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HTML5 and openness in mobile platforms

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HTML5 is an open standard that enables new functionality in the mobile web ecosystem. Speculation by companies around its potential presents an opportunity to view how notions of ‘openness’ are employed to create and support mobile platforms. Particularly, Internet-based companies such as Google seek a foothold in mobile industries which have traditionally been dominated by carriers and device manufacturers. I compare two paradigms of openness and suggest a third in this article. Open source describes the development of the HTML5 standard by multiple stakeholders in online industries. Open innovation is a process where value is being constantly created and captured, such as when companies make app developer tools public but carefully manage the point-of-sale ‘app stores’. A third type – rhetorical openness – describes claims that strategically bolster a corporate position. Rhetorical openness is increasingly necessary for mobile companies needing to balance multiple stakeholders, appeal to developers, and convince the public of their good intentions. Disputes around the politics of online and mobile media will be increasingly conducted through, using, and around these three forms of openness.

HTML5, the new web standard that has been adopted by Apple, Google and many others, lets web developers create advanced graphics, typography, animations and transitions without relying on third party browser plug-ins (like Flash). HTML5 is completely open and controlled by a standards committee, of which Apple is a member. Steve Jobs (2010)

It’s about the money, people... it’s a multi-billion dollar industry... John Foliot, at the ‘Politics Behind HTML5’ roundtable at SxSW 2011

The openness of the internet is a product of the peculiar way in which it developed, not something inherent in the technology. Thomas Streeter (2011)

Google CEO Eric Schmidt advocated in 2010 for companies to ‘start with the presumption of connectivity, location... locality and interaction’ (Google 2011). This ‘mobile first’ mantra would resonate throughout technology and software industries as he presented his vision at a series of widely attended trade shows (Albanesius 2010), despite the fact that monetization of mobile media was elusive (Wilken and Sinclair 2009b). Schmidt was channelling widespread interest in the mobile Internet, particularly opportunities in geolocative services (Wilken 2012), mobile advertising (Wilken and Sinclair 2009b), and gaming (de Souza e Silva and Sutko 2009). ‘Mobile first’ described a shift from designing for online experiences on desktop computers towards designing primarily for mobile media. Yet, the technologies behind going ‘mobile first’ were unclear; these were keynotes for corporate executives, not engineers, product developers, and managers.

HTML5 emerged as the most viable option for fulfilling Schmidt’s vision, helping to reconcile various technical, social, and economic factors. The last several years have seen

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an industry shift towards the mobile Internet in technologies, user practices, and industry speculation. A majority of American adults (61%) currently own a smart phone (Smith 2013) and more than 34% own a tablet (Zickuhr 2013). High-speed cellular networks (mainly 3G and 4G) provide access (albeit not always complete, fast or cheap) to the mobile Internet. Internet and technology companies such as Google, Apple, and Mozilla are becoming increasingly active in creating and supporting mobile operating systems, software, and hardware, disrupting historical relationships between carriers and device manufacturers (Goggin 2011a). Devices are ‘becoming more like a personal computer’ (Ling 2012, 12) in processor speed and networked capabilities. Manufacturers such as Samsung and Apple have created a variety of phone-tablets or ‘phablets’ with screen sizes ranging from 5 to 7 inches. Communication on the mobile Internet has become at least as diverse as on desktops, supporting interpersonal interactions (Ling 2008), group collaboration (Humphreys 2010), media production (Goggin 2011a), and locative services (de Souza e Silva 2013). As will become clear in the following pages, HTML5 is more than just an iteration of a standard for ‘web pages’. Rather, it creates a common platform for producing mobile software that runs across multiple smart phones and tablets that alternately pushes against and aligns with corporate desires and ideologies.

**Infrastructure and standards**

Horst (2013) recently suggested taking an infrastructural perspective to unpack the often hidden political and economic forces behind mobile media delivery and use. Focusing on infrastructure helps provide insight on how power is distributed in mobile media, a relatively under-researched area of mobile communication (Goggin 2011a). Infrastructure studies comes out of science and technology studies’ (STS) (Bijker 1997; MacKenzie 1985) concern with casting a critical eye on medical (Bowker and Star 1999), scientific (Knorr-Cetina 1999; Latour 1986), and technical (Bowker et al. 2010) systems. Infrastructure is also fundamentally socio-technical (Latour 2003, 2005), reflecting not just the built environment (computers, plugs, cables, servers), but ‘the set of organizational practices, technical infrastructure, and social norms’ (Bowker et al. 2010, 102) that accompany it. The more sensory and interpretive side of infrastructure studies that focuses on uncovering infrastructure that is invisible, taken for granted, and observable during breakdown (Star and Ruhleder 1994) is helpful, as mobile media have become ubiquitous in everyday lives of individuals worldwide, always present but going unnoticed (Ling 2012).

