

# Mobile Computing: Predictions on Sustainable Advantage

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This study is the result of research done under the supervision of Professor Jeffrey R. Williams in the spring of 2009 in the Competitive Strategy Project course (45-979) at the Tepper School of Business. Substantial contributions were made by Thomas Drexler, Salman Mukhtar, Ramneet Rekhi, Neha Sinha, Robert Vertullo, and Ali Zafer.

<b>CONCLUSIONS AND INSIGHTS .....</b>	<b>3</b>
<b>CARRIERS AND NETWORKS .....</b>	<b>3</b>
<b>HANDHELD DEVICES .....</b>	<b>5</b>
TWO HANDSETS CURRENTLY DOMINATE THE SMARTPHONE MARKET .....	5
<i>The iPhone</i> .....	6
<i>Blackberry</i> .....	7
<i>Other Handsets</i> .....	8
<b>THE ATTEMPT TO GAIN CONTROL.....</b>	<b>8</b>
THREE COMPLIMENTARY ASSET TRIADS AT WORK .....	8
<b>MARKET SEGMENTATION AND STANDARDIZATION.....</b>	<b>11</b>
FACTORS SPLIT MARKET INTO CORPORATE AND CONSUMER SEGMENTS .....	11
THE BATTLE FOR A STANDARDIZED COMPUTING SYSTEM.....	13
<b>APPLICATIONS.....</b>	<b>14</b>
REVENUE MODELS FOR APPLICATION DEVELOPERS .....	14
MARKETPLACE FOR APPLICATION DEVELOPERS.....	16
ECONOMIC TIME OF APPLICATIONS .....	18
THE NEED FOR STRATEGY TO SUSTAIN PROFITS .....	19
TYPES OF APPLICATIONS.....	22
<i>Disruptive Applications</i> .....	24
APPLICATION CONCLUSIONS .....	24
<b>APPLICATION DISTRIBUTION .....</b>	<b>25</b>
ECONOMIC TIME OF APPLICATION DISTRIBUTION .....	25
SUSTAINING ECONOMIC PROFITS .....	26
APPLICATION DISTRIBUTION CONCLUSIONS .....	26
<b>APPLICATION ECOSYSTEM .....</b>	<b>27</b>
DESCRIPTION OF PARTIES .....	27
KNOWLEDGE OF DOWNLOAD AND USAGE DATA.....	28
APPLICATION USE RAPIDLY DECLINES .....	28
DISADVANTAGES FOR APPLICATION DEVELOPERS & MOBILE ADVERTISING .....	29
PLATFORM CREATOR POSSESSES CLEAR CONTROL POINT .....	31
<b>FORCES EXIST LEADING TO CONVERGENCE.....</b>	<b>32</b>

## Conclusions and Insights

Our research allowed us to make several predictions regarding the direction of the mobile computing industry. We believe the following developments are likely to occur in this industry within the next several years:

- The competitive advantage of the current players in the mobile computing industry is directly linked to the *degree of control* of the three complementary assets—handset design, applications, and established customer relationships.
- Apple’s central control point is the Application Store.
- Similar to the PC market, we could see the emergence of an intermediate (java-like) layer that will permit applications to be run on varying platforms.
- The differentiating capabilities of hardware will become marginal due to the decreasing rate of innovation and the more rapid rate of copying.
- We will see a battle for one standardized operating system that will dominate the application market.
- Application distribution is a fast cycle business, and most applications will become commonplace and available on most smartphones.
- Applications in the ‘Combination’, ‘Networking’, and ‘Product Supporters’ categories are better positioned to garner rents.
- New and platform-independent application distribution models are likely to emerge.
- The platform creator, in a closed source environment, possesses the clear control point. In the case of the iPhone Application Ecosystem, Apple owns the only application being reused consistently—the App Store itself.
- Strong forces could drive convergence to a standardized operating system and a single handheld for private and business use.

## Carriers and Networks

The wireless carriers market in the United States is an oligopolistic one with the four national carriers (AT&T, Verizon Wireless, Sprint-Nextel and T-Mobile USA) accounting

for 85%<sup>1</sup> of the United States subscriber base. Few companies dominate this industry, and there is extended rivalry among the players where competitive advantage comes from low costs and product differentiation. However, the standardized product gives the players a mass market capability but forces a no-surprise, zero defect culture. Technology changes are quick and players have to constantly innovate just to keep up. The evolution of fast and slow broadband, 3G, and 4G networks illustrate how carriers have to continuously invest in infrastructure and technology just to stay competitive and maintain market share. This classic standard cycle market is well described by the Red Queen Principle, whereby the co-evolution of multiple entities results in a consistent relative position. As the Red Queen stated to Alice in Lewis Carroll's "Through the Looking Glass", "...it takes all the running you can do to stay in the same place."<sup>2</sup>

Network carriers possess no inherent sustainable advantage except superior economies of scale. Carriers rely on convergence with operating systems or handsets to create strategic advantages. For example, T-Mobile has partnered with Windows Mobile to create a potential control point for itself. Other carriers, such as Verizon and AT&T, use the Blackberry to cater to a larger subscriber base. AT&T has also entered into an exclusive relationship with Apple in the United States to sell its iPhone in an attempt to exploit the phone's popularity. AT&T hopes Apple, as the embodiment of "urban cool", will help draw iPhone fans to AT&T. Also, low margins and lack of sufficient control points create the need to raise barriers through putting in high switching costs in the form of long term contracts. Additionally, carriers take advantage of their complimentary assets and offer other services like internet and cable as a bundle to attract customers. Verizon FIOS is a prime example.

Carriers—both national and regional—also rely on strong brands and the persistence of pure economies of scale to allow them to offer services to multiple customer segments. The smaller operators have to strike a fine balance between allocating resources to expand their customer base and giving quality service to their existing customers. The last few years have been marked by heavy M&A activity in an effort to gain the advantage of scale.

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<sup>1</sup> Standard and Poor's Wireless Industry Survey January 15<sup>th</sup> 2009

<sup>2</sup> [Through the Looking Glass](#)

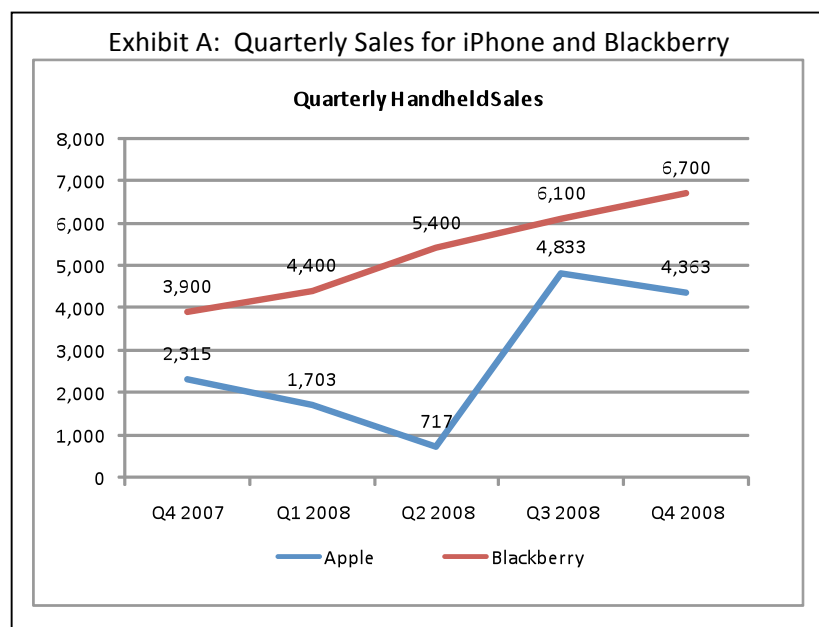
As time progresses, most revenues in the wireless computing industry will come from innovative content, services, and experiences.<sup>3</sup> Carriers must segment the markets and offer value added services or bundled services to remain competitive and retain their market share and minimize churn. Sources of sustainable advantage will stem from the carriers' abilities to make strategic alliances and develop complimentary assets. There will be persistence in the battle of achieving economies of scale.

