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Ubiquitous apps: politics of openness in global mobile cultures

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Abstract

Smartphones are a central element of mobile ubiquity, with mobile applications ('apps') becoming especially important. This article discusses the concept of iPhone apps, and other apps, as cultural platforms. Apps are highly significant for emerging cultures of mobile ubiquity, yet these platforms are constituted and controlled by major transnational global mobile media corporations. The article looks at the characteristics, constraints and limits of apps as they have emerged from 2008–2011, arguing that we need to carefully examine the terms of openness as they are constituted at the intersection of such mobile hardware, software and content. Finally, it offers a critique of apps, suggesting it is time to reconceive our ideas about apps and mobile Internet generally.

Keywords: apps, smartphones, mobile media, openness, mobile Internet

There is more information available at our fingertips during a walk in the woods than in any computer system, yet people find a walk among trees relaxing and computers frustrating. Machines that fit the human environment, instead of forcing humans to enter theirs, will make using a computer as refreshing as taking a walk in the woods—Mark Weiser (Weiser 1991).

If the hardware is the brain and sinew of our products, the software in them is their soul—Steve Jobs (Apple, 2011a).

[O]ne of the most important shifts in the digital world has been the move from the wide-open Web to semiclosed platforms [. . .] driven primarily by the rise of the iPhone model of mobile computing . . . As it moved from your desktop to your pocket, the nature of the Net changed. The delirious chaos of the open Web was an adolescent phase subsidized by industrial giants groping their way in a new world. Now they're doing what industrialists do best—finding choke points. And by the looks of it, we're loving it—Chris Anderson (Anderson and Wolff 2010).

1 Introduction

In 2011, mobile phone subscriber numbers passed the six billion mark. Though the overall rate of diffusion of the technology is slowing, use of mobile broadband, mobile Internet, mobile media and

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wireless technology devices continues to grow (International Telecommunications Union 2010). This widespread diffusion of this family of technologies means that mobile devices are a key infrastructure and setting for the contemporary growth and salience of ubiquitous computing (Greenfield 2006, Schuster 2007, Elliott and Kraemer 2008).

The intersection of mobile technologies and ubiquitous computing is already resulting in profound socio-cultural ramifications. These particular technologies of mobility—at the intersection of mobiles, Internet and computing—promise to make possible the idea of cultures characterised by, presuming, and grounded upon, ubiquitous information. This is strikingly the case when we consider the place of mobile technologies—especially smartphones—in the notions of ubiquitous data featuring in discourses of cloud computing (Chee and Franklin 2010). There are literal and technical coordinates of this conjuncture between smartphones and your data everywhere, made visible by Apple's iCloud announcement in June 2011. Apple's fully-fledged foray into consumer-accessible cloud computing extends well beyond its established 'Mobile Me' portal-like data storage and applications service:

> *This is the cloud the way it should be: automatic and effortless. iCloud is seamlessly integrated into your apps, so you can access your content on all your devices* (http://www.apple.com/icloud/).

iCloud is part of Apple's iOS5 mobile phone operating system, rivalling Google Chrome OS and its 'Chromebooks'. In June 2011, Apple claimed that its iOS, used on iPhones, iPads and iPod touch, was the dominant mobile operating system, with 200 million users or 44% of the global market (Apple 2011a).

As the iCloud reveals, rather like the idea of ubiquitous computing—ubicomp—itself, such emergent cultures of information are powerfully shaped by quite specific, particular social imaginaries (Taylor 2004), as much as they are by the materialities through which they are constituted (Galloway 2004, Ekman 2011). An obvious point made by many is that ubiquitous information is an ideal that is difficult to obtain, indeed a fantasy of sorts—underpinned by particular assumptions (Weiser 1991, Dourish 2004, Rogers 2006). Technologies, especially those constituting the global mobile media infrastructure, are messy, partial and contingent. They are a combination of the old, new, reused and repurposed—a triumph of making-do, accident, unintended consequence and resistance, as much as the remains of grand plans (Larkin 2008, Dourish and Bell 2011). So we are a long way off having cultures in which information is actually ubiquitous. However, the assumptions shaping our concepts of ubiquitous information are certainly with us. A simple example is email. Many of us remember the time, from the mid-1990s onwards, where email was based on the POP system—in which the email client downloaded email from the service to one's computer. To combat the difficulty that, unless one was vigilant about the settings, email was deleted from the server and held on one particular device, email services were developed—using web-based, IMAP and Entourage systems, for instance—which always stored the email on the server, for a user to access on any device they wished and to leave in storage for as long as they wished. Of course, various difficulties ensued from corporate policies that sought to ensure users deleted email or only stored on their computer (to save space), or connectivity problems. Thus, it is important to understand and critique the positive and negative imaginaries of ubiquitous information because of the ideas about the world they contain—something pointed out by Daniel Pargman in his proposal that we need to ground our thinking in a recognition of a 'world of limitation' (Pargman 2011).

