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Evolving Taxonomy of Business Models for Mobile Service Delivery Platform

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Abstract

The state of mobile technology and its widespread use has evolved drastically within the past several years. Cell phones with small monochrome displays – designed solely for phone calls and text messaging – have turned into miniaturized computers with dual-core processors. Combined with 3G standards such as UMTS, mobile devices nowadays offer almost the same freedom in exploring the Internet as desktop PCs do. Apple's iPhone, Google's Android, and the availability of mobile broadband Internet have changed the mobile landscape, and therefore the way in which mobile services are delivered to their users. Thus, we focus in this paper on the theory and implementation of four distinct platform models for mobile service delivery. Furthermore, we perform a classification of platform agility features, business and technology oriented, along with a comparative analysis of their effectiveness.

Keywords: Mobile Service Delivery; Platform Models; Classification; Comparative Analysis; Business Models.

1. Introduction

The mobile landscape has evolved from devices purely built for telephone calls and text messaging to sophisticated pocket computers called smartphones, while mobile Internet connections have shifted from slow and costly GSM connections towards 3G broadband access. At the same time, new ways in which consumers use the mobile Internet and in which mobile service applications have emerged, breaking the traditional dominance of mobile network carriers over service delivery [1], and leading to a more modular market environment with competing platform models [2]. With mobile devices getting more widespread and technically advanced, potential business models have to be developed or existing models need to be adapted. The aim of this paper is to analyze and illustrate the ways in which current and emerging mobile service platforms cope with the characteristics of platform competition, using strategies centered on platform leadership. Ballon & Walravens' paper [3], which is eponymous to this task, provides a basis for further exploration of the topic. Afterwards, this fundament is extended by more recent literature and developments since then; after all, the past two years brought along the mass market entrance of

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tablet PCs, Android's inception and rise to market leadership for mobile operating systems, Symbian's fall, a new alliance between Nokia and Microsoft, and an on-going battle between open and closed systems (i.e., Google vs. Apple) [4, 5].

Before discussing various competing platform models for mobile service delivery in detail, basic terms used in this paper need to be explained. The term *mobile service delivery* implies that mobile devices are able to offer more services than just simple phone calls and text messaging. Nowadays, they are also used for web browsing (e.g., news, shopping), entertainment (e.g., music games), receiving broadcasts (radio and television streaming), payments (e.g., "Paybox" or the upcoming NFC) and other services such as email, GPS or even social network [6]. These services are usually delivered through applications [4, 5]. Several definitions of the term *platform* (from a mobile viewpoint) exist: while technically, it can be described as "a shared, stable set of hardware, software, and networking technologies on which users build and run computer applications" [7], its function is commonly defined as mediating between two or more groups of stakeholders, usually a demand and a supply side, to extract revenues from both sides, implying that the platform generates some added value for all parties involved [2, 8÷10]. To emphasize their mediating role, mobile platforms are also known as mobile middleware [11]. After basic terms and concepts have been clarified, several platform models for mobile service delivery will be analyzed in detail in the following Subsection 2. Ballon & Walravens [3] describe four different platform models for mobile service delivery, of which three are still relevant: The telco-centric model, the aggregator-centric model, and the device-centric model. However, due to recent developments on the mobile market, the latter can be divided into two separate models: An open technology approach and a closed technology approach [9]. Each of these models can be associated with current key players in the mobile market; examples in order of the aforementioned models would be Vodafone Live!, Facebook Mobile, Apple's iPhone and Google´s mobile operating system Android [4, 5]. The paper concludes with a summary and future prospects.

2. Four Platform Models for Mobile Service Delivery

2.1. The Portal-Based Model I: Telco-Centric Model

The telco-centric model by Ballon & Walravens [3] is the oldest and most basic model for mobile service delivery. The network carrier (or the telco provider) is the major and controlling stakeholder of this platform approach. Within its role as a platform operator, the network operator mediates between mobile customers and mobile service providers as depicted in Figure 1. In the center of this platform's service provision is a portal site only accessible by the mobile network's customers and containing an aggregated selection of content by third party service providers or exclusive partners of the network operator. To generate revenues, the portal provider charges its customers fees, and pays the service providers according to individually agreed upon revenue sharing plans [2]. Due to its operator-controlled selection of content, which cannot be influenced by the end user, this platform model is often referred to as a so-called "walled garden" approach [2, 8, 9]. The most common services provided were news, ringtone and picture downloads shopping sites, weather forecasts, stock prices, or chat applications.