Standards are a type of infrastructure that allow for the smooth operation of a system (Lampland and Star 2009), but also reflect certain ideologies and visions that impact everyday lives (Busch 2011). Like other forms of infrastructure, standards are nested, distributed unevenly, are integrated with other systems, and embody ethics and values (Lampland and Star 2009). The operations of the groups that have been standardizing HTML5 have commonalities with other standard-setting processes. It has been continually developed by a combination of players from industry, non-profits, and educational institutions over the last 15 years. As Star (1999) observed, infrastructure is modular and changes occur over time, meaning that nobody is ‘in charge’ of its development.

However, significant differences also exist between HTML5 and other types of standards. Investigations of socio-technical systems from an STS perspective frequently been driven by ethical imperatives. Bowker and Star (1999) revealed how medical standards such as the World Health Organization’s International Classification of Diseases came to negatively impact the everyday lives of classified individuals. In web-based
standards on the Internet (Sandvig 2013), ASCII standards forced users worldwide to interact with online resources such as universal resource locators using English (Pargman and Palme 2009). By comparison, although there is significant debate over the impact of the HTML5 standard on users (or who even constitutes a ‘user’), the outcome of standardization is still in flux. Thus, I am primarily interested in the politics that have emerged among industry participants during the standardization process, and I employ the notion of infrastructure as a way to make visible business stakes in mobile software during standardization. Specifically, contrary to dominant narratives, HTML5 cannot be viewed as unsullied by commercial interests or ethically neutral simply because it is ‘open’. Corporate interests in the standard are driven by hopes that it can offer new routes to monetization and help reconcile the fractured nature of mobile platforms. In other words, the ongoing development of HTML5 is at least as reflective of corporate interests in gaining greater leverage in the mobile marketplace as it is an egalitarian resurgence of the ‘open web’. The current study is thus an initial exploration of openness, viewing disputes surrounding HTML5 as illuminative of deeper infrastructural concerns in the mobile space.

**Openness in mobile software development**

Open mobile standards have been previously employed through two smartphone operating systems: Symbian and Android. Nokia broadly moved from 1985 to 2002 to embrace an open innovation strategy that embraced external collaborations (Dittrich and Duysters 2007). The Symbian operating system emerged in the late 1980s from Psion, which helped form a jointly controlled company in 1998. Symbian was purchased in 2008 by Nokia to be made open source and royalty-free (Goggin 2012). However, by late 2010, ‘in effect Symbian reverted to a proprietary software platforms, completely under Nokia’s control’ (Goggin 2012, 746) and by 2011 support was outsourced to Accenture as part of a shift towards the Windows mobile OS. Symbian was slowly overtaken by Android and iOS until the last Symbian handset was shipped in June 2013 (Null 2013).

Development on Google’s Android operating system started in earnest in 2007, initially with the help of the ‘Open Handset Alliance’, an industry consortium of carriers and manufacturers (Goggin 2012). Rather than manufacture their own devices, Google developed the Android operating system open source in 2008 to draw revenue from sales through their Play app store and drive advertising. Although Google has received less criticism than Apple for policing of its storefront, ‘there is a striking imbalance between the kind of claims made for [Google’s] smartphone platform... and its openness... as compared to the realities of its heavily enclosed and policed nature as an ecosystem’ (Goggin 2012, 747). Devices running Android currently dominate the smartphone marketplace in many countries.

The complexities of these cases are best covered elsewhere (Goggin 2011b, 2012), but several points should be noted about Symbian and Android. First, standardized formats and technologies permitting collaboration across industry barriers are hardly new to the mobile space. Google and Symbian carefully managed openness at various points in their respective histories, particularly as a way to engage with external partners. Second, a shift towards the mobile Internet has permitted Internet companies to compete in a mobile ecosystem by producing hardware and an attendant ecosystem (Apple) or operating systems (Google). Third, to compete on the mobile Internet, corporate entities have an increasing need to develop relationships with external companies and independent developers to drive adoption across devices (Funk 2002). Finally, the rapidity of
Symbian’s decline – from the dominant smartphone operating system worldwide in 2010 to obsolescence a few years later – demonstrates the increased pace of mobile industries.