A fascinating feature of recent developments in mobile technologies and notions of ubiquity involves something that we might term a new cultural platform, namely, smartphone applications ('apps')—catalysed by the advent of Apple's phenomenally popular iPhone, apps and apps store. Apps are a good example of twenty-first-century mobile computing delivering what ubicomp's great founding figure, Mark Weiser, suggested they should:

> *Like the personal computer, ubiquitous computing will enable nothing fundamentally new, but by making everything faster and easier to do, with less strain and mental gymnastics, it will transform what is apparently possible . . . But ease of use makes an enormous difference. When almost every object either contains a computer or can have a tab attached to it, obtaining information will be trivial: 'Who made that dress? Are there any more in the store? What was the name of the designer of that suit I liked last week?' The computing environment knows the suit you looked at for a long time last week because it knows both of your locations, and it can retroactively find the designer's name even if it did not interest you at the time* (Weiser 1991, p. 100).

In the environments in which many of us live in the minority world of the global north, we certainly encounter many computers, some of which talk to each other—or have 'tabs' attached to them, slowly slouching towards the Internet of things. For hundreds of millions of people, smartphone apps now make obtaining all kinds of information a relatively trivial affair.

If this is the case, then the appearance of apps at this time is important. Yet, thus far, we know relatively little about apps as a whole; that is, what kind of technological system they constitute as a cultural platform; and, in particular, what kinds of activities, projects, aims, groups and individuals may access apps—and upon what terms, and subject to what social, and power, relations they may do so. These are basic cultural, political questions we ask of all our media systems. So the point of this article is to raise the visibility of such a problematic.

To do so, the article focuses on a relatively narrow aspect of apps—though one with considerably broader implications. I discuss and offer a critique of the market forces holding the whip hand on the structure of apps. Through a discussion of Apple's apps in particular, my argument is twofold: firstly, that apps have constituted an important new platform, or area, for cultural development and innovation; however, that, secondly, the playground of apps remains tightly controlled by particular corporations—such as Apple, Google, Samsung, Nokia, and others—and the rules of the apps stores that each has created. While it is true that there are relatively low barriers of entry for developing software that can be made available for free or at a price through apps store, the underlying structure of this cultural platform is far from a free market—as it might be understood in relation to other media, communications, software and information technologies industries. Nor is it easily available for significant non-commercial uses.

2 Mobile apps: a new cultural platform

Software applications for cellular mobile devices have been available since for some years, part of a burgeoning field of mobile data (Maitland *et al.* 2002, Maitland *et al.* 2005, Steinbock 2005); popular computing software adapted for mobiles, including business applications like Microsoft's Office Suite, or Adobe's PDF readers, or entertainment software such as games. In addition, new software applications were developed for mobiles, the most popular categories including short message service (SMS), mobile news, music, logos and pictures, and mobile banking applications. The appearance of multimedia mobile phones—especially so-called 'smartphones', kin to other ubiquitous 'smart' technology (Kuniavsky 2010)—had increased the space, power and flexibility on such devices for software development. Thus, mobile data had become an increasing part of mobile design, production, marketing, consumption and public discussion since at least the late 1990s (when the Japanese pioneered i-Mode). Smartphones, tablet computers and portable media player devices such as iPod had also been considered and often incorporated into ubiquitous computing discussions (Kuniavsky 2010). Yet it is really only with the advent of Apple iPhone apps that this aspect of mobile media—indeed the full-fledged entry of mobile computing—has come to fruition.