The telco-centric model stems from an era of mobile handsets with small, monochrome, low-resolution displays and slow GSM/GPRS connections. To navigate websites, the Wireless Application Protocol (WAP), a simplified version of wired standards like HTTP, was employed. These websites had to be specifically tailored to mobile browsers; lacking any interoperability, WAP browsers required websites to be written in Wireless Markup Language (WML) instead of HTML [26]. Back then, providing mobile services was mainly controlled by the mobile network operators, phone manufacturers, and selected application and content providers [9]. Considering that WAP browsers could not freely browse the Worldwide Web, as we know it today, the necessity for a portal containing links and content appears to be a logical result. Today, most telco providers still offer their own mobile portal sites, but their importance in mobile service delivery has decreased significantly. Gonçalves & Ballon [8] have come to the conclusion that these walled garden portals "have failed or are experiencing slow take-off". As a result, the world's largest mobile network operator Vodafone reacted in 2009 [12] with a relaunch of its Vodafone Live! portal as Vodafone 360 by incorporating social networks, personalization options, and new application stores to compete with the platform models of Apple and Google [13÷15], which are going to be discussed in this paper in Subsection 2.3. Modern smartphones and tablet PCs are running Google's Android, Apple's iOS, or even Windows 7, thus being

able to browse HTML websites and the WWW in an unaltered form. Meanwhile, WIFI and 3G broadband Internet access are rapidly becoming the industry's de-facto standard, allowing mobile users similar freedom in exploring the Internet as PC users. Hence, there is no longer the need to pay a subscription fee for portal access to spoon-fed content such as news, weather, or sports results. This model lends itself more as a free service; as an additional benefit and an incentive for customer retention. Also, it might be beneficial to elderly users, who do not have the ability to search and install desired applications but rather use a portal with their mostly needed services.

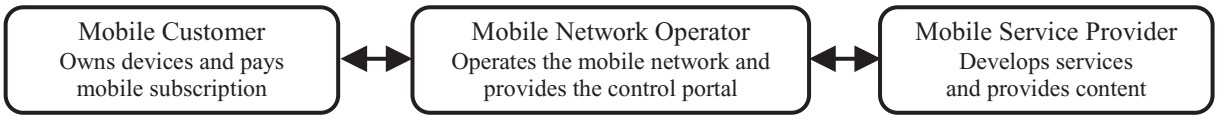

Fig. 1. Telco-centric platform actors (adapted from [2]).

Lastly, it is still viable for offering "premium" services, which are not available in the Internet for free. Application stores, mobile television, or livestreaming of sports events come to mind as suitable content. The latter being the topic of recent discussions [16], as it offers potentially attractive revenues, but also comes with high entry barriers for mobile network operators.

2.2. The Portal-Based Model II: Aggregator-Centric Model

The aggregator-centric model by Ballon et al. [2] does show similarities to the telco-centric model, as it also revolves around a portal site (or service aggregation platform) with aggregated content. However, this model offers interoperability, as the portal site is no longer controlled by the network operator but by an independent third party, resulting in a portal, which can be accessed by anyone from any device. Two of the most relevant examples to date would be Facebook (mobile) and iGoogle. The main actors and their relations are almost identical to those mentioned in Figure 1, with the prime exception that the portal is being provided by a third party, thus "degrading" the network provider to its original role of merely granting mobile network access. Up- and down-stream cash flows to and from the portal provider also differ, as the portal site is freely available [2]. Consequently, no subscription fees have to be paid for using the portal, while service providers develop their own applications via an openly available API (Application Programming Interface), which can be published with no regulation or just slight regulation from the providers (cf. iGoogle Developer FAQ and Facebook Developers Documentation). Revenues are generated either indirectly (e.g., via advertising) or, in the case of real Platform-as-a-Service (PaaS) models, by charging developers for development space, hosting costs, and computing resources [8]. However, the latter will not be covered by the following two examples, as it refers rather to the subject of cloud computing [48] which in turn goes beyond the scope of this paper.

As mentioned, two of the most relevant examples for mobile service aggregation platforms are the mobile versions of iGoogle and Facebook respectively. Thus, the remainder of this subsection will describe these two examples.

The mobile version of Facebook has almost reached the immense popularity of its original "computer related" version. As of April 2012, it is being used by 500 million users per month, which already equates to more than half of Facebook's total user base [17]. In addition to the core features of this social network platform (such as a blogging-system, chat function, picture and video sharing), Facebook also facilitates the integration of self-made applications into the platform. For this purpose, Service Development Kits (SDK) supporting JavaScript, PHP, iOS, and Android are being freely provided. The actual application is still located and hosted by the developer, who rather benefits from access and integration to Facebook's huge user base [47]. Both, Facebook and the application providers, generate direct and indirect revenues. Advertisements are placed in Facebook as well as directly within the applications, the first generating revenues for Facebook and the latter for the application provider. Direct

revenues are generated by micro-transactions within these applications, most notoriously in Facebook games, where players are able to buy virtual goods for real money [3, 18÷21].

iGoogle, a second major player among aggregator-centric models, acts as a personalized portal screen for the Google search page, which can be customized by users with widgets called gadgets. These gadgets can be compared to Facebook's applications and range from newsfeeds, weather forecasts, or integration with Google's email service GMAIL to self-made gadgets by independent third party developers [22], often aiming at integrating a plethora of most-used websites to aggregate their content into a single portal which can be accessed from any device [23]. iGoogle, on the other hand, seems to be less focused on generating direct revenues. Instead, it appears to be yet another additional service to collect user data and strengthen customer retention. An Internet user, who is deeply integrated into the Google network, with a personalized iGoogle portal set as home page, is certainly less likely to use other search engines. Just like Facebook Mobile, iGoogle is, of course, not solely a mobile platform, but rather concerns mobile and stationary devices alike.

2.3. The Device-Centric Model I: Closed Technology Approach

We have described two portal-based approaches to mobile service delivery in Subsection 2.1. and 2.2: the telco-centric model, with a portal controlled by the mobile network operator and only accessible by its subscribers, and the aggregator-centric model, delivering a similar portal – controlled by an independent platform provider with likewise independent application providers – which can be accessed by any device and thus offers interoperability. In contrast to the two portal-based approaches the device-centric model follows an approach, which is based on a device or, more specifically, a combination of a device and its operating system. It does, however, share the walled garden approach with the telco-centric model for several reasons, which are discussed in the following.

The closed technology approach to a device-centric model according to Ballon et al. [2] emerged with the release of Apple's iPhone in 2007, and is based on the smartphone technology. Smartphones, unlike their predecessors, are characterized by large touch-screens, html-browsers, and real multi-tasking-capable operating systems which run complex third party applications, whereas traditional cell phones were only able to use limited applications written in BREW or the Java-based J2ME [24].

Unlike the aggregator-centric model, the device-centric model leads to more drastic changes in the traditional, telco-centric mobile value chain presented in Subsection 2.1. Mobile network operators lost control on devices and service provision, while as the integration of service providers into the platform is now more informal. The device as a platform uses application portals (like Apple's AppStore) to mediate between application developers and consumers (Figure 2) usually charging the application provider a brokerage fee of 30% per application and transaction [25, 21]. To create their content, application developers have access to SDK provided by the device manufacturer. These toolkits include libraries, debuggers, handset emulators, and other tools to create new applications [9].

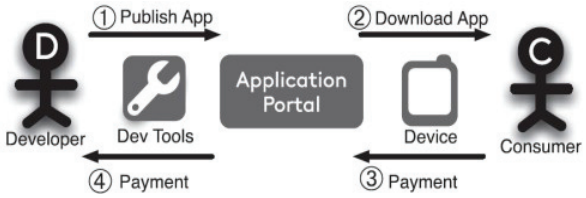

Fig. 2. Mobile Application Distribution Process [9].

Represented by RIM's Blackberry, Microsoft's Windows Phone 7 (formerly Windows Mobile), and Apple's iPhone, the device-centric model constitutes a closed technology approach (or "cathedral model") using proprietary software as a basis [9]; hence, the aforementioned walled garden is similar to the telco-centric model introduced in Subsection 2.1. Aside from other structural and theoretic traits, the main noticeable difference for consumers and developers – in comparison to the open (source) systems, which will be discussed later – is that these devices only allow the use of their own native applications or applications acquired from the official portal (e.g., AppStore), respectively. Whenever a consumer wants to use a developer's application, the intermediary (i.e., the application

portal and its 30% brokerage fee) cannot be bypassed. In the case of iPhone, developers have to be registered and their applications to be approved by Apple, following strict guidelines and approval processes which have been criticized for their lack of transparency [26]. As seen in every platform approach other than the telco-centric model, the mobile network operator is, again, reduced to the role of a network provider without impact on platform, portal, and mobile services provided [2]. However, with the ability to browse full HTML websites combined with the smartphone's integration into an environment of Internet services & applications (such as weather forecast widgets on the phone's desktop or instant push email reception), the device essentially requires a 3G connection with monthly data volumes of at least 1GB per month. Obviously, this fact creates new business opportunities for the telco companies, namely by providing data packages which were widely unsuccessful during the WAP era (cf. Subsection 2.1) [27÷30].