The current study examines disputes about openness around HTML5 as a way to make business interests in ‘mobile first’ visible. On a technical level, HTML5 provides a solution to industry needs for media playing, cross-platform development, and web rendering engines. One oft-repeated narrative is that HTML5, when combined with CSS3 and Javascript, constitute a ‘more open’ platform for creating mobile software. Because it is open source and builds on technologies created for the web (Wroblewski 2011), it is positioned as a disruptive (Bower and Christensen 1995; Christensen 2001) alternative to app marketplaces, and these claims can veer towards the hyperbolic. Mikkonen and Taivalsaari ( 2011) described the tension between apps and the open web as the ‘battle of the decade’. There is some truth to this because as Microsoft moves towards portal integration there will be no major platforms without at least some coupling between development environments, app stores, and devices (Holzer and Ondrus 2011, 27). However, the simplicity of this narrative – egalitarian leanings of the ‘open web’ versus commercialized and ‘closed’ apps – threatens to obscure how industry interests are promoted through, using, and around openness with HTML5.

**Conceptualizing ‘openness’**

Openness has been defined as easing or inhibiting the flow of mobile media production, distribution, and use. This often takes the form of comparing ‘open’ to ‘closed’ forms. From a macro-perspective, tighter relationships between carriers and device manufacturers can restrict consumer choice (Baer et al. 2011) and extend existing monopolies (Crawford 2013). Developers can be locked into certain retail patterns, such as being required to sell software through certain portals, or consumers can be ‘locked’ to a specific carrier – prevented from transferring their device to service through a different carrier. The relationship between mobile hardware and its operating system has been subjected to particular scrutiny. Zittrain (2008) proposed that the iPhone was an example of a ‘closed’ technology that was not ‘generative’. Indeed, broad trends point to companies organizing more tightly coupled relationships between development environments, distribution, and devices in app platforms (Holzer and Ondrus 2011). Despite this wealth of opportunities for increased control, it seems everyone claims to be more ‘open’, particularly new players in the mobile space such as Apple and Google.

Following from Goggin, I critique the ‘notion of openness’ (2011b, 156) against a complex international backdrop of uncertain restrictions and affordances of relationships between individuals, mobile devices, and corporations. There is not sufficient vocabulary developed to thinking through how and why openness is wielded by companies on the mobile Internet (Goggin 2011b, 155). App stores are generally considered from a framework of law and regulation (Mac Sı ´thigh 2012; Zittrain 2008) rather than infrastructure. Few mobile communication scholars have considered political economy of mobile media (Goggin 2011a; Wilken and Sinclair 2009a, 2009b) and fewer still specifically on openness on the mobile Internet (Burgess 2012; Goggin 2011b, 2012; ). Horst (2013, 147) proposed that research on the essential but ‘boring’ infrastructure (Star 1999; Star and Ruhleder 1994) of mobile media has been neglected in favour of a focus on ‘novel uses’ such as geolocative services.
I argue that ‘openness’ — a notion that often falls prey to simple open/closed dichotomies — can only be considered within the context of a particular system: open to whom, how and why? A technology is rarely entirely open, but is made open for specific purposes. To help shed light on this topic, the current study describes several types of openness before describing specific disputes emerging from the standardization of HTML5. The development of this format can be described as open source, as no single entity controls its creation and the format is free to use or modify. Companies also employ HTML5 as an open innovation that enables external collaboration. Finally, companies employ rhetorical openness, jockeying for attention in the press, attracting developers, and positioning themselves using HTML5. This differs from previous considerations of openness in national-level policies of carriers (Baer et al. 2011), structural relationships of ‘app stores’ (Holzer and Ondrus 2011), or restrictions of a single device such as an iPhone (Zittrain 2008) where openness tends to be defined a priori. I place particular emphasis on how new entrants to the mobile space work their interests through, using, and around various types of openness. In particular, often contradicting their egalitarian mottoes, they extended and buttressed their business interests by becoming involved with open platforms, standards, and software in the mobile space. This study extends previous work on historical antecedents that relate openness to historical standards-setting bodies (Russell 2014) and particular communities such as Free and Open-Source Software (F/OSS) enthusiasts (Kelty 2008). While openness manifests in a multitude of ways, here I focus on three forms most relevant to the current discussion: open source, open innovation, and rhetoric of openness.