Apple's iPhone was introduced in January 2007. Since then, it has had a galvanising effect on the smartphone market—provoking the development of competitor technologies such as Google's Android, RIM's precedence in Blackberry, Samsung Galaxy, Nokia's various offerings, smartphones from the Taiwanese company HTC, and the various *shanzai* smartphones copied and adapted in China (Shi 2011).

In late 2011, smartphones have become a fast-growing technology in the mobile-phone saturated countries and sufficiently cashed-up user groups in the global north (west and east alike). Smartphone technology is now also making inroads into the global south (Goggin 2011). Note how Apple's iPhone accounted for roughly 100 million—or one-third—of the 300 million-odd smartphones shipped in 2010 (Screen Digest 2011, p. 67).

Apple launched its apps in July 2008, at the same time that the iPhone 3 went on sale. The development was relatively slow in the first few months, and apps were not something that Apple heavily promoted (there are no archived press releases about apps during this period, for instance—compared to various releases concerning the iPhone). What quickened the growth of apps was Apple opening up apps development to third-party developers. This occurred when Apple released its Software Development Kit (SDK) on 6 March 2009. Simultaneously Apple previewed its new apps store, with endorsements from leading developers of applications for small business, games, mobiles and blogging (Apple 2009). At the first anniversary of apps in July 2008, Apple claimed that 1.5 billion apps had been downloaded, and by November 2009 that more than 100,000 apps were available (Apple 2011c). By January 2011, Apple was celebrating the 10 billionth download by the then estimated 160 million iPhone, iPod Touch and iPad users worldwide—and the availability of some 350,000 apps on its store (Apple 2011b).

Thus, in a brief three years since its inception, Apple's apps have created an impressive new area of relatively easy to download and use mobile software. While public attention and user take-up has centred on Apple's apps, its various competitors have also set up their own apps and apps store equivalents. Blackberry App World increased its share to 7.7% in 2010. Nokia's Ovi Store was the third-most popular in 2010, but has joined forces with Microsoft to combine the software giant's smartphone with Nokia's Ovi branded content and apps (Screen Digest 2011, pp. 67, 85). Finally, Google's Android Market more than tripled its share of mobile applications store returns to claim 4.7% of the market in 2010—set to increase further, given that sales of Android are now outstripping its iPhone rival.

There now exists a bewildering array of apps available across a number of apps stores and handset types. These apps themselves have wrought a metamorphosis in our notion of mobile phones and media. An app can make it possible to imagine and do things with a mobile phone that were previously never associated with the technology. A definitive list would be very long indeed, but apps discussed in the scholarly literature that take the mobile device well beyond its former identity as a phone include: travel apps; virtual stethoscope; bowling ball; meditation device; brain training game; seismic sensors; library discovery tool; obesity prevention; tools for surgeons; steganography (hiding data within data); data interdiction by law enforcement; and many others. Some apps clearly have their provenance in other media forms. There are apps that originate as software developed for other computer platforms. There are books, video, film or multimedia that are adapted as apps. Then there are other media forms, such as the Internet, reconceived for mobile apps platforms—such as the many popular social media apps. Or there are apps that are inspired by the affordances of the iPhone or iPad—the many retro photography apps (Hipstamatic, Instagram, Pocketbooth, and so on), games that use the accelerometer sensing technology (such as the bowling or snowboarding games), mapping and location technologies (that can rely on Apple's controversial logging of location coordinates of their devices). Quite a few of these apps involve domesticating the smartphone via remediation, or extending the other media through apps' capacity for hybridisation

of media and cultural forms (something apps share with mobile Internet generally).

A key affordance of apps is their ubiquity in the lives of their users. Depending on licence conditions, once downloaded an app is available whenever the users wish to avail themselves of it. This deepens the 'personal' and 'portable' nature of the mobile communication device (Ito *et al.* 2005), already established as intimate technology that users take with them whenever they go, carry or wear close to the body, and place nearby, even in sleep or repose. Unlike the early visions of ubiquitous computing, however, it is not so much that apps are 'invisible' and so play a 'calm' role in the life of the user (though this would apply to many). Rather, with various new classes of apps, aspects of everyday life, bodies, effects and identities are rendered much more visible, calculable and governable. This is what is remarkable about the passion users have for 'lifestyle' apps. When I began riding to work, my cycling enthusiast neighbours urged me to download and use the *iMapMy Ride* app, so I would always be able to reckon how far and fast I had ridden. Food consumption apps allow the care of the self represented in diet regimes, nutrition advice and cultural technologies such as diaries to be powerfully reconfigured. For instance, *Diet & Food Tracker* is a free app offered by SparkPeople.com, the 'world's most popular diet and fitness' site, which keeps tally of the calories eaten and burned each day, food details and videos of suggested exercises.