## Handheld Devices

### *Two Handsets Currently Dominate the Smartphone Market*

The market for smart phones is currently dominated by Blackberry for heavy users in the business community and Apple's popular iPhone mainly in the sphere of private users. RIM recently announced the number of users has reached approximately 21 million<sup>4</sup>, and Apple has sold 17M iPhone units so far<sup>5</sup> surpassing Windows Mobile based phones in sales per quarter recently<sup>6</sup>. Nokia

and Microsoft, in cooperation with the handheld producer HTC, are the main players besides Apple and Blackberry but have not yet developed such a clear-cut profile as Blackberry and Apple. The rapid shift toward the iPhone can be seen



<sup>3</sup> Gartner report id number G00157170

<sup>4</sup> [http://www.rim.com/investors/pdf/Q3F09\\_MDA\\_FS\\_PR.pdf](http://www.rim.com/investors/pdf/Q3F09_MDA_FS_PR.pdf)

<sup>5</sup> <http://poweredbysteam.com/2009/01/iphone-sales-by-quarter/>

<sup>6</sup> <http://gartner.com/it/page.jsp?id=827912>

in Exhibit A. The iPhone appears to have a certain fashion characteristic, which can be shown by the drop in sales towards the release of the second version of the phone in mid 2008.

## **The iPhone**

The iPhone may be the pinnacle of mobile handset hardware development. Most users praise the easy to use interface and the sleek design. The most common customer complaint appears to be the time it takes for one to get used to the touch screen keyboard. Currently, the iPhone has gained a competitive advantage due its technological difference from other phones. Apple correctly predicted the stupendous success of the iPhone and contracted Samsung as an exclusive hardware supplier for NAND Flash RAM. Even though the iPhone is comprised of commodity products, Apple has invested significant money and effort into not allowing the iPhone to be positioned as a commodity item. As this research is being conducted, Apple is planning the release of the third generation iPhone. Apple, with its focus on applications, is well positioned to profit from the new technology of 3G-networks. The industry is increasingly moving towards convergence of communications, computing and entertainment. The 3GPP, the standards body that defines mobile broadband standards, is currently defining Long Term Evolution (LTE), which allows UMTS operators to offer even higher peak data rates and lower latency than is possible with existing High-Speed Packet Access (HSPA) technology. The higher speeds and lower latency are achieved from OFDMA and antenna techniques such as MIMO (Multiple Input Multiple Output), SDMA (Spatial Division Multiple Access) etc. LTE promises to allow operators to economically offer innovative services to different market segments such as PDA's, laptops, interactive gaming devices etc.

Regarding market share, the iPhone is rapidly gaining presence in the high-end segment for privately financed firms<sup>7</sup>. It is viewed as a great “second phone” but has not been able to take away Blackberry’s corporate presence. This inability to overtake Blackberry appears to result from security concerns within firms. It has, however, managed to become the

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<sup>7</sup> <http://money.cnn.com/2008/03/06/technology/apple.fortune/index.htm>

business phone of choice in creative industries such as the entertainment or arts industry. Currently, there is little motivation for customers to replace the iPhone for reasons such as technological or software obsolescence because Apple continuously strives to update and improve it. Updates are consistently pushed to iPhone users resulting in a continuously improving device. Additionally, even though an iPhone can be purchased at AT&T stores, the device cannot be activated without iTunes, thus implying the control point still lies with Apple.

## Blackberry

The Blackberry continues to maintain its strong presence as a business phone. Its full QWERTY keyboard, click wheel and track ball differentiate it from other handsets in the market. Most corporations are also reluctant to switch standards due inadequate security measures on other platforms. In addition the iPhone does not currently allow for real time email download, which is an important feature for corporate users<sup>8</sup>. Thus, Black Berry currently has a control point and a strong isolating mechanism over the corporate smartphone market because of high compatibility with popular corporate systems.

As a result, Research in Motion (RIM), Blackberry's parent company, has enjoyed strong returns over the last three years, with its return on equity averaging 30%. Recently RIM introduced the Blackberry Storm, which is a touch screen version of its popular product. This phone was introduced to compete with Apple's iPhone. The reception to the Storm however has so far been tepid because of clumsy design and poor touch screen design. As a recent review in Engadget summarizes the following:

“...it's not as easy, enjoyable, or consistent to use as the iPhone, and the one place where everyone is sure they have an upper hand -- that wow-inducing clickable screen -- just isn't all that great. For casual users, the learning curve and complexity of this phone will feel like an instant turn off, and for power users, the lack of a decent typing option and considerable laginess in software will give them pause.”<sup>9</sup>

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<sup>8</sup> Currently one has setup a “Fetch Schedule” where the iPhone checks the email server for updates on a fixed time interval, such as Every 15 minutes or half hour.

<sup>9</sup> <http://www.engadget.com/2008/11/19/blackberry-storm-review/>

## Other Handsets

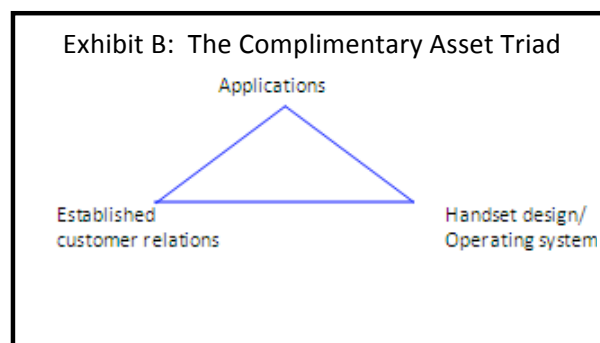
Within the mobile computing market, other companies are aiming to introduce their own smartphones. Google recently introduced its G1 Android Phone which, so far, has received a lackluster response due to its undesirable hardware packages and difficult to use software platform. As Tech Blog Gizmodo summed up in its review, [The Android] “has some serious problems with accessibility and usability”<sup>10</sup>. Motorola and Nokia also have products under development; however, none of these have yet gained significant market share when compared to the iPhone or Blackberry. This is not to say these developments are not significant. History has shown many examples of fast-follower firms eventually dominating markets. Such an outcome is difficult to predict at this time.

## The Attempt to Gain Control

### ***Three Complimentary Asset Triads at Work***

Currently we see a threefold relationship between handset design, applications for handsets, and established customer relationships that drive the market segmentation for smartphones.

The complementary assets that are controlled by the handset and operating system providers dissect the market in a private and a business segment. The value propositions, known as the Complimentary Asset Triad, are highlighted in Exhibit B.



Our research shows the competitive advantage of the current players in the field of operating systems and handhelds is directly linked to the *degree of control* of the three complementary assets. These three assets are the value drivers for future business success. If one would remove the three control points the market would look like pure fast cycle. If,

<sup>10</sup> <http://gizmodo.com/5062977/t+mobile-g1-google-android-phone-review>



for example, Apple would not have its established customer relations with iPod users the iPhone would have been another handheld in a very competitive market. The same is valid for applications. The fact that iPhone applications are not transferrable to handhelds of other producers binds user to Apple products. This binding effect leads to isolating mechanisms to Apple and isolates Apple from some of the fierce competition of a fast cycle industry.

*Central point of control is the application store.*

We will see very strenuous completion around application stores to create a control point. Exhibit C shows the current landscape of application stores. The clearest example of this

Exhibit C: Current Application Store Landscape		
Applicati on Store	Opening	Number of Applicati ons
Apple Apps Store	June 2008	approximately 15,000
Berrystore	October 2008	71 as of January 2009
Blackberry Applicati on Center	March 2009	
Android Market	3Q 2008	
Nokia OviStore	Fall 2009	
Windows Apps Store		approximately 20,000

control point is Apple's utilization of the App Store. As of January 16<sup>th</sup> 2009, there were 15,000 applications<sup>11</sup> in the App store resulting in 500,000,000 downloads. Most of the current applications are for leisure use, further suggesting Apple intends to position its product as a "second phone." However, a recent article<sup>12</sup> did highlight several business applications that can be downloaded onto the iPhone. This suggests Apple is not blind to the prospect of business use for the iPhone. The ability to create applications that combine unique attributes of the device's hardware and operating system will help to make a device "stickier". Windows Mobile has attempted to strike this kind of balance with limited success. While one may see Windows having 20,000 applications, our research suggests Windows Mobile has provided the wrong applications for its business users by attempting to transfer Windows software to the handheld. This has, up to this point, received a lukewarm response since Windows software as PowerPoint is difficult to use on small screens of handheld devices.