Open source
Open source broadly refers to code that is made publicly accessible for use and successive improvement. It is often developed collaboratively by geographically distant parties motivated by intrinsic factors such as enjoyment or for the challenge (Lakhani and Wolf 2007). Interest from the business community in open source started in the late 1990s with Raymond’s (1999) influential book The Cathedral and the Bazaar, which described two models for software development. He described the cathedral model as a top-down system with strong administration, longer cycles, and less customer feedback. He argued for the bazaar model’s personal involvement, improved collaboration, and faster product releases. Although these models were exaggerations – the ‘waterfall model’ of software development is mostly apocryphal – Raymond started a shift towards the incorporation of open-source practices into business. He overtly distanced himself from ‘free to re-use’ portion of Richard Stallman’s ‘free software’ model, stating that open-source is not ‘a moral or a legal issue. It’s an engineering issue’ (Raymond 2002). It seems that ‘the “free” label was getting in the way’ (Weber 2004, 114). Raymond’s coining of ‘open source’ (rather than ‘free’) embraced a more corporate perspective where open source is more an effective solution to development problems than an ethical imperative, as with those who held onto the more ‘libre’ connotations (Kelty 2008).

This overview is insufficient to cover the many intricacies of open-source culture and licensing that have developed, but several contours should be noted. There are currently many strands of open source, with the commonalities being viewing developers as users, open access, and right to make derived works (Gacek and Arief 2004). Berners-Lee (2010) has similarly defined open standards as those that ‘can have any committed expert involved in the design, that have been widely reviewed as acceptable, that are available for free on the Web, and that are royalty-free (no need to pay) for developers and users’.
To him, open standards drove innovation on the web, resulting in the success of business ventures such as Amazon.com. As will be discussed, he has guided world-wide web consortium (W3C) as an open-source body where paying members (corporations such as Microsoft, as well as educational and non-profit entities) outline a set of voluntary technical standards for the next iteration of the markup language that defines the web.

**Open innovation**

Open innovation is a business process where innovation both internal and external to a company is maximized. Through this perspective, external innovations of value should be incorporated into ongoing internal goals. Products do not need to be marketed by the companies that create them, but can lead to other beneficial outcomes. For example, IBM developed relationships with third parties in the early 1980s to create software for personal computers. Xerox, although spinning off several successful companies (such as 3Com in 1975), insisted on keeping all development and production in-house. This resulted in a spectacular failure of the company in the computer industry (Douglas and Alexander 1988), even as spin-off companies such as 3Com (1979) and Adobe (1983) flourished. This is compatible with Berners-Lee’s vision, to a point; unlike open source, open innovation ‘explicitly incorporates the business model as the source of both value creation and value capture’ (Chesbrough 2008, 1).

Open innovation is a strategic openness that creates value for companies and external entities. In other words, companies release control over one portion of the process with the understanding that they will profit elsewhere. This strategy is referred to in the business community under terms such as ‘two-sided markets’ where users and developers are motivated and charged differently (Eisenmann, Parker, and van Alstyne 2006). As Cusumano and Yoffie (2000) observed during the ‘browser wars’, ‘the dirty secret of the computer industry is that everyone is “open, but not open”; they differ only in degree’ (133). In the case of the iPhone, the development environment is more open and the portal lightly policed, with the goal of encouraging the creation of a wide range of apps that will drive hardware sales. Google has very much followed suit, with their Google Play store and ‘open handset alliance’ that served to initially align various device manufacturers with Android (Goggin 2012). Companies view HTML5 as a technology in the larger mobile ecosystem that offers market advantages that can be implemented inside their own closed efforts. They seek to capture these synergies rather than let them ‘disrupt’ existing monetization strategies by being undercut (Bower and Christensen 1995).

**Rhetoric of openness**

Companies such as Google and Apple are increasingly quick to publicly position their products as open in press releases, interviews, and industry conferences. Gillespie (2010) observed how discursive work allowed companies to balance the needs of stakeholders as they seek better business models. This type of talk draws on connotations of openness to attract developers, gain positive recognition in the media, and please stakeholders. This storytelling can draw on a relative vagueness of the concept (Millerand et al. 2012). For example, Coleman (2012) noted how the ‘semiotic surplus’ of open-source software permitted a business-friendly adoption. A multi-million dollar 2000 campaign by IBM emblazoned iconography representing ‘Peace, Love, and Linux’ on the sidewalks of major cities. Using open source’s connotations of freedom, they were able to connect with ‘countercultural ideals of sharing, empowerment, and openness, on the one hand, and
market agility and dominance, on the other hand' (Coleman 2012, 191). Rhetoric of openness is particularly important in the current moment when developers need to be persuaded to populate ‘app stores’ to entice more users to join a platform, the ultimate measure of success.