Without a more systematic study and conceptualisation, it is difficult to inventory and map the Apple apps universe and provide a deeper taxonomy and analysis. However, there is at least anecdotal evidence to suggest that opening the apps store to third-party development has been a boon for software innovation on mobile platforms—indeed it can be seen as a highly significant development in software, especially in various areas of media (games, news, books, video, Internet), as well as a wide range of other social domain (health, to single out but one leading area). Yet, despite its burgeoning significance and adoption across many domains of life, we still do not know very much about how mobile innovation works in the particular, if not peculiar, public and private spaces that smartphone apps represent. While innovation is not the prime focus of this article, it is useful to briefly elaborate on this point—before proceeding with the main argument.

Both mobiles and the Internet have been of keen interest for their contribution to contemporary rethinking of innovation as decentralised, user-driven and catalysed by digital networked technology (Hippel 2005, Anheier *et al.* 2010, Brynjolfsson and Saunders 2010, Pascal Le Masson *et al.* 2010, Stoneman 2010). The Internet and mobiles have been studied themselves for insights to the kind of innovation models and systems these technologies represent (Van Schewick 2010, Lemstra *et al.* 2011). The studies underscore the obvious sense in which mobiles have emerged from more conventional structures and conditions of innovation organised through large multinational corporations, and so much contemporary focus has been on the Internet, especially for its ability to support new models of user-driven innovation.

Though it was proposed in 2005, Sawhney and Lee's (2005) handy notion of 'arenas of innovation' remains useful for considering the case of apps—especially as updated by Sawhney in a 2009 paper on the iPhone (Sawhney 2009). What is especially pertinent about this model is evident in Sawhney's 2009 attempt to use it to think about the way that mobile phones were moving from a closed system architecture to an open one, in a context where innovation is occurring between the Internet and mobiles. He asks:

> *If an arena of innovation supported by handheld devices were indeed to emerge, what would be its relationship to the arena of innovation supported by the Internet? Would it be an extension of the Internet or would it be different? What innovations will arise? Which way will they flow?* (Sawhney 2009, p. 114).

The case of apps has emerged since Sawhney raised these questions. We could indeed see apps as an 'arena of innovation', yet this is but

one of the many available models from the teeming literature that could be used to theorise iPhone as a platform for innovation. For the purposes of my discussion, I wish to leave innovation *per se*, in order to focus on the quality of openness, which Sawhney nominates as a cardinal quality. Sawhney provides an important, early discussion of emerging issues in openness, contrasting the relatively closed platform bequeathed by mobile cellular telecommunications c. 1980–2007 with efforts by amateur, open source mobile, 'home brew' initiatives which he feels are ideal (Sawhney 2009, p. 113). In doing so, he highlights a deep structural issue, which especially comes to the fore in the case of iPhone apps, but also the other apps platforms. This is an issue that goes directly to a very serious shortcoming in the capacity of apps to support transformative cultures of mobile ubiquity.

The iPhone apps platform is premised for the most part on the dominant interests of commercial industry—with apps 'stores' opening up a new 'market' in the interstices of mobile networks still heavily controlled by dominant transnational mobile carriers in alliance with handset vendors, and new intermediaries, creating tightly coordinated value chains (or networks) (Goggin 2011). So when Apple launched the iPhone it was able to, firstly, open a breach in the dam of cellular mobile control. It did so initially via tightly configured, exclusive deals with a dominant provider in a market—for example, with AT & T in the US. Handsets were locked to this carrier's network, and difficult to unlock ('jail-break') otherwise (Maun 2008). In establishing this toe-hold in markets around the world, the popularity of its iPhone product—built on the back of its existing reputation—meant that it was able to exact surprisingly good deals from mobile carriers for access to and use of their networks. The introduction of its apps store meant that it was able to break the vice-like grip that carriers had held on mobile software. Previously, developers and content providers needed to make deals with the carriers to be able to offer the software to the carrier's customers. Some customers were prepared to download software from websites outside the control of the carrier on the public Internet (that is, outside the carrier portals). However, such software then needed to be installed on the mobile phone, which was not so easy to do. Apple's apps store, once opened to developers, meant that they needed to have their software accepted by one entity, at better terms than had generally prevailed with the mobile carriers. Then, via apps store and iTunes, apps could be easily searched, purchased and installed.