<sup>11</sup> Wikipedia- [http://en.wikipedia.org/wiki/App\\_Store](http://en.wikipedia.org/wiki/App_Store)

<sup>12</sup> <http://www.macworld.com/article/137035/iphonebusinessapps.html>

A control point for one Operating System provider is reached if one of the standards has such a dominant customer base that it is not beneficial for third party software developer to develop applications for more than one standard. The competitive landscape could be shaped in the same manner as in the PC market in the past—a single operating system becomes dominant based on classic networking effect.

*Similar to the PC market we could see the emergence of an intermediate (java-like) layer that will permit the application to run on different platforms.*

Looking back at the history and development of programming languages, it appears that the cell phone application development industry will follow a similar development path. With programming languages in the past, an application developed for Windows would run only on Windows operating system and would not run either on Mac OS or UNIX unless additional changes were made. With the advent of Java, the concept of "write once, run anywhere" gained enormous popularity. It allowed application developers to write an application for one operating system and, without any additional changes, that application could run on other operating systems such as UNIX, Mac OS, etc. This led to enormous efficiencies and wide adoption of Java as the industry platform for application development.

The cell phone industry is at the same crossroads as the programming languages were couple of decades ago. As stated earlier the two major smartphone manufacturers are Apple and RIM with their iPhone and Blackberry models respectively. Today, an application developer has to separately develop applications for iPhone and Blackberry. This requires twice as much time and resources than if a "write once, run anywhere" concept were to develop for cell phone applications. The development of such an intermediate layer has the potential of bringing enormous efficiencies and wide adoption by the industry.

In addition to the App Store, another potential control point for Apple is brand ownership. The iPhone is a successful carryover of the iPod brand. Both of these pieces of hardware, technically speaking, contain many parts that could be copied and commoditized by

competitors. There is no doubt Apple iPhone is “cool<sup>13</sup>”. Like Nike Shoes or Diesel Jeans, all of these products fulfill consumer needs not only on a utility level but also create an important emotional connection with the consumer. In this respect Apple should be viewed as a marketing company and not just a technology company. The path to renewal for Apple will be similar to other consumer products companies where advertising and brand exclusivity become paramount to maintenance of rents. If Apple’s main control point truly is its brand, this could explain why Apple only seeks to dominate the entertainment/leisure side of the smartphone market. Over saturation could undercut its pricing power and, hence, lead to lower returns.

## Market Segmentation and Standardization

### ***Factors Split Market into Corporate and Consumer Segments***

Handset design, applications, and effects of staircase strategies divide market into business and private segment. The handheld, as a complementary asset to the operating system, defines the applications that are provided for the user community, and, therefore, drives the positioning in the business or private segment. Apple was able to enter the Smartphone market building on the popularity of its iPod in a staircase strategy. For example, Apple was able to leverage the ability for iPod users to transfer their files to just one handheld device—the iPhone. The company was clearly following its strategic path, which is defined by customer relations, asset and an individual strategy. It expanded the capabilities of the iPod by integrating cell phone and mobile computing functions into the handheld device. The large touch screen, as well as sleek user interface, build on Apple’s iPod and allows numerous applications with advanced graphics and strong orientation on fun and spare time activities. Additionally Apple was the first company that realized the market potential for application software for smartphones and is currently the most popular platform among application developers.

Traditionally, Apple has leveraged strong customer loyalty among private users. All three complementary asset triads—established customer relations, handheld design, as well as fun-

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<sup>13</sup><http://www.wired.com/gadgets/mac/commentary/cultofmac/2002/12/56677>

oriented applications—currently provide the iPhone with a very strong standing in the market for privately used smartphones. These strong assets and control points found in the consumer market segment present challenges to Apple’s attempts to enter the business market. Apple’s traditional marketing strategy—a strong focus on exclusivity—led to an exclusive contract with AT&T which does not allow Apple to sell its iPhone to users of all wireless networks. Consequently, businesses with long-term contracts with other wireless providers cannot use the iPhone as a preferred, standard device. However, this contract is due to expire in 2010<sup>14</sup>. The future will show whether Apple’s strategic path will, similar to the development of the personal computer, again lead to an existence as a niche player.

Microsoft attempts to use isolating mechanisms relating to mobile technology similarly to Apple. Whereas the iPhone builds on a staircase strategy from the success of the iPod, Microsoft tries in cooperation with the handheld producer HTC Corporation to build on the success of MS Office software. It can build on the high compatibility of its smartphone software with the MS Office software applications for PCs. Currently only Windows Mobile based phones allow opening and working on the MS Office files. Nevertheless, in practice, we believe the smartphones are too small to fully leverage this capability. The Windows user interface of Windows Mobile phones previously only appealed to hardcore business users.

Blackberry established a dominant position in the business community and can shelter its market share of 21 million subscribers, at least in the short run, by building on the high switching cost that companies would face if they would switch to another corporate standard. Still, as previously explained, Blackberry’s popularity is limited to business users whereas Apple quickly generated a market share of 17M private users. The strong position in the value driver category “established customer relations” is supported by handheld and operating system capabilities. Most corporations are also reluctant to switch standards due to inadequate security measures on other platforms. Looking at our Complimentary Asset Triad, we see that Windows Mobile based handhelds have a weak position in all three value drivers. Recent market developments show all players attempt to gain control of the three value drivers. Current strengths of the market participants are illustrated in Exhibit D.

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<sup>14</sup> [http://www.iphonematters.com/article/apple\\_att\\_contract\\_to\\_last\\_until\\_2010\\_556/](http://www.iphonematters.com/article/apple_att_contract_to_last_until_2010_556/)

All market players try to gain a stronger foothold in the control points in which they are weak. Recall earlier, we stated the iPhone

Exhibit D: Current Market Strengths			
Control Points	iPhone	Blackberry	Windows Mobile
Customer base/relations	Strong but limited to private	Strong relations but limited to business users	Weak, can only built on Windows users
Applications	Strong platform, high diversity	Weak platform, limited apps.	Weak platform, few applications
Handset/Operating System	Strong handset, but limited customer access	Strong, but limited to business users	Medium strength

has attempted to tap into the business market via business applications. Blackberry, as well as Windows Mobile<sup>15</sup>, released applications stores to provide its users with tools similar to the iPhone applications. Windows has tried to enter the private user market with its recent, slim iPhone and Android-like release of Windows Mobile 6.5.

### ***The Battle for a Standardized Computing System***

*The differentiating capability of hardware will become marginal due to the decreasing rate of innovation and the more rapid rate of copying.*

One belief is that rapid innovation rates regarding handheld devices are now in the past. This belief states the handheld will, in the long run, be reduced to a touch screen with certain battery and computing power. Existing isolating mechanisms from superior hardware will be overcome. Nokia lost significant market share to Blackberry and the iPhone which shows the competition will be won by improving the operating system and applications.

On the other hand, many recent smart phones have moved from single processor to dual processor architectures creating enormous computing power and high speed capabilities to facilitate their convergence as a single device for communications, computing and entertainment. Hence, although operating system and applications are important, the hardware will play a significant role in facilitating their effective execution.

<sup>15</sup> <http://www.roughlydrafted.com/2008/09/01/microsoft-plans-“skymarket”-apps-store-for-windows-mobile-7-in-2009/>

*We will see a battle for one standardized operating system that will dominate the applications market<sup>16</sup>.*

## Applications

“Applications” for the purposes of this study are defined as software programs available on the mobile/smartphone. July 10<sup>th</sup>, 2008 marked the release of the iPhone 2.0 update and the launch of the Apple’s Application Store. Five hundred fifty two applications were available then<sup>17</sup>. Today, eight months later, there are over 15,000 applications available on the App Store for download<sup>18</sup>. Independent developers, social networks, and large corporations are all developing applications to remain competitive and capture economic profits. This section of our research discusses the characteristics of the application development industry, the value drivers and strategies for creating and sustaining economic profit.

### **Revenue Models for Application Developers**

Our analysis identified four distinct revenue models for application developers. Application developers can implement these exclusively or as hybrids. Revenue models are described below.

**Purchase Price:** The traditional business model of charging a price for the application downloaded to the handset. One example is Apple’s Application Store where sales revenues are split 70/30 in favor of application developers.