The mobile ecosystem’s complexity and need to engage multiple stakeholders requires that open source, open innovation, and rhetoric of openness are blurred, to the advantage of companies over individuals. Open source’s nature as a public good with a history that resonates with developers allows feelings of goodwill to flow to companies, even as they maintain a careful eye on their bottom line in the mobile space. The foothold of Apple and Google has not been upset by open-source standards, and they move towards being tightly coupled with devices and operating systems (Holzer and Ondrus 2011). Open-source code is incorporated into products at through open innovation, being developed as products that are closed or revealed later as being open at a time that is best suited for company positioning and financial benefits. This foreground–background interplay – through rhetoric as well as code – is complex and difficult to completely track. Moreover, the overall interest in low-level components of the mobile web and app ecosystem is still highly speculative. These wranglings over openness manifest in businesses perceiving benefits in exerting control over a crucial historical movement, from the web to the mobile web.

HTML

Tim Berners-Lee is widely credited with creating the metaphor and initial version of the web, composed of the hypertext markup language (HTML), universal resource identifiers, and the hypertext transport protocol. He envisioned the web as a decentralized set of linked documents in contrast to the pervasive vision of the day: centralized databases. Berners-Lee fashioned a horizontal structure that would be created organically by individuals, where ‘there would be no special nodes, no special links’ (Berners-Lee and Fischetti 1999, 61). The W3C organization was founded out of recognition of the web’s fast decentralized growth meant that it ‘could splinter into various factions’ (Berners-Lee and Fischetti 1999, 76) with varying access and pay structures. To avoid this, the W3C followed a basic set of conventions such as deliberation on features through mailing lists and once yearly in-person meetings to vote. The W3C follows core principles of compatibility, utility, interoperability, and universal access. When interest in a certain topic (such as geolocation) reaches a critical mass it splits off into a separate working group. The W3C is currently composed of 375 (W3C 2013) academic and industry partners, who pay a fee to participate and generally appoint a single person as a point of contact. Agreement on a format for voluntary compliance allows for a consistent user experience across various desktop computers, mobile devices, and browsers. The W3C was created to accomplish the delicate task of encouraging unity and compliance through collaboration rather than a strong enforcement mechanism. Business interest in the web did not surge until the National Science Foundation’s sponsorship of the networked backbone ended, allowing commercial traffic on the Internet in 1995.

HTML is a markup language, meaning that it is composed of text and brackets that are interpreted by a web browser, rather than compiled. The formatting requirements of tags need to be interpreted similarly across different browsers on various operating systems to ensure consistency. HTML5 is often paired with CSS3 and Javascript, which control appearance and interactivity, respectively. HTML5 grew out of (and is compatible with) HTML4.1, which was published as a W3C recommendation in late 1997, signalling its
maturation. In 1998 the W3C primarily shifted towards working on XHTML, with work around more strict formatting and error handling requirements arising in 2001. Generally this work focused on revising HTML to be more rigorous in error reporting and formatting rather than extend its functionality. However, not all members agreed with what the future of HTML should be. In 2004 Mozilla and Opera brought forward a position paper on web forms at the yearly W3C workshop. It was voted down, leading to Apple, Mozilla, and Opera forming the Web Hypertext Application Technology Working Group (WHATWG), essentially an alternate group to address the evolving needs of web-based applications. The group started with two rules – backwards compatibility and implementations must match each other – and released drafts for web forms, web apps, and web controls (Way 2012). In 2006 the W3C, with little movement on XHTML, signalled that they were interested in collaborating with WHATWG. This collaboration resulted in web apps 1.0 being renamed to HTML5, and the group continuing its work under that name. Both groups are currently actively developing HTML5, but have quite different perspectives on how standardization should be developed. WHATWG allows all members and believes in a ‘living standard’ while W3C maintains a smaller community and works towards codified standards that can be adhered to. The two groups currently operate in a kind of symbiosis, with some overlap in membership but quite different philosophies on how standards should be developed.