Thus, Apple apps provided a lucrative platform for some software developers to launch fabulously successful products. A good example is *Angry Birds*, developed by the Finnish mobile company Rovio Mobile, founded in 2003. Released in 2009, *Angry Birds* rose to success the following year. By mid-2011, *Angry Birds* was the number one iPhone app in over 30 countries across the Americas, Asia-Pacific, and Middle East. It was also the most popular game on Nokia's Ovi store, and was migrating to the web for the first time—released as a beta in Google's Chrome Web Store. While games and entertainment dominate the top paid apps, there are many other paid apps also in less traditional areas, such as health, productivity, lifestyle and travel. As well as paid apps, the iPhone is an available platform for making available and distributing free apps. While lists of all-time top free apps are now dominated by Facebook, Google Mobile, Skype and other Internet program apps available on mobile, there are many other kinds of free apps too. Some are forms of advertising or catalogues, but others cover a range of individual or organisations offering apps—from public transport companies and broadcasters to activist and political organisations. Like iTunes, which has become a broadcasting platform for universities to offer podcasts of talks, or Facebook, which fast became an indispensable social media conduit for all sorts of institutions, Apple's apps store has become a commercially owned and controlled platform which is used by a range of both commercial and non-commercial providers.

Thus it certainly is the case that iPhone apps have offered a platform for a flourishing of mobile software, across commercial and

non-commercial areas. However, while the platform has become an important part of public culture, it is still firmly in the gift of Apple. At the most general level, the Apple's smartphone and tablet system is highly horizontally and vertically integrated (Shi 2011), bearing out most aspects of Manuel Castells's comprehensive theorisation of the select group of corporations that hold great power in the digital age (Castells 2009). Apple seeks to bind consumers to its handset (iPhone, iPad, iPod touch); which to do basic things such as purchase and upload software or digital media (music) must be used in conjunction with its digital management and rights system (iTunes); which in turn only offers software—'apps'—approved by Apple, or otherwise these cannot be distributed via the apps store.

The iPhone and iTunes have been the subject of much criticism regarding their enactment of restrictive regimes of intellectual property and user control. For its part, the iPhone's strict official controls were immediately met on launch—indeed, before the launch in each country—with a wave of user modification, hacking and widespread sharing of code and instructions on how to jail-break devices. Yet Apple's apps have not received the same degree of attention, or even levels of resistance (at least from consumers in the west). For example, we still know little about the apps that Apple refuses to allow to use its platform—something the corporation easily regulates through its own rules and controls. From time to time a case comes to notice—more often than not, when there is outcry because some users find an app offensive and Apple has not banned it. This occurred, for instance, in the famous *Baby Shaker* app case, where users shake their device to stop a baby crying—changing the image of an unhappy baby to a calm one (Choney 2009).

It can fairly contended that other apps platforms may offer more generous terms of access and approval. Android Market, for instance, launched with a user-rating system. Google also prides itself on its open source approach to design of its operating system, though there is clearly a politics to this championing of the open source values by Google and other large corporations. However, there has been even less study, or indeed scrutiny, of the openness of Blackberry, Nokia's Ovi and other apps stores than there has of Apple and Google's apps platforms. A conventional economic and competition issue raised by the various apps stores is the issue of the lack of connection and portability among these different arenas (as well as the sometimes incompatible characteristics of different handset systems). Of course, this is not an unprecedented issue when it comes to technology, as there are often divergent hardware and technological systems with quite different standards (or diverse implementations of these systems). Many apps developers are quite adroit in designing and offering their software pluralistically, where possible, by 'portable code' across platforms (Hook 2005). However, the issue of the terms of access and use of these various apps platforms has been little discussed. Even if there were a more transparent approach by the various corporations to how they set up, grant access to, price and regulate their apps platforms, there still remains the overarching issue that commercial forces of an all too conventional economic kind shape these important new apps platforms. All in all, I contend that apps now function as a strategically significant cultural platform for mobiles as an everyday technology—and the nature and politics of this infrastructure is something that needs further discussion (Goriunova 2011a, 2011b).