With its iPhone, Apple is particularly effective at capitalizing its position as platform leader by extracting revenues from all kind of stakeholders along the platform. Lastly, Apple also extracts revenues from mobile network operators, who traditionally have to sign exclusive contracts in order to market the iPhone. These agreements also work on basis of revenue sharing plans, and are estimated to earn Apple 5% to 40% of the mobile operators subscriber revenue from iPhone contracts, depending on the particular provider and contract [26]. Obviously, the immense popularity of the iPhone, making it a main selling point for expensive high-end mobile contracts, seems to give Apple enough leverage to demand such high amounts.

In 2008, Ballon et al. [2] still argued that the iPhone as a platform could be successful, if it was "compelling and differentiating enough to ensure consumer uptake" and if it was able to "generate considerable interest with telco carriers as well as service developers". Now, in 2012 it seems clear that all of these requirements have been met. Network carrier are not only interested, but also willing to share substantial revenues with the device manufacturer, while Apple is now the largest global smartphone manufacturer. Moreover, the AppStore contains over 500,000 applications, which have been downloaded neary 25 billion times by February 2012 [46] thus far. Hence, reception from both, consumers and developers may be described as overwhelming.

2.4. The Device-Centric Model II: Open Technology Approach

The forth model covered in this paper will be an open system approach based on a mobile device technology, which in the current market – considering Symbian's decline and upcoming take-off – is mainly represented by Google's Android platform, an open source operating system based on the Linux kernel [31]. Hence, unless explicitly stated otherwise, the theoretical framework for this model implicitly corresponds to Android.

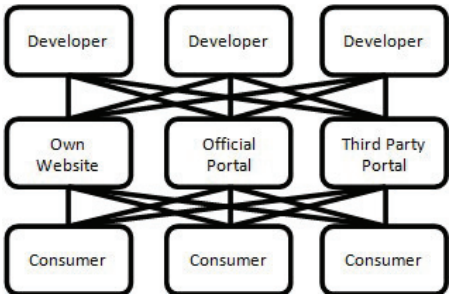

Fig. 3. Ecosystem of Actors in the Open Technology Approach of the Device-Centric Model.

The second variation of the device-centric model differs from the first one covered in Subsection 2.3 by being based on an open technology approach. This platform type is based on an open source operating system, granting its developers full access to the SDK and OS source code [9]. Changing the model to an open platform, results in further changes to the mobile value chain. Similar to the aggregator- and device-centric model, mobile network carriers lost control over the platform and its applications, and are no longer able to restrict either [32]. Since the operating system is built on open source software, it is freely available to all stakeholders along the platform. Hence, unlike iOS, which is exclusively used for Apple devices such as the iPhone or the iPad, any phone manufacturer might use the operating system as its platform and modify the software as they see it [33]. Furthermore, application

developers and consumers alike are not forced to use a central portal (like the AppStore) to buy and sell mobile applications. Instead, developers may directly provide/sell their applications to consumers either through their own distribution channels (e.g., own website), third party distribution portals (e.g., Amazon AppStore), or the official applications portal (e.g., Android Market) [31]. The result is closer to a real ecosystem of manufacturers, developers, and consumers than to a mere platform [5]. Figure 3 illustrates the relationships between the actors in the open technology approach of the device-centric model. Both, consumers and developers have access to several distribution channels for interacting with each other.

As shown in Subsection 2.3, only two of the five players in the current smartphone market follow an open technology approach: Google's Android and Nokia's Symbian. Since Symbian is already experiencing take-off, and the recently forged alliance between Nokia and Microsoft may be considered as the "final nail in Symbian's coffin", Android is the only remaining player in the market for open mobile platforms. It is, however, the current market leader for smartphone operating systems, with a market share of 52,5% in the 3rd quarter of 2011 [45] and predicted to be dominant the long-term market leader [27]. While main competitor Apple follows the route of a centralized portal (i.e., the AppStore) with device uniformity – since iOS is restricted to Apple devices such as the iPhone and iPad series – Google's approach is moving towards decentralized portals and device variety, as Android is currently used by various device manufacturers such as Samsung, HTC, Sony Ericsson, LG, or Motorola [9, 32, 34].

Manufacturers can freely use and modify the Android platform, while developers and consumers are not forced to use Google's official distribution channel, which at the same time constitutes its only real source of income on Android devices. Furthermore, in July 2010 the Android Market had the highest percentage of free applications (57% as opposed to 28% in Apple's AppStore), meaning that only 43% of all applications even could generate any revenues for Google [37], while as of May 2012 the total number of application downloads jumped over 8,7 Billion [38] compared to far more than 25 billion downloads from Apple's AppStore [46]. It can be argued, however, that unlike traditional companies, Google is generally known for building a product first, and finding the appropriate revenue model afterwards [39]. Still, Apple's platform model – and the company's platform leader position within – certainly offers higher potentials for generating revenues than Google's open technology approach [35, 36].

3. Prospects

In future, the question remains whether completely new platform models could emerge, and what they would look like. Ballon et al. [2] envisioned a service-centric platform model, calling it "a more or less theoretical model for now". This theoretical model was based on Google's Open Social initiative, to unify the APIs of several (social network) platforms. The goal would have been total data portability across different platforms, so people could use their data (such as profile information) for other services. However, the success of such a model would obviously be largely dependent on Facebook's involvement, as it is by far the most popular and influential social network worldwide. And even though Facebook did join the DataPortability Workgroup along with Google in 2008 [43], so far, it remained passive and has shown no real efforts towards developing a service-centric model [44]. By now, the uniform brokerage fee of 30% on application transactions, imposed by players of the three most relevant approaches (Facebook, iPhone, Android), indicates that we are indeed looking at competing platform models for mobile service delivery. While the two device-centric models are obvious substitutes, it can be argued, whether the aggregator-centric model is more of a complementary to any of the device-centric approaches; this seems to be especially true, if until 2013 mobile devices should indeed become the most common method to access the Internet.

4. Conclusions

After analyzing four major platform models, and their current market situations, a further classification becomes apparent. As shown in Table 1, a distinction can be made between closed systems, where the platform leader dictates the available content, and open systems, with the platform leader providing the platform, but the content being developed by independent third parties with a high degree of freedom. Furthermore, there is a difference between platforms being based on portal sites, and platforms revolving around (operating systems for) mobile devices.

Table 1. Taxonomy of Platform Models

	Closed System ("Walled Garden")	Open System
Portal-based models (based on portal site)	Telco-centric (e.g., Vodafone Live!)	Aggregator-centric (e.g., Facebook Mobile)
Device-centric models (based in device/OS)	Closed Technology (e.g., Apple iPhone)	Open Technology (e.g., Google Android)

Hence, mobile business has left the stage of its infancy, being no longer just a niche market of electronic business. Gartner [40] predicts that by 2013, "mobile phones will overtake PCs as the most common Web access device worldwide". And indeed, the fact that iPhone was the first mass marketed consumer-level mobile phone to allow "real" web browsing without altering websites (unlike the WAP portals used before), has been convincingly argued as the key factor for the device's (and hence the smartphone technology's) success, being even more important than the ability to run complex applications [26]. The future development of this market is hard to predict, considering that past forecasts have been vastly inaccurate or simply wrong. According to Gartner's long-term predictions for Smartphone OS market shares, predictions for Symbian had to be corrected from dominant market leader in 2009 to complete disappearance in 2011, while for Android almost the opposite applies [41÷43]. But eventually it seems more than likely that the closed technology approach will remain a relevant counterpart to the open technology approach in mobile business; regardless of the winners' and losers' names in the end.

The electronic economy does seem to be stronger inclined towards monopolization than the traditional one (as shown by Google, eBay, Amazon, or Facebook); a tendency which might as well affect the mobile business.

We have already seen that mobile network operators have lost most of their initial power in the aggregator- and device-centric platform structures, but modern technology and open platforms further threat their influence on mobile service delivery. The most basic services such as text messaging and phone calls might be replaced (or at least supplemented) by mobile email delivery or messaging applications, while VOIP (e.g., Skype) becomes increasingly viable in the mobile sector, as WIFI and 3G connections are becoming the industry's standard in the developed countries [23].

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