**HTML5 disputes**

Since the demise of Flash on mobile, HTML5 is an increasingly essential infrastructure of the mobile web. The standard is a battleground between the F/OSS community, corporations, and regulatory bodies, as infrastructures are the ‘object of passionate debates’ (Bowker et al. 2010, 99). Thus, I examine several key disputes involving mobile technologies in the history of HTML5 in an effort to make the politics behind infrastructure visible. Industry representatives have helped develop the open source (Weber 2004) HTML5 specification, occasionally leading to controversies around the enthusiasm at which they advocate for certain implementations over others. Companies use HTML5 as an open innovation (Chesbrough 2003) that can be integrated into mobile platforms. Finally, talk around openness has become an additional way for companies to promote their platforms in an increasingly public environment where they must accomplish a complex set of activities in public: attract developers, appease shareholders, and leverage existing assets. This rhetorically constructed openness describes the discourse used by companies to defend, promote, and describe platforms (Gillespie 2010). Far from being technologically deterministic, ‘people, routines, forms, and classification systems are as integral to information handling as computers, ethernet cables, and web protocols’ (Bowker et al. 2010, 103). Openness, then, may relate to existing open-source technologies and open innovation, but also exists as a set of beliefs and ways in which individuals attend to technologies. To consider the implications of these various types of openness on the mobile web, we must turn an eye towards specific conflicts that emerged as HTML made this transition to mobile.

**Media playing**

Playing media on web pages has slowly entered mainstream use. In the mid-1990s, clips could be played in browsers through a Quicktime plug-in or external software such as Realplayer. Macromedia’s Flash 6 added support for video in 2002 and became a leading
method of delivering rich multimedia content such as games and video to desktop devices, leading to Adobe acquiring it in 2005. More recently, streaming media has become an important method of delivery as consumers migrate their viewing experiences to tablets and other devices. During this time HTML5 was slowly being developed through mailing lists and yearly meetings, in parallel to ‘app stores’ becoming the dominant paradigm for delivery of mobile software (Goggin 2011b). Although HTML5 was in its infancy, it was clear that it would be a direct competitor to Flash in the mobile space. Yet, Apple and Adobe were unable to reach an agreement on terms for deploying a version of Flash player on the then-dominant iOS. This left Apple customers feeling frustrated at the lack of streaming media, and Adobe claiming that Apple was being unreasonable.

The confrontation came to a head in 2010 when Steve Jobs wrote a public letter coyly titled ‘Thoughts on Flash’ that outlined contours of his arguments against allowing Flash player on iOS. Jobs felt Adobe was imposing ‘closed’ technologies that were a burden on battery life and processing power rather than more efficient Apple-backed formats such as H.264 for video. Jobs described the ‘full web’ as separate from Apple’s own proprietary system for developing and distributing mobile software through app stores. Accordingly, he claimed that Apple’s enthusiasm for HTML5 as an open technology justified their proprietary system for developing and distributing mobile software through app stores, and Adobe’s fault was to create technology that would not run (in his opinion) well enough on iOS devices. Even as he extolled Apple’s presence in the W3C, he invoked WebKit as an example of open-source technology that could benefit the ‘full web’. Here we can see the contours of rhetoric of openness, where the maintenance of an open-source code base affords leverage to accuse other companies of not being ‘open’. This comes with no small amount of irony, given Apple’s notoriously closed mobile platforms (Zittrain 2008).

Media playing would emerge again in 2013 around objections surrounding encrypted media extensions (EME), which would add provisions for copyright-protected media to stream over the mobile web. Representatives from Google, Microsoft, and Netflix proposed a draft for EME on 6 May 2013 which was approved by the consortium (Dorwin, Bateman, and Watson 2013). Discussion on the W3C’s various groups reflect the macro-level positioning of corporations, as ‘values, opinions, and rhetoric are frozen into codes... software is frozen organizational and policy discourse’ (Bowker and Star 1999, 135), especially as there is disagreement about to what degree the web should be commercialized.

Groups such as the Free Software Foundation objected. They dubbed the effort ‘Hollyweb’ and derided it as an attempt to inject DRM into the web, going against the primary tenets of open source and the original vision for the web by Berners-Lee. Technically, the proposal ‘enables encryption but doesn’t do the encryption itself’ (Shankland 2013), describing a plug-in to HTML5 rather than specify encryption formats. Yet, the alternative seems to be even more fragmented, a world of non-compliant browsers and apps built by companies operating independently. Industry partners setting their own methods for plug-ins playing video content is also against a W3C’s core principle of ‘media independence’ (van Kesteren and Stachowiak 2007). Members of the web community particularly bristled at the notion, given Mozilla’s unique history and their flirting with advertisements as a revenue stream. Doctorow (2014) points out that Mozilla was caught between a rock and hard place. Pressure from media companies threatened to make Firefox – whose adoption is already extremely low on mobile devices – obsolete, even as complying would go against their core tenets.
Cross-platform development

Apps and the mobile web are quite different, at first glance. Apps are linked with specific development environments and distributed through portals such as ‘app stores’ where users can purchase and download mobile software using a credit card (Holzer and Ondrus 2011). The mobile web, on the other hand, connects web pages developed in HTML5 with various web browsers. Yet, the distinctions between apps and the mobile web are starting to blur due to HTML5 increasingly being used for cross-platform app development. Kosner (2012) elaborated on ideas promoted by Carr (2011) and described ‘appification’, or a move away from the web and towards the Internet as an underlying delivery mechanism for mobile services. Kosner overstated the suddenness of this shift in the interest of coining a catchy phrase, but was essentially correct that apps were starting to use web standards and protocols, a move that rankled Berners-Lee (2010). HTML5 can be employed in various ways to create two types of ‘lightweight’ (small) apps that are functionally similar to native versions and can be delivered to multiple platforms at once. The first type, ‘hybrid apps’, use HTML5’s rendering and network functions but are ‘wrapped’ in a native installation package. The appearance of web apps is similar to native, although they may run more slowly because they rely on the inner workings on HTML5, CSS, and Javascript for functionality. Phonegap, produced by Nitobi and purchased by Adobe in 2011, is an example of a hybrid app framework that is part of Adobe’s shift towards HTML5 in the wake of abandoning Flash. It delivers hybrid apps to various app stores for various platforms, including Blackberry, Apple, Symbian, Windows Phone, and Android.

Firefox OS, which emerged from the Mozilla ‘Boot to Gecko’ project started in mid-2011, serves as a counter-example of how HTML5 can be used to circumvent app stores entirely. Developer versions of the low-end (Keon) and mid-range model (Peak) have shipped. They run Linux and interpret HTML5 apps that access phone functions through APIs developed by Mozilla and Telefonica for standard phone features such as dialing and SMS. These ‘web apps’ are essentially web pages that look and function similar to natively compiled apps, but do not require an app store. Firefox OS thus shows potential for delivering smartphone features and interface at a far lower price point than current models. Phones running the OS will be rolled out by various operators worldwide, particularly in the global south and European markets. In summer 2013 Telefonica released the ZTE Open Spain and Deutsche Telekom released the Alcatel One Touch in Poland.

These two examples – Adobe’s Phonegap and Mozilla’s Firefox OS – show how HTML5 can reinforce tightly coupled distribution structures such as app stores. Companies such as Adobe have employed HTML5 as an external innovation and folded it into ongoing efforts to charge for development tools (Adobe Edge). Corporate interest in hybrid apps are lagging, as iOS and Android development environments are more robust, have a clear routes to monetization, and generally run faster. Mark Zuckerberg can be counted among the disgruntled, announcing at Disrupt SF in September 2012 that Facebook would move away from HTML5 after two years of development. Although his statement was considerably qualified and widely interpreted to be partly a cover-up for poor managerial decisions, it still painted HTML5 as not yet ready for mainstream use.

Web rendering engines

A web rendering engine is the heart of a web browser and controls code parsing and layout.2 We first encountered WebKit when Steve Jobs criticized Adobe in 2010.
He pointed to this web rendering engine as an example of an open technology that had benefitted the community. However, the history and controversies surrounding WebKit are significantly more complex than Jobs suggested. Webkit is the result of a KDE open-source project started in 1998 comprising two rendering engines (KHTML and KJS) which were further developed internally by Apple. Apple dubbed this WebKit and made it the rendering engine for Safari. Later, it reintroduced WebKit as open source at their 2005 Worldwide Developers Conference. They progressively developed features such as the canvas tag, CSS gradients, and support for multi-touch (Biggs 2010), which were gradually introduced by Apple’s David Hyatt to the W3C for standardization. WebKit included a series of experimental CSS prefixes that were not fully supported but made their way into many browsers.

Apple took an open-source code tree, ‘forked’ it (started editing a version separate from the older code), and made it closed, only to be strategically reintroduced to the market as an ‘open’ technology, with much fanfare. In June 2010 Apple launched an HTML5 showcase page that used experimental WebKit features, meaning that visitors not using Safari would see an error message that they should download Apple’s web browser. To Mozilla evangelist Christopher Blizzard, this move was showy and ‘not intellectually honest’. Google’s Chrome adopted WebKit in fall of 2008, Blackberry followed suit in 2010, and long holdout Opera shifted their rendering engine over in February 2013 (Olanoff 2013). Mozilla remains an outspoken critic of Apple and has no plans to adopt WebKit into their Firefox browser or Firefox OS.

Blizzard criticized Apple for implementing browser features that were not yet finalized and unsupported by other browsers. As the WHATWG (2013) observes, ‘browser vendors already have veto power – by not following the standard... veto isn’t a power that we grant browsers; it’s a right that they earn on their own by virtue of having users’. These features were introduced to the W3C for standardization, often competing with Mozilla’s suggestions, but shown to the public before the recommendation moved to being a release candidate. Companies work open-source standards to their advantage by introducing features into the W3C, while ignoring or downplaying features introduced by others. This can be seen as a milder version of the infamous ‘browser wars’ in the mid-1990s, where Internet Explorer and Netscape competed for market share partly by creating proprietary features, leading to a rash of ‘Best Viewed With’ icons. The W3C, which was active during this time as well, does not have an enforcement mechanism, meaning compliance is entirely voluntary.

Conclusions
Researchers of social media and mobile communication should pay attention to how specific notions of openness are deployed in a web-based ecosystem that increasingly values mobile. Openness is a multi-dimensional concept that has differing meanings based on context, technology, and shared history. Conflicts on the mobile web and app platforms are fought through the standards-creating process, using open technologies (or not), and using openness as a rhetorical device. Open innovation – not open source – has become the norm, where ideas from outside companies drive internal products and vice-versa. The Safari demo example illustrates how participation in an open-source community can serve a strategic goal. Rhetoric of openness is deployed as a public relations tactic and to reconcile competing visions of stakeholders. It is important to not conflate these versions while understanding that definitions of openness are still in flux and have a polysemic quality. Russell (2014) observes that ‘the ideals of openness fit equally as comfortably in
the spirit of entrepreneurial capitalism as they do in the liberatory impulse of the hacker ethic’ (280). As HTML5, app stores, and protocols find a place in the fluid landscape of the mobile web, the politics of infrastructures will likely be further revealed.

**Discussion**

Who does HTML5 as an open standard serve and why? Industry partners are asked to serve users by coming together on a shared implementation strategy, but a significant gap exists between corporate and user-driven goals. This gap is widened by the complex discussions surrounding standards occurring on various public and semi-public communication technologies, which are in theory open and accessible to all but take place in technical language that is difficult to understand. It is often only on mailing lists, blogs, and in-person meetings that the politics of openness come to a head as participants find the open-source efforts of industry partners increasingly disingenuous. At times, such as with EME, these complaints rise to mainstream interest through media stories and petitions on change.org. Simultaneously, important issues that are not central concerns to for-profit companies stay off the news. Long-standing debates in the W3C and WHATWG concern obscure but extremely important concerns about accessibility – that the Internet can be used by differently abled individuals. Rarely has the highly technical debate around HTML5 been framed in ethical terms.

A unified vision for the future of the mobile web in the Berners-Lee mould is becoming increasingly difficult to imagine in light of corporate manoeuvrings. HTML5 seems the most viable solution for reconciling multiple central concerns of Internet businesses, making the open standard a central factor for continued financial growth in mobile markets. The kinds of industry-wide clashes seen in the ‘browser wars’ have devolved into a set of microscopic skirmishes occurring constantly across the technologically mediated landscape of mobile software development. Denying or blocking industry interests such as for protected content through EME will likely lead to a more fractured web. Ostracizing industry partners would seem to have the effect of driving them to their own individual solutions. HTML5 as an open standard is both surprisingly delicate – constantly changing through debate in the W3C and WHATWG – and robust – a primary driver of commercial change and industry speculation. Open software standards operate fundamentally differently than other types of infrastructures, even as they extend corporate practices. The implementation of openness is fraught with compromise and conflict that requires constant awareness, participation, and negotiation of the meaning of visibility.

**Notes**

1. http://www.w3.org/TR/html-design-principles/
2. For a more complex and complete description, see Paul Irish’s post at http://www.paulirish.com/2013/webkit-for-developers/

**Notes on contributor**

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