3 Critique of apps

In theorising apps, I would suggest that these new media ecologies have created new openness and opportunities in mobile cultural platforms. Such potentialities have been the result of the entrance of computer and Internet production, user cultures and movement (such as open source) into mobile media. In addition, apps have evidently represented the efflorescence of small, micro-enterprises and individuals associated with software development industries, for whom the platform has allowed distribution of their wares where otherwise the political economy of software and

computing industries (Pattison 2007)—not to mention mobile telecommunications industries (Goggin 2011)—has made this difficult.

Arguably, then, we can regard apps as an important new cultural platform for mobiles. Yet, if this is the case, there needs to be scrutiny of the terms upon which culture circulates in the apps arena, what kinds of power relations exist and what kinds of freedom are permitted. Following the prompt of Sawhney, but also the many bloggers, fans and pundits disgruntled with the design of Apple's iPhone and apps, it is certainly arguable that in actuality the reality of apps is but a caricature of what might be possible—and indeed is required—in this historical phase of social transformation and cultural development under mobile mediation.

Thus far there had been little attention paid to the terms upon which such openness in apps plaforms is conceived and conferred by Apple, Nokia, Blackberry and others. Research and public debate has tended to focus upon the Internet, where theorisation of this new medium as a cultural platform is relatively advanced. When it comes to mobile media, there has been a lack of developed work and wider understanding, in part because of the historically specialised realm of telecommunications technology and media policy—from which mobiles developed. There have certainly been important critiques of the controls adopted by Apple with its iPhone. An early and important critique was that of Jonathan Zittrain (Zittrain 2008). Since then, many everyday iPhone hackers and 'jail-breakers', as well as legal scholars (Haubenreich 2008), have railed against 'tethered' devices and, to a lesser extent, the constraints of apps stores. More recently Chris Anderson has broadened such arguments to propose that the nature of the Internet itself in changing—as represented in apps—and that this is not necessarily a bad thing (Anderson and Wolff 2010).

Something hampering our analysis and discussion of apps is a conceptual blockage in understanding these platforms—especially when it comes to how they operate as new circuits for culture. When the politics of openness of apps is discussed, it is contrasted with the ideal possibilities and cultural visions associated with dominant Internet cultures. The Internet is assumed to be normatively superior to mobile platforms and architectures on a number of levels—especially from the perspective of advocates of free and open software, and also those of the commons. The decentralised nature of the Internet means that innovation can very much come from the edges, with individual users establishing servers, running applications, writing and offering software, publishing, circulating and downloading material. In contrast, it is difficult for an individual or small group to set up its own mobile phone transmitter and network, or even use the mobile phone network to circulate and broadcast messages, images, video and other material as the Internet easily can. True, there are a great examples of mobiles being used in quite distinctive ways for this—with many celebrated cases of text messaging being used in protest, dissent and as a tool for democracy from the Philippines to China and India and, more recently, in the 2010–2011 Arab Spring of uprisings in Tunisia, Egypt, Yemen, Syria and Libya. Yet much of this potential has come from the articulation of the affordances of mobile devices with those of the Internet, for example, recording video with a mobile phone, and uploading it to YouTube.

There is a short step from such accounts of the imbrication of mobile and Internet cultures to assuming that the Internet is the generative cultural and media platform. This is a move that I feel occurs in the important work of Jonathan Zittrain (2008), but also in other influential theories of sharing economies such that of Yochai Benkler (Benkler 2006), who, for instance, champions the wireless commons against mobile media. Rather than exploring the potential of mobile media to offer a cultural platform that would unlock the 'wealth of networks' he theorises, Benkler argues for the aggregrative action of wireless (Wi-Fi and other wireless Internet) technologies, which can be assembled by users to form networks. These are indeed important critiques of tendencies in smartphones and apps as a platform. Yet they still often rest on problematic assumptions about the models underlying both the Internet and mobiles.