**Mobile Advertising:** A stream of revenues can be realized by embedding mobile advertising into the application. Revenues under such a business model are shared with the mobile advertising provider. San Mateo, CA based AdMob, a mobile advertising

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<sup>16</sup> <http://www.networkworld.com/news/2008/091008-experts-predict-mobile-operating-system.html>

<sup>17</sup> Apple’s Application Store Launches

[http://www.readriteweb.com/archives/apples\\_iphone\\_app\\_store\\_launch.php](http://www.readriteweb.com/archives/apples_iphone_app_store_launch.php)

<sup>18</sup> App Store abound at Mobile World Congress [http://news.cnet.com/8301-1035\\_3-10164638-94.html](http://news.cnet.com/8301-1035_3-10164638-94.html)

startup that has served over 60 billion impressions, features a 60/40 split in perpetuity of advertising revenues in favor of the application developer<sup>19</sup>.

**Networks:** This revenue model is centered on developing a large embedded user base and collecting and selling data.

**Airtime:** A revenue model that is centered on charging a commission for additional airtime used by the device can also be implemented. The revenue model is highly dependent on data and internet access features of the subscriber's plan. Should "unlimited" data and internet access plans become a de facto standard, the sustainability of the revenue model will be questionable. A commission-based airtime model can also be implemented in context to SMS based text messaging. The dependency on the features of the subscriber's plan will persist.

The price charged and profit margins able to be sustained are largely dependent on the type of application. At the launch of Apple's Application Store, Piper Jaffray's conducted a brief survey of 20 application developers at the WWDC conference. The results stated 71% of the applications under development were to be distributed free of charge (i.e. they were centered on one of the other three revenue models)<sup>20</sup>. As competition increases and price compression occurs, the 30% charge, particularly on a \$0.99 application, could result in an increasing shift towards the mobile advertising or network business models.

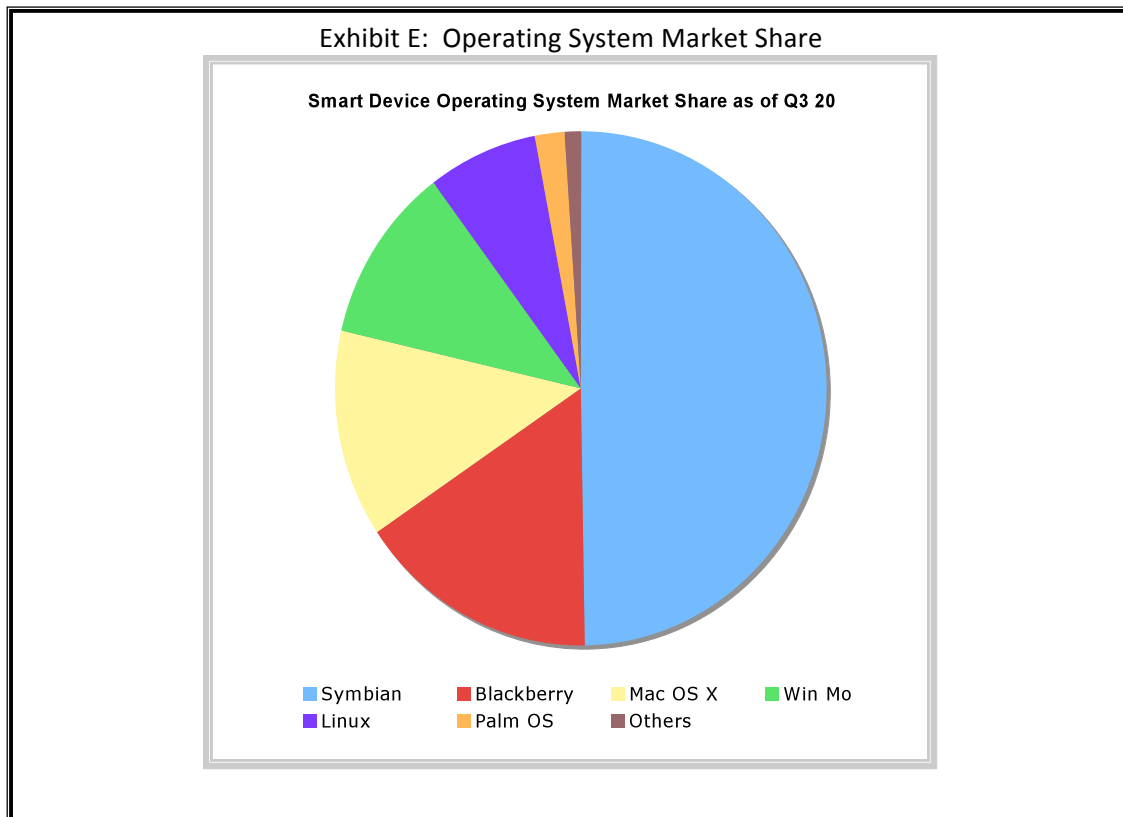
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<sup>19</sup> AdMob <http://www.admob.com/s/home/>

<sup>20</sup> 70% of iPhone Apps May be Free <http://www.tuaw.com/2008/06/11/survey-70-of-all-iphone-apps-may-be-free/>

## ***Marketplace for Application Developers***

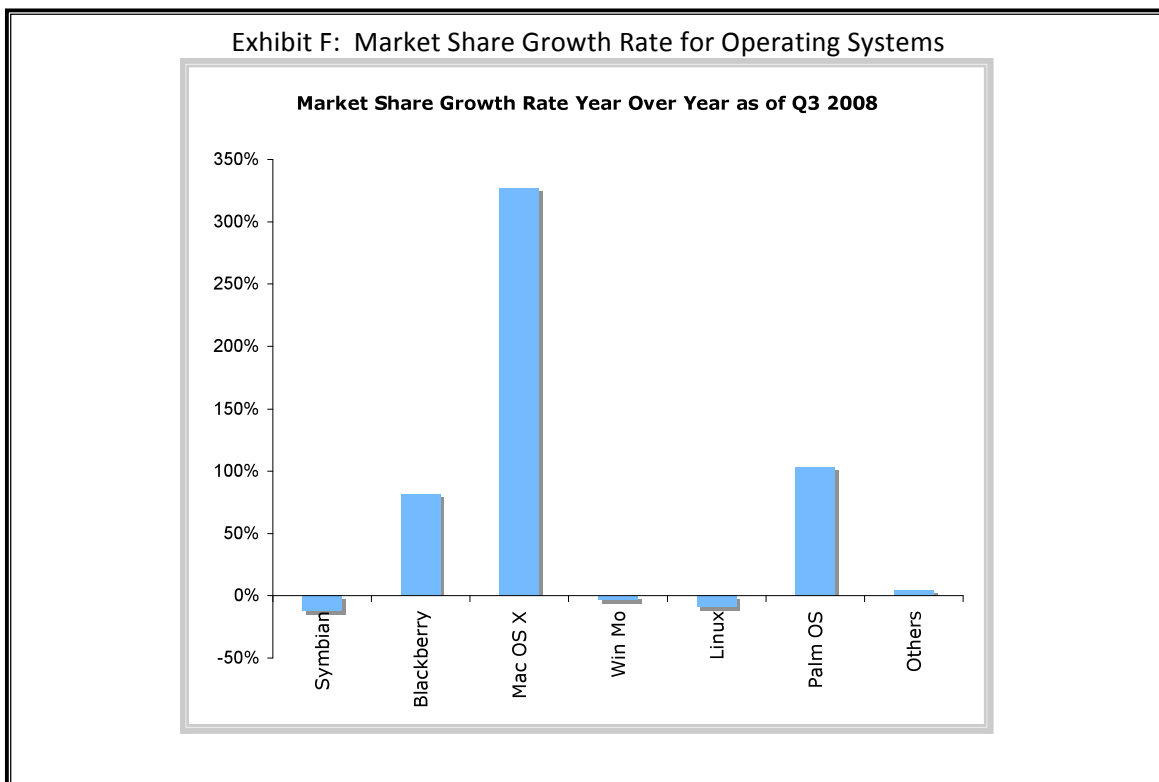
What is the addressable market size? That question, above all others, must be answered by a developer or venture capitalist seeking to invest in the application development space. From an application development standpoint, the question centers on which mobile operating systems and platforms should be supported. Exhibit E illustrates the Operating System Market Share for 3<sup>rd</sup> quarter 2008<sup>21</sup>. Exhibit F shows the market share for these operating systems.



<sup>21</sup> Gartner Says Worldwide Smartphones Sales Grew 16% in Second Quarter of 2008

<http://www.gartner.com/it/page.jsp?id=754112>





Apple's iPhone has witnessed explosive growth since launch in 2007. However, Symbian remains the dominant operating system despite a slightly negative growth rate implying a large but stagnant user base on current handsets. RIM has nearly 21 million users and over 50,000 corporate contracts<sup>22</sup>. Our analysis concludes that application developers should pursue a strategy of independence from operating systems and devices. This allows developers access to the largest markets and allows the reduction of any dependencies or control points that can be exerted on them. One can also conclude that most applications, and their alternatives, will eventually become available on all operating systems and devices. This conclusion is further discussed in a subsequent section of this paper.

<sup>22</sup> [http://www.rim.com/investors/pdf/Q3F09\\_MDA\\_FS\\_PR.pdf](http://www.rim.com/investors/pdf/Q3F09_MDA_FS_PR.pdf)

## ***Economic Time of Applications***

The applications available for the iPhone, as well as those being developed for other platforms, are generally an extensively fast cycle product.<sup>23</sup> The hyper-growth this industry has witnessed is a defining characteristic of fast cycle markets. The vast majority of applications, particularly the “stand alones”, are freestanding and idea-based. The numerous Solitaire, Pac man and Air Hockey games available for smartphones are an example. Furthermore, applications can be easily developed, copied and improved upon. The industry has seen an explosion of independent application developers commercializing applications since the launch of Apple’s Application Store. This includes Lim Ding Wen, a 9-year-old fourth grader in Singapore who wrote a drawing application for his 3 and 5 year-old sisters<sup>24</sup>. The application named Doodle Kids is available for free on Apple’s Application Store.

Actual data on the pricing of applications is not publicly available; however, there is anecdotal evidence that price compression has occurred and that application developers are increasingly competing on the basis of price. Indirect evidence and pointers of this come from two different data points.

First, studies by Admob have indicated that the conversion rate of free application is 10%. This figure is significantly higher than the conversion rate of 1% for priced applications<sup>25</sup>. Second, as of November 2008, shortly after Apple’s Application Store surpassed the 10,000 applications mark, Edible Apple reported that over 2,000 of these were free of charge and over 3,000 were priced at \$0.99<sup>26</sup>. Exhibit G illustrates the pricing of applications as of November 20<sup>th</sup>, 2008.

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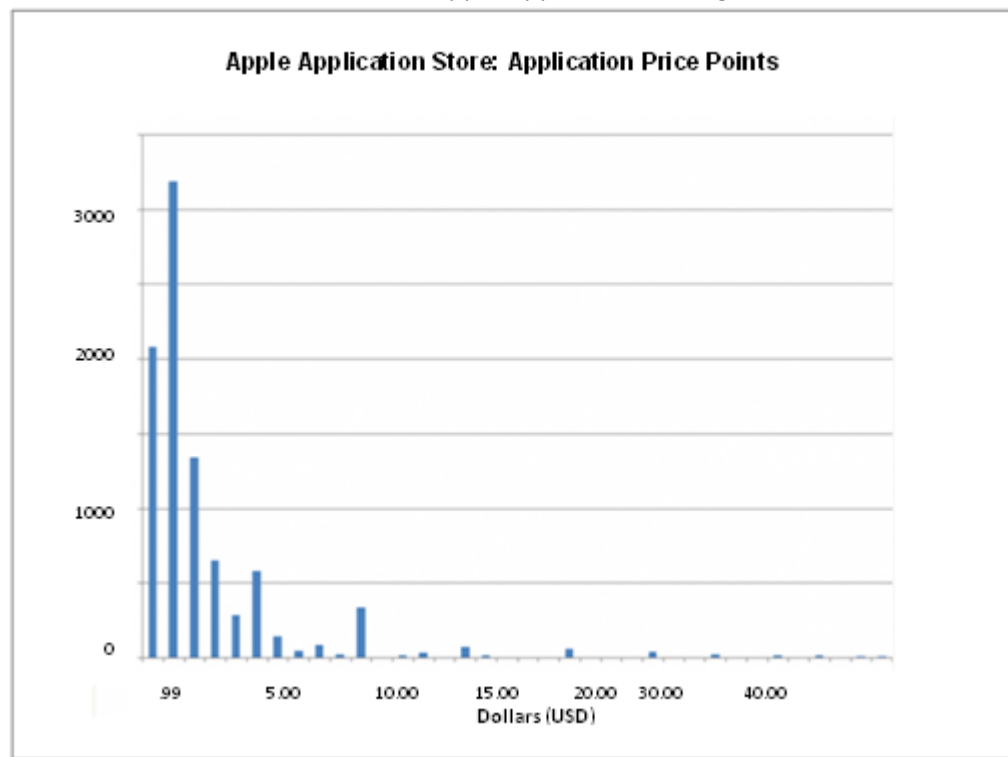
<sup>23</sup> Renewable Advantage: Crafting Strategy through Economic Time, Jeffrey R. Williams, c1998 The Free Press

<sup>24</sup> Nine Year Old Whiz Kid Writes iPhone Application

<http://www.reuters.com/article/technologyNews/idUSTRE5140FI20090205>

<sup>25</sup> AdMob Lets You Track Application Store Downloads <http://venturebeat.com/2009/01/06/admob-lets-you-track-app-store-downloads/>

<sup>26</sup> The iTunes Application Store is Thriving <http://www.edibleapple.com/the-itunes-app-store-is-thriving/>



An analysis conducted by our team of the “top 99” paid applications revealed that 79 of them were priced below \$5.0 with the average price being \$3.54.

### ***The Need for Strategy to Sustain Profits***

Applications are a collection of ideas that can be copied. Isolating mechanisms are weak and barriers to entry are low. Under these conditions, application developers with a unique product and capacity to sell 100 applications per day at \$0.99 per application are limited to less than \$40,000 in revenues annually. Selling 100 amongst 15,000 can be a daunting task. To develop an application development business beyond this threshold, companies will need to slow economic time and continuously innovate. Developing isolating mechanisms, networking effects, spawning and integration are mechanisms that can be used to slow economic time and are consequently the following topic of discussion.

**Red Queen Effects:** “For an evolutionary system, continuing development is needed just in order to maintain its fitness relative to the systems it is co-evolving with.”<sup>27</sup> The theory has deep implication on the fast cycle application development ecosystem that has evolved. To remain competitive application developers will need to continuously innovate and upgrade their products. To capture the economic profits, developers will need to seek time-based alignment with operating systems, handset hardware upgrades, and releases.

**User Base:** Application development companies can create value by rapidly developing a large user base. The user base, particularly for applications that have a networking component, will serve as a switching cost by itself. In addition, the user base may increase the possible advertising revenues that can be garnered in future. Furthermore, applications that can collect and leverage data on user behavior will benefit from espousing a strategy that is focused on a large user base. Venture capital funded mobile social networking startups such as Loopt and Whrrl appear to be following this strategy. Both products are available for free, support multiple smartphone platforms (including the iPhone, Blackberry and Google Android) and integrate leading online social networks. Loopt is funded by Sequoia Capital and Whrrl by Kliener Perkins Caufield & Byers<sup>28</sup>. Loopt raised approximately \$13 million in venture funding from Sequoia. Whrrl has raised over \$15 million since it was founded. It was also the first application to be funded by the Kliener, Perkins, Caufield, and Byers iFUND. Others funding Whrrl include Amazon CEO Jeff Bezos and T-Mobile.<sup>29</sup>

**Network Effects:** Creating a large user base for your application has a network effect and creates barriers for the competition to enter into the same domain. Facebook has used the network effect to become a dominant player in the social networking market.

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<sup>27</sup> Red Queen [http://en.wikipedia.org/wiki/Red\\_queen](http://en.wikipedia.org/wiki/Red_queen)

<sup>28</sup> Pelago raises \$15million to expand Whrrl both in the US and abroad  
<http://venturebeat.com/2008/05/27/pelago-closes-new-15-million-round-to-expand-whrrl-both-in-the-us-and-abroad/>

<sup>29</sup> [http://news.cnet.com/8301-1023\\_3-10094959-93.html](http://news.cnet.com/8301-1023_3-10094959-93.html)

Similarly, wireless carriers' attempts to commit customers to long term contracts create network effects. When one family member is on Verizon's network, other members tend to subscribe to Verizon because of free in-network calling features of the plan. Our analysis of the application development space suggests that applications which tap into the networking effects will be able to slow economic time and sustain economic profit. It is important to note that while having a large embedded user base is important, "stickiness" and "usage" of that user base will be among the most important factors to garner the benefits of the network impacts. Pinch Media analyzed 30 million downloaded applications from Apple's Application Store and determined that only 30% of the applications were used the next day. That number dropped to less than 5% after 20 days<sup>30</sup>. The drop in the user base was found to be worse for "free applications". This is important knowledge for application developers pursuing the mobile advertising and or networking business model by distributing their applications for free.

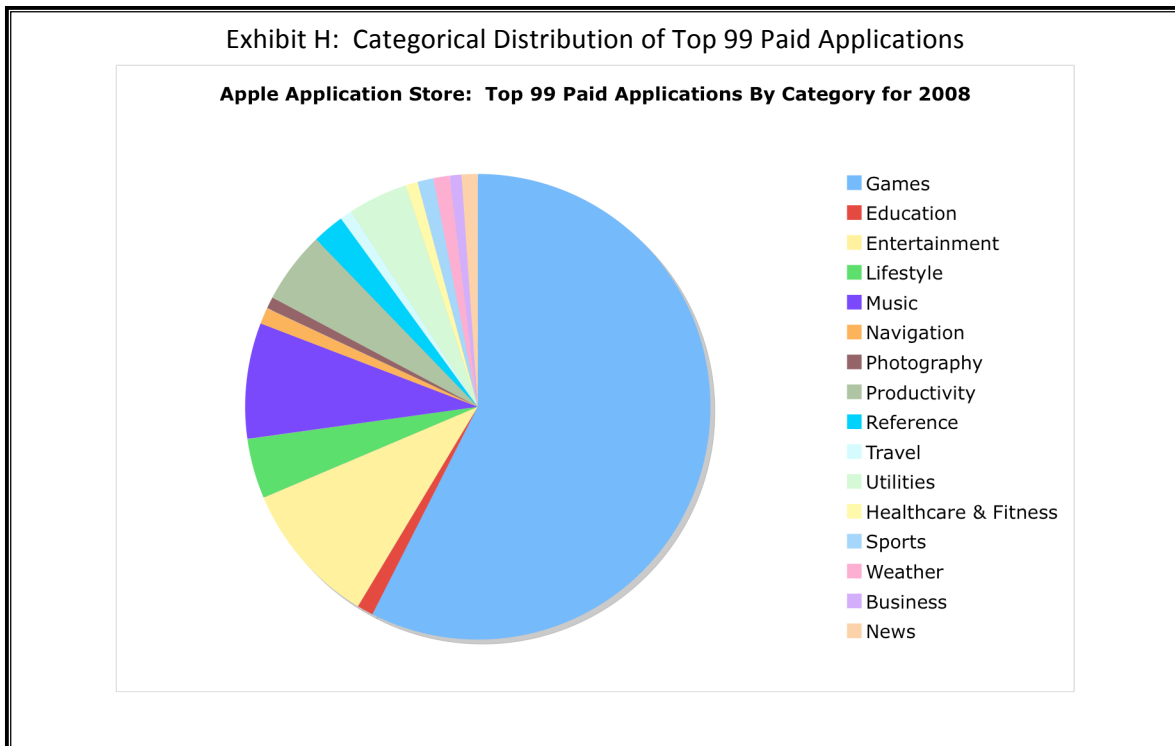
**Product Supporters and Integrators:** Economic time and profit can be sustained if applications attempt to integrate and complement products in other slow and standard cycle industries. In essence, applications that extend a smartphone beyond its traditional functions as a cell phone, music player and camera to name a few. An example of such an application is iControl—a company that makes home automation applications giving iPhone users remote control over air conditioners, lighting and window shades. On January 9<sup>th</sup>, 2009 iControl announced an agreement that incorporates iControl's platform into ADT's monitoring network. Economic time for iControl is extended because first, it addresses an essential need, and second, it integrates into a short cycle industry—home security.

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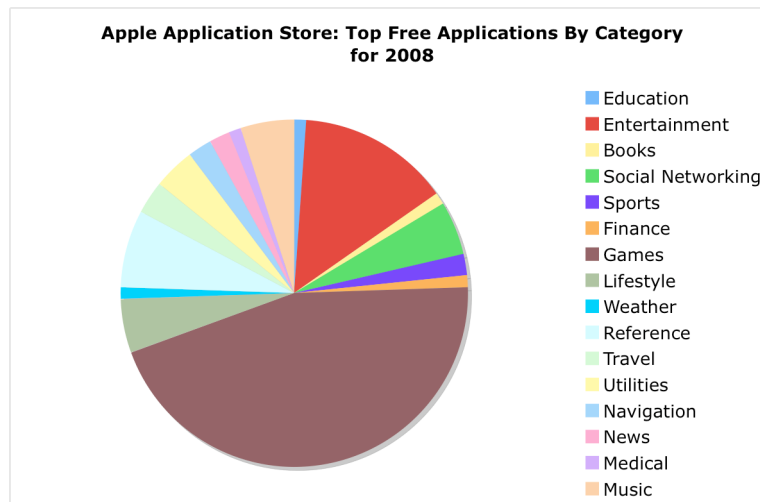
<sup>30</sup> Pinch Media iPhone App Store Secrets <http://www.slideshare.net/pinchmedia/iphone-appstore-secrets-pinch-media?type=powerpoint>

## ***Types of Applications***

With the number of applications available, it is necessary to develop a framework through which the economic profit potentials of the applications can be understood. First, we analyze the types of applications based on functions for which they have been developed. Exhibits H and I illustrate the distribution of the top 99 applications by functional categories for 2008. Games and Entertainment dominate both the paid and the free downloaded applications. The distribution across both is roughly similar; however, the free applications appear to come from a broader mix of businesses. In addition, the free applications include products such as New York Times, eBay, Facebook, Associated Press, AOL Radio, Bloomberg. These are companies for which the smartphone is essentially an additional distribution channel they need to address to remain competitive.



Based on the possible strategies for extending economic time, a second dimensional categorization can be introduced to help focus on the economic profit potential. The second dimension includes the following categories.



**Stand Alone Applications:** These are commonly defined in blogosphere as “ring tone” applications. These are self-contained applications in functionality and purely “codified” to reality.

**Extended Distribution Applications:** These are applications that have been developed to simply address this new distribution channel.

**Combination Applications:** These are applications that leverage functionalities of the operating system, hardware and other aspects of the device to deliver unique functionality.

**Network Applications:** These are applications with a “networking” aspect.

**Product Supporters:** These are applications that complement or heavily integrate into slow and standard cycle products.

Using the “y” axis for the traditional categorization and the “x” axis value categorization defined above, application can be mapped out and strategic play opportunities can be identified.

An overwhelming majority of development has focused in the “games” and “entertainment” space for “stand alone” applications. These are categories with the fastest economic time, requiring simple organizational structures (such as individuals) to support them. As we move to right on the “x” axis the implications of the application become of greater importance. Applications in “extended distribution” space can

possibly be disruptive to the industry. An example is GPS functionalities on the smartphone having the power to potentially disrupt the traditional GPS manufacturers such as Garmin. However dependencies to the accuracy of wireless triangulation exist. Another example is the electronic book applications that are available for the smartphone and their implications on products like the Kindle from Amazon. The “combination”, “network” and “product supporter” applications have a relatively longer economic time. Those applications have the potential to build isolating mechanisms, rapidly develop embedded user bases and require greater investment and more complex organizational structures to support them.

### **Disruptive Applications**

Disruptive applications, such as mobile payments and electronic readers, can create control points for the handset manufacturer and lock-in customers to their devices. Near Field Communication technology, which is critical to the success of the mobile payments industry is mature and has shown enormous promise in initial customer trials. Once customers start using mobile phones as a payment device, they will be less likely to switch it with another device. This resistance to switch will create high barriers for competition to enter.

### ***Application Conclusions***

Our analysis has led to several conclusions. First, a vast majority of applications will become commonplace and available on most smart phones. Economic profits from “stand alone” applications are short lived. Given the economics and proliferation of stand-alone applications, individual developers will find it hard to compete and sustain profits in the long run. Second, those applications in the “Combination”, “Networking” and “Product Supporters” are better positioned to garner rents, but they require more complicated uses of architecture to support them. Finally, a rapidly developing a “sticky” user base can add significant value.



## Application Distribution

If the new 3G iPhone had a “WOW” factor, Apple’s Application Store has had an even more impactful “double WOW” affect. Apple’s App Store enjoyed sixty million downloads in the first 30 days, 100 million in 60 days<sup>31</sup>. According to estimates by Kliener Perkins Caufield & Byers and data from M:Metrics, more iPhone applications were downloaded in the first 30 days than all US carriers combined have in a quarter<sup>14</sup>. Apple’s application distribution business model—the 70/30 revenue split with application developers would seem profitable. This section of document discusses the economic time and profit potential for the application distribution business model.

### *Economic Time of Application Distribution*

The product cycle for the application distribution needs to be researched and determined. On the surface it seems that it is a fast cycle product. Since Apple’s App Store launched, nearly every major player has announced its intent to launch an application distribution system. This includes Google, RIM, Nokia and Microsoft. We wonder if this could result in a reduction of the 30% distribution charge by Apple. Our analysis suspects that price compression, as well as the economics of application development, may result in a shift toward non purchase price business models. This may result in diminishing returns for application distributors.

Whereas Apple has strictly controlled the applications that are being distributed to its products through a centralized distribution process, new models are emerging. Berrystore, an independent application store for the RIM Blackberry platform currently in its beta release, appears to be taking a decentralized approach where application is downloaded directly from the application developer. The competitive dynamics of the application and application distribution industries could radically change if a business model such as this were to endure.

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<sup>31</sup> Launching the iFund <http://ifundvc.com/2008/09/15/launching-the-ifundvc-blog/>

Currently, RIM has not responded with its own proprietary application store. We believe, due to the open-source nature of the RIM operating system, the company believes an application store is not a sustainable control point.

### ***Sustaining Economic Profits***

Economic profit from application distribution is a function of the embedded user base of the platform (i.e. operating system and handset), the propensity to download, the number of applications available, the purchase price, the operating costs, and the revenue model. If the application developers are to seek platform independence and an increasing propensity to move to “non purchase price” business models, then the sustenance of economic profits is questionable. This is especially true if major competitors are to provide application distribution channels. Following a strategy that focuses on building an embedded user base for the platform and encouraging application development will be a key to sustaining economic profit.

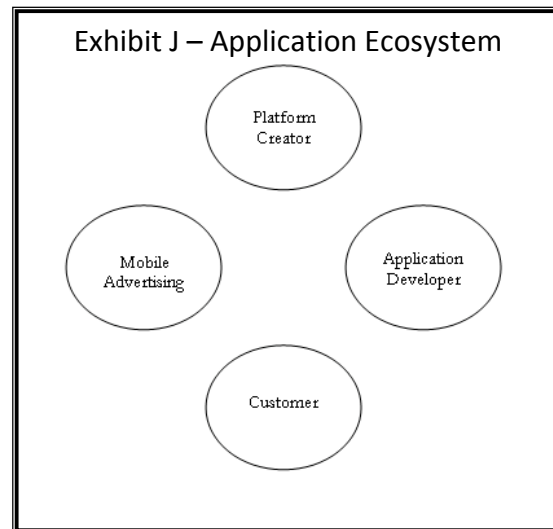
### ***Application Distribution Conclusions***

Our analysis has led to several conclusions. First, application distribution is a fast cycle business. To sustain profits, application distributors, particularly those owned by operating system providers, will need to attract application developers to their platform. To remain competitive, they will need to work to ensure that the operating systems and hardware offer opportunities for the development of “killer” applications. Second, application distribution businesses such as Apple’s Application Store are a control point for the company. Finally, given the success of the application distribution business, new and independent application distribution models are likely to emerge. An exception is the situation where rapid acceptance of an application created a network effect. Here, as in fast cycle environments, rapid distribution is also required but the outcome could become more sustainable.

# Application Ecosystem

## *Description of Parties*

Currently the clearest example of an application system is the one created by Apple—creators of the Mac OSX and the iPhone Application Ecosystem. Four major parties exist in the iPhone Application Ecosystem that may foreshadow things to come for others in the industry. These parties are the Platform Creator (Apple), Application Developers, Mobile Advertising Firms, and Customers. The platform creator can be defined as an entity using its own operating system to leverage advantages and create customer loyalty within the marketplace. Interdependent relationships exist between all parties. A graphical representation of these relationships can be seen in Exhibit J.



The Platform Creator can be seen at the top of the relationship diagram. This is because it holds the chief control point for the ecosystem. In the case of Apple, this is its Application Store—the App Store. All applications must pass approval from Apple prior to being displayed within the App Store. Additionally, the App Store is the only avenue by which customers can obtain these applications. To the contrary, RIM does not conform to this model—holding the chief control point for an application store—because it is open source.

Application Developers and Mobile Advertising Firms can be found on the second tier of the interdependency diagram. These entities capture revenue from application downloads and usage. Assuming the platform is not open-source, they must adhere to the requirements set forth by the platform creator regarding application development, and they must appeal to the customer to benefit from the application being downloaded and used.

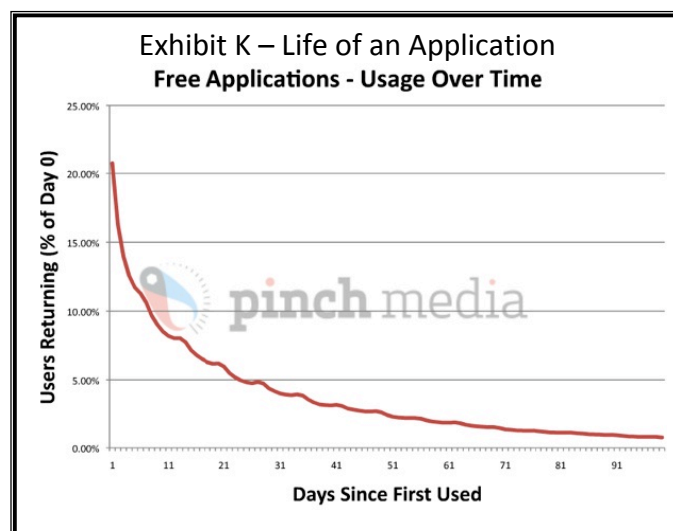
Finally, customers exist as the true means by which the other three entities have the ability to recognize revenues and profits (i.e. rents). Customer preferences in terms of desires, willingness to pay, and revenue models are motivating factors for all other nodes in the above diagram.

### ***Knowledge of Download and Usage Data***

Platform creators have access download and usage statistics for all subscribers. Apple has made daily download statistics available to developers<sup>32</sup>. This allows developers to assess the level of success their applications enjoy. Additionally, several tools exist to help application developers and mobile advertisers assess the usage data of applications after the initial customer download. Pinch Media “offers iPhone SDK developers free code that gives them analytics based on unique users, active users and length of time the application is in use.”<sup>33</sup> Another such service is mobclix. This company assists both developers and advertisers understand who is using the applications and “how they are interacting with” the application<sup>34</sup>.

### ***Application Use Rapidly Declines***

As previously stated, an analysis of application use shows a rapid decline of use after the initial customer download. Concerning free (i.e. no charge) applications, the number of people using an application 30 days after it was initially downloaded is 5%. Exhibit K illustrates the percentage of



<sup>32</sup> <http://www.148apps.com/news/developers-start-daily-download-stats/>

<sup>33</sup> <http://gigaom.com/2008/05/29/pinch-media-offers-metrics-for-iphone-developers/>

<sup>34</sup> <http://www.mobclix.com/>

users after the initial download over time<sup>35</sup>. Paid applications showed similar data. These data strongly suggest applications, with the exception of a few “sticky” applications, are a fast cycle market, and the developers have a very short window in which they can earn their profits. A demographic analysis may hold some insights into why applications have become a fast cycle market. One month following the release of the iPhone 3G, over 54% of visitors to Apple’s website were between the ages of 18 and 34. Assuming iPhone application downloads follow similar trends, the fact cycle for applications may be reinforced by the immediacy-focused, short attention span of people within this age range. This fast cycle relationship creates severe issues for both application developers and mobile advertisers.

### ***Disadvantages for Application Developers & Mobile Advertising***

Application developers are deeply concerned with pricing their applications. The first decision to be made is whether to charge for the application or give it to customers for free and rely on advertising dollars for revenue. If the developer decides to charge, a price point must be set.

The above data concerning the rapid decline of usage suggests giving the application to customers for free and relying on the advertising revenue would not result in a positive outcome. Based on average revenue rates, only about 5% of free applications would have the ability to utilize advertising revenue to become profitable. According to Greg Yardley, chief executive of Pinch Media, “...unless there's something inherent about the app that screams free, sell it.”<sup>36</sup>.

Developers who decide to sell the application encounter different issues and problems. Currently, the prices for applications in Apple’s App Store appear to be converging on the \$.99 price point. With over 15,000 applications found in the App Store, competition for attention is fierce. Developers have little incentive to attempt to develop the “killer app”

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<sup>35</sup> <http://www.techcrunch.com/2009/02/19/pinch-media-data-shows-the-average-shelf-life-of-an-iphone-app-is-less-than-30-days/>

<sup>36</sup> [http://www.appleinsider.com/articles/09/02/19/iphone\\_app\\_usage\\_declining\\_rapidly\\_after\\_first\\_downloads.html](http://www.appleinsider.com/articles/09/02/19/iphone_app_usage_declining_rapidly_after_first_downloads.html)

because those innovative applications cost significantly more to develop and are more expensive to customers. With purchasing the applications without trying them, customers are reserved about paying more than \$.99 for an application. This has given developers an incentive to develop catchy games with short lives, thus contributing to the fast cycle for applications<sup>37</sup>. Craig Hockenberry, developer of iPhone application Twitterrific, wrote the following open letter—below—to Apple CEO Steve Jobs discussing this very issue.

Dear Steve,

As an iPhone developer who's been in the App Store since its launch, I'm starting to see a trend that concerns me: developers are lowering prices to the lowest possible level in order to get favorable placement in iTunes. This proliferation of 99¢ "ringtone apps" is affecting our product development.

Unlike a lot of other developers, I'm not going to give you suggestions on what to do about this: you and your team are perfectly capable of dealing with it on your own terms. Rather, I'd like to give you some insight into how these ringtone apps are affecting my business. Both of our products, Frenzic and Twitterrific, have been quite successful in the App Store. Frenzic is currently in What's Hot and Twitterrific appears in both the Top Free and Top Paid Apps for 2008. We also won an ADA at this year's WWDC. It hasn't been easy, but we've learned what it takes to make a kick ass product for the iPhone.

The problem now is funding those products.

We have a lot of great ideas for iPhone applications. Unfortunately, we're not working on the cooler (and more complex) ideas. Instead, we're working on 99¢ titles that have a limited lifespan and broad appeal. Market conditions make ringtone apps most appealing. Before commencing any new iPhone development, we look at the numbers and evaluate the risk of recouping our investment on a new project. Both developers and designers cost somewhere between \$150-200 per hour. For a three man month project, let's say that's about \$80K in development costs. To break even, we have to sell over 115K units. Not impossible with a good concept and few of weeks of prominent placement in iTunes.

But what happens when we start talking about bigger projects: something that takes 6 or even 9 man months? That's either \$150K or \$225K in development costs with a break even at 215K or 322K units. Unless you have a white hot title, selling 10-15K units a day for a few weeks isn't going to happen. There's too much risk.

Raising your price to help cover these costs makes it hard to get to the top of the charts. (You're competing against a lot of other titles in the lower price tier.) You also have to come to terms with the fact that you're only going to be featured for a short time, so you have to make the bulk of your revenue during this period.

This is why we're going for simple and cheap instead of complex and expensive. Not our preferred choice, but the one that's fiscally responsible.

I'm also concerned that this "making it up in volume" approach won't last too much longer. With 10,000 apps in the App Store, it's already a fricken' cat fight to get into one of the top 100 spots. What's it going to be like when there are 20,000 apps? Or 100,000 apps? Volume is going to get split amongst a lot of players, hopefully the number of devices/customers will increase at the same rate.

We're not afraid of competition. In fact, we welcome it as a way to improve our products and business. The thing we're hoping for is a way to rise above the competition when we do our job well, not just when we have the lowest price.

I've been thinking about what's causing this rush to the 99¢ price point. From what I can tell, it's because people are buying our products sight unseen. I see customers complaining about how "expensive" a \$4.99 app is and that it should cost less. (Do they do the same thing when they walk into Starbucks?) The only justification I can find for these attitudes is that you only have a screenshot to evaluate the quality of a product. A buck is easy to waste on an app that looks great in iTunes but works poorly once you install it.

Our products are a joy to use: as you well know, customers are willing to pay a premium for a quality products. This quality comes at a cost which we're willing to incur. The issue is then getting people to see that our \$2.99 product really is worth three times the price of a 99¢ piece of crapware.

I also worry that this low price point for applications is going to limit innovation on the platform. Sure, apps like Ocarina and Koi Pond are very cool and very cheap. But when are we going to see the utility of the platform taken to another level, like when spreadsheets appeared on the Apple ][ and desktop publishing appeared on the Mac? (It could be argued that Safari has already accomplished this, but I still think there is a third party idea that will be just as transformative.)

It would be great if the killer app for the iPhone cost 99¢, but given the numbers above I can't see it being very likely.

Thanks for your time and attention. I hope this information has been helpful.

Best regards,

Craig Hockenberry

<sup>37</sup> <http://furbo.org/2008/12/09/ring-tone-apps/>

## ***Platform Creator Possesses Clear Control Point***

Again, the best known illustration of this control point is with Apple. The ever-increasing number of applications found in Apple's App Store is increasing the risks for all developers. Developers risk spending a significant amount of time and money producing something that could never gain the attention of customers. This risk, however, is not felt by Apple. Apple essentially has become a distribution hub for application developers. Since Apple takes 30% of all revenues for applications sold through the App Store, Apple does not concern itself with whether or not an application sells. If an application does not sell, Apple possesses no cost burden. The only entity possessing that cost burden is the application developer. Any platform creator, not governing an open-source standard, has an opportunity to capture rents similar to Apple. At the same time, however, Apple is concerned about the overall incentive for developers to participate.

The platform creator—Apple—has the only clear advantage among the interdependencies we've discussed. Apple owns the only application being reused consistently—the App Store itself. The App Store is the only avenue by which consumers are able to get the applications. Gartner Research states "...in mature markets, revenue from voice calls is at best leveling out and is expected to decline in the next 5 years.<sup>38</sup>" This statement underscores the importance of the control point created by Apple. The advantage of the Application Store puts Apple at the top of the interdependency diagram and means Apple can continue to garner large profits from the App Store as long as developers feel the need to develop applications, customers feel the need to buy those applications, and competitors fail to commercialize viable alternatives.

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<sup>38</sup> Gartner Research: Hope Cycle for Computer Mobile Applications, 2008. ID G00157189

## Forces Exist Leading to Convergence

Strong forces could drive convergence to a standardized operating system and a single handheld for private and business use. The value propositions of Smartphones are driven by capabilities of the operating system and hardware.

Windows Mobile 6.5, as well as the most recent Blackberry devices, reduced the gap to the user-friendliness of Apple's iPhone. We assume that the differentiating propositions of the underlying operating systems will be copied as seen in the personal computer industry.

The same tendency can be seen in hardware. Huawei Technologies recently released an iPhone look alike. Tests of the new phone will show how sustainable iPhone's technological advantage will be. Also, LG, Blackberry and other handheld producers are using touch screens for new phones. That could reduce the competitive advantage of the iPhone<sup>39</sup>. Disruptive changes in the handheld technology are unlikely. Memory capacities and speed of the handheld already are similar to low-cost laptops. We expect that the 'Wow-Effect' strategies of the past will no longer work for handheld devices. The competition has shifted from increasingly sophisticated hardware to more sophisticated applications. The operating systems, as well as the applications for these operating systems, are the value drivers for future competition. Future innovation will be driven by operating system, applications, and the attractiveness of revenue models.

The industry is increasingly moving towards convergence of communications, computing and entertainment. The 3GPP, the standards body that defines mobile broadband standards, is currently defining Long Term Evolution (LTE), which allows UMTS operators to offer even higher peak data rates and lower latency than is possible with existing High-Speed Packet Access (HSPA) technology. The higher speeds and lower latency are achieved from OFDMA and antenna techniques such as MIMO (Multiple Input Multiple Output), SDMA (Spatial Division Multiple Access) etc. LTE promises to allow operators to economically

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<sup>39</sup> <http://www.stern.de/computer-technik/telefon/:Mobile-World-Congress-Alle-Software/654971.html>



offer innovative services to different market segments such as PDA's, laptops, interactive gaming devices etc.<sup>40</sup>

As a consequence, technological isolating mechanisms that currently separate business and private phones will be leveled. A similar development was seen in the development of personal computers. Apple's strong advantage in desktop publishing and graphical design in both hardware and software eroded over time to the point where Microsoft dominