored remotely "in the cloud," independent of locations and devices.

[1] Hypertext markup language.

That's the first reason Web-centricity holds particular promise for mobile devices. The second is that it helps overcome the relatively weak processing power of smartphones and tablets compared with PCs and laptops. It's partly this lack of horsepower that has fuelled the explosive growth in applications (or "apps") to optimize the performance of specific devices: the average smartphone user now spends more than 11 hours a month using apps, more time than either Web browsing or talking, according to a March 2011 study by research firm Zokem. HTML5 has the potential to improve the mobile experience—its specifications enable browsers to locally store 1,000 times more data than they currently do, so users can work when offline—writing e-mails, for example—and their devices will automatically update when a network becomes available. What's more, programs and applications run faster because complex processing tasks are handled by network servers, although mobile-network capacity must go on growing to deal with heavier data demands.

Of course, not all programs are suited to running through browsers, nor is HTML5 the first would-be universal platform to emerge: Sun Microsystems (purchased by Oracle in 2010) promised that with its Java language, programmers could "write once, run anywhere." Things haven't worked out that way. And there's never a guarantee that one kind of standard will prevail (see sidebar, "Winning the Web standards battle"). The rate at which developers are writing apps and consumers buying them is dizzying, and ingrained behavior can be hard to change. Web-centricity may raise security fears among users because programs are no longer installed on specific devices and because data are stored remotely. And there could be fragmentation issues with both the standard and the browsers—after all, existing ones, such as Google's Chrome, Microsoft's Internet Explorer, and Mozilla's Firefox, don't all treat the current standard, HTML4, the same way.[2]

Despite these possible headwinds, the number of HTML5 Web sites is increasing by the day. Hardware manufacturers are lining up behind HTML5, and the development community is undertaking efforts to safeguard data in the cloud at a very fast pace. We therefore estimate that more than 50 percent of all mobile applications will switch to HTML5 within three to five years—and the rate of transition could be considerably higher and faster. No matter how quickly the shift occurs, it will affect both consumers and businesses significantly.

Consumer impact

Consider a simple task many consumers currently use mobile devices for: reading news headlines. Today, that requires accessing a specific Web site—often a sluggish exercise in frustration—or separately installing an application on every device used and, for those that charge a fee, paying each time. With Web-centricity, a single application can theoretically

[2]Various plug-in programs written for HTML4, such as those that run audio or video files, often require multiple versions customized to specific browsers. As the complexity of Web programs accelerates, those mismatches are increasing. To read more about how HTML5 may help the Web keep up with the pace of change, see Bobbie Johnson, "The Web is reborn," *Technology Review*, November/December 2010, Volume 113, Number 6, pp. 46–53.

Winning the Web standards battle

Jacques Bughin

HTML5 offers many advantages, from a better video experience to easy access to programs when users are offline. But history tells us that the better platform doesn't *always* win. Consider how Betamax foundered during early efforts to set a standard for home videos, although it was widely considered to be better technically than its rival, VHS.

The critical issue in platform competition is whether a new technology can create a vibrant ecosystem of large and small players. In the case of HTML5, this means providing an environment that not only enables a better user experience but also makes it possible for innovative new Web programs to scale rapidly and for industry players to gain significant benefits. Web companies that rely on advertising revenues, for example, may want to use HTML5 to help expand their reach, making mobile devices and even TV screens frictionless portals to the Web. Apple and Nokia would want the new platform to enhance the user experience in ways that stimulate sales of their smartphones and tablets.

Recent research on standards-based competition highlights four issues, unrelated to the consumer experience, that will help determine the platform of the future.[1] Executives should keep a careful watch on them to find out whether HTML5 will reach its potential or be stymied by the difficulties that sometimes block the progress of new standards.

1. What developers do. A winning platform needs to capture the hearts and minds of the best developers. HTML5's flexibility should be a strong selling point for many, but sheer numbers aren't enough. To create compelling value, a platform must also encourage collaboration among talented programmers and content developers. This leads to greater innovation and to applications that excite a critical mass of new users.

The preferences and goals of developers will also affect the pace of change. Some may be quite satisfied with the returns they currently get from app stores. For others, the allure of wider reach, multiscreen access, and, potentially, a more significant distribution and marketing platform could make HTML5's open standard more attractive.

2. How the economics evolve. The actions of developers and companies will reflect the economics of paid applications and advertising. Apple, through its App Store, has demonstrated that the paid mobile-content model can succeed. It's also clear that mobile advertising finally has taken off as smartphones have improved. Mobile Web search now spins out revenues from paid keyword advertising, much as the PC-based Web does. Still, analysts remain uncertain about which of these two models will gain ascendancy. How much will customers be willing to pay for apps? (If demand for paid ones hits a wall as users resist paying for specialized, "long-tail" programs—which don't have mass appeal but seek to attract niche users beyond the first wave of hits—

that would be a boon for HTML5.) Will advertising revenues grow in line with rising numbers of mobile users? (If not, Web-based HTML5 applications might be less attractive for developers than apps they can charge for.)

The answers to such questions will determine whether the mobile Web ultimately looks more like today's PC-based market (advertising and paid content are about equal in importance) or today's mobile-Internet market (paid-content revenues are more significant). They also will have major second-order effects: if the economics start tilting one way or the other, developers will probably steer ever more of their innovative efforts toward the winner—paid applications or advertising-supported content. A similar virtuous cycle could affect the decisions of advertisers, whose returns on mobile digital-marketing investments will increase along with the size of the audience consuming ad-supported content.

3. How platforms fare. At present, the mission of Google's Android platform may simply be to become a broadly accepted mobile-Web operating system that ensures the successful transition of Google's core search business to smartphones. An open-source model can help maximize reach, with revenue coming not from traditional licensing deals but from alternative sources such as mobile advertising. But what if ad growth hovers below expected targets? Similarly, if the mobile environment becomes more open—more like today's PC-based Internet—will Apple and others continue to nurture their walled-garden operating platforms?

4. How the technical issues play out. When hardware and software producers, as well as service providers, can easily incorporate elements of a platform, momentum for the standard increases. Interfaces—the specifications that allow diverse systems and hardware to interact readily—are often the key. In the PC world, a powerful impetus toward standardization was BIOS,[2] which provides rules for how Intel processors handle instructions from software programs and communicate with other components and devices. On today's mobile battlefield, complexity reigns. Apple's mobile interface ties the iPhone's operating system to custom-built processors. Android and Windows Mobile systems interface with chips designed by Intel, Qualcomm, and Samsung. While this fragmentation could slow down HTML5's adoption, it could also set up a healthy competition for a faster, more robust HTML5 interface that will enhance the standard, leading to greater innovation and, ultimately, to higher sales of chips.

[1]See, among other sources, Carliss Y. Baldwin and C. Jason Woodard, "The architecture of platforms: A unified view," Harvard Business School working paper, Number 09-034, September 2008; Martin Kenny and Bryan Pon, "Structuring the smartphone mobile industry: Is the mobile Internet OS platform the key?" ETLA working paper, Number 1238, February 2011; and Michael Cusumano, "Technology strategy and management: The puzzle of Apple," *Communications of the ACM*, 2008, Volume 51, Number 9, pp. 22–24.

[2]Basic input/output system.

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be accessed from any device through a browser—pay once and you're done. And because all content is stored in the cloud, billing information and preferences can be seamlessly shared and accessed, and all devices remain in sync. A consumer can start reading an article on a tablet and then switch to a laptop, picking up where she left off. In a more advanced example, she could start an instant-messaging or video-chat conversation on her desktop computer and continue it on her smartphone. The bottom line for consumers: Web-centricity represents a major step toward genuinely "smart" devices that offer the same simple, relevant, and personalized experience everywhere.

Industry impact

These changes to consumer behavior may affect the economics of industries ranging from telecommunications and media to technology and even advertising. As Web stores selling applications that can be used across devices proliferate, for example, cutthroat competition may leave ad agencies reminiscing wistfully about the days when they could claim up to 40 percent of every dollar of mobile-advertising revenue. Consider, briefly, the implications for the following players in a world where content is everywhere and the relative importance of operating systems and Web browsers for creating and distributing programs and applications is shifting.

Software developers. Application developers currently pay a fee of up to 30 percent to device makers, telecommunications operators, or operating-system developers whenever an application is sold to a consumer. In a Web-centric world, developers can avoid these intermediaries: not only can the same application be sold across all devices but anyone can set up a Web store and sell directly to users. Google, for instance, is already charging application developers a distribution fee of about 5 percent through its Chrome Web store.[3] In addition, the emergence of an open platform will probably motivate bigger enterprise software companies to introduce—and quickly—mobile-based programs for managing customer relationships, marketing, and supply chains.

Telecom operators. Web-centricity may be a double-edged sword for telecom players. On the one hand, it will spur demand for mobile-Internet services, create opportunities for operators as consumers seek applications that work across multiple devices, and loosen the grip of native app stores. On the other hand, there's no guarantee that operators can make money with new apps, the likely surge in data traffic will require significant investments in network infrastructure, and operators may face increased competition from companies offering Web-based mobile-voice and -video services.

Content providers. Web-centricity should provide revenue and savings opportunities for content providers. On the revenue side, the ease with which consumers can access Web-centric content on the go should stimulate their interest in more relevant, timely

[3]See http://code.google.com/chrome/webstore/docs/index.html#builtin.

material. Moreover, the seamlessness with which consumers can access HTML5 content across devices could create more opportunities for providers, such as television and movie studios, to offer consumers programming directly or to work through aggregators such as Apple's iTunes. Finally, advertising could support additional mobile content. Fragmented mobile platforms today make it hard for online publishers to manage ad inventories across a broad range of users. Advanced features such as consumer targeting and measurement may migrate to the mobile-Web environment. Of course, this development will no doubt attract entrants and intensify competition, making the new environment as challenging as it is dynamic.

Savings, a secondary benefit, come from avoiding the cost of converting an application from one platform to another (today, typically around 50 percent of the original development cost). Newspapers and magazines, for example, should be able to create content once and deliver it seamlessly across multiple devices, lowering production costs and increasing reach.

Device makers. Web-centricity will probably make consumers more "device agnostic," and that will in turn reduce the ability of players to control an ecosystem of developers and could accelerate the commoditization of mobile devices. The shift does, however, create opportunities. Manufacturers will be able to better and more easily integrate software and hardware experiences within and across devices. They can try to develop compelling cross-device applications and speed up the push to make synchronizing and storing data across devices easier. Finally, they have some control (along with operators) in choosing the default set of Web-centric services and applications embedded in devices.

What it means for senior executives

Consumer uses propel many innovations associated with Web-centricity. Yet it could ultimately provide a range of benefits for companies as information technology moves to Web-centric platforms and away from the current hard-wired infrastructure and applications. These are enterprise-level issues, and any CEO who isn't confident that the organization is grappling with them should start pushing the senior team to understand their importance.

The CMO

The emergence of the "m-dot revolution"[4]—the increasingly strong tendency of consumers to use mobile devices to access company and product information—will have its greatest impact on chief marketing officers. Many companies are already experimenting with innovative smartphone applications; Volkswagen, for instance, has released a popular racing game for the iPhone. Companies will be able to continue taking advantage of the enhanced power of mobile Web browsers to create compelling experiences directly for

[4]"M-dot" refers to the URL of a Web site that is optimized for mobile phones. Many of these sites include an "m." at the beginning of the URL, such as "m.usatoday.com" or "m.facebook.com."

users. In addition, CMOs will need to push their teams to develop compelling mobile-advertising strategies that go well beyond merely inserting ads into applications, as many do today. HTML5 should create opportunities to use video advertising more often, for example, and the development of robust mobile capabilities may spur the evolution of marketing tactics such as the monitoring of shopping activity to deliver real-time, location-specific coupons.

The CIO

Web-centricity puts additional pressure on organizations to invest in corporate cloud infrastructure. Chief information officers should, for example, prepare for the day when consumers, employees, and suppliers all communicate and interact through the use of mobile devices that run Web applications. This phenomenon will not only extend the reach of the enterprise but also place a premium on analytics and possibly improve the competitiveness of companies that can exploit the new information and interactions a Web-centric environment provides.

CIOs will have to decide whether costs can be cut and productivity increased by introducing rich applications both horizontally, across industries (for example, enterprise customer-relationship-management systems such as Salesforce.com), and vertically, within industries (say, mobile electronic medical records in health care or smartphone-based claims processing in insurance). Web-centricity also promises smaller productivity improvements, such as allowing users to store content locally for later uploading. Employees will therefore be able to work without being connected to the Internet—for instance, when they're on airplanes.

The CEO

From the perspective of the chief executive officer, Web-centricity should be part of a broader imperative to elevate the importance of mobile marketing in corporate strategy. CEOs will need a response when, as must inevitably happen, they are asked how their companies are dealing with the m-dot revolution, which introduces a mobile element into everything from commerce to advertising to public relations. What's needed is not just the coordination of mobile initiatives from functional offices, however. CEOs must take a big-picture approach to the collective implications of Web-centricity, the way it redefines a company's interactions with employees and customers, and the challenges and opportunities it presents.

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Of course, Web-centricity will require spending money to make money. Organizations will have to make IT investments, particularly for cloud-based computing and mobile platforms. Employees, especially in sales and operations, will need training in the art

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and science of mobility if companies are to maximize cost savings and productivity improvements. Yet Web-centricity also promises to make the mobile-Internet experience more open, complex, and dynamic. It may change the way consumers and enterprises behave. Even if companies don't understand the technical aspects of this transition, they must master the technology's potential and possible ramifications.

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