As it is emerging, mobile Internet, including apps, amounts to a powerful platform for the action and movement of culture. Moreover, new forms of collaboration, qualitatively different from what they were in the past, are being developed at the intersections of mobiles and Internet with new social forms. Digital content is being developed in exciting new directions, with people undertaking new kinds of activities, representations and instigating new kinds of value. In this light, the key problem bound up with the politics of openness in apps is to push the boundaries of inclusiveness in apps, and how to harness the potential of such possibilities.

A starting point for this is a radical rethinking and reformulation of media, based on the kinds of uses of mobile Internet emerging from a diverse range of locations around the world. What is evident in an early study of the Chinese iPhone experience, for instance, is that apps are not so popular or applicable in that country because of the role that the informal economy plays (Shi 2011). Yu Shi argues that:

> *The iPhone and its global distribution symbolizes Apple's strategies to control not only the market of the phone itself but also its software development environment, wireless services, and the information and entertainment available to its users. Such strategies encounter various obstacles in the Chinese market* (Shi 2011, p. 2).

Shi describes how the grey market saw the smuggling and unlocking of an estimated one million iPhones before they had been officially launched in China. Once the iPhones were activated, then the informal software economy swung into action. According to Shi, the characteristics of this 'indigenous mobile culture that sustains the bottom-up resistance is that Chinese digital consumers have relied on an open-source environment of software and entertainment' (Shi 2011, p. 13). Shi suggests that:

> *Open-source, sometimes pirated, software applications and media materials, although illegal from the perspective of the intellectual property holders of dominant ICT and media corporations, have truly enabled an egalitarian space in China, where knowledge can be spread, for instance, to a rural middle school that cannot afford an official version of MS Office and where fun can light up migrant workers' temporary dorms who do not have the money for a night out at the theater* (Shi, 2011, p. 13).

China is perhaps the most significant, yet still unacknowledged case of user resistance of the official iPhone apps system, certainly compared to the celebration of iPhone hacking and modification in Western countries, especially the US. As such, it is a highly significant sign of the efforts of users to fashion the cultural platform of mobile media after their own desires, warranting Shi's argument that 'unlocked, jailbroken, and unofficial iPhones can offer users a democratic mobile platform open to free software and entertainment' (Shi 2011, p. 13).

There is a body of research on the social shaping of technology, and now the everyday innovation of users, but we can point in particular to a well-established, cultural-specific, informal economy of mobile phone practices to which the Chinese case contributes. An obvious example is the rich, if recent, heritage of user customisation of phones, encouraged by the design of 2G mobiles, that Larissa Hjorth documents playing an influential role in gender and culture in the Asia-Pacific region (Hjorth 2009). Research is only now emerging on the relationships, or lack thereof, between the 'apps' ecology and 'mod' ecology (that is, centring on modding, or modification)—a distinction discussed by Alison Powell in her important work on open mobile platforms (Powell 2011).

In conclusion, I propose a critical approach where the notion of openness is looked at from diverse perspectives when it comes to apps. There is an urgent need for such critique because smartphones, and apps especially, have become a central element of mobile ubiquity. As apps, and the software and hardware systems in which they are embedded, articulate directly into cloud

computing, and other emergent technology directions, there is great portent to such research, as Dourish and Bell point out:

> *[T]he ways in which the Internet has connected mobile devices to new streams of content has created new experiences and also new patterns of use and nonuse. It is thus increasingly clear that infrastructure, the mechanisms by which connectivity and content are delivered, are also implicated in ubicomp. More attention needs to be paid to how these operate and are delivered, billed, and regulated; and to the ways they routinely fall, are thwarted, subverted, hacked, and repurposed; and, perhaps most importantly, to the ways in which they are imagined* (Dourish and Bell 2011).

Thus, we need to study and debate the terms upon which openness has been conceived in apps platforms thus far. We also need to acknowledge the limits of notions of openness ported over from Internet cultural debates, such as the commons. Finally, we need to greatly remodel our understanding of what the moving media platforms that apps—or, really, software-based cultures for mobiles—represent, and might become, if we can make them a transformational force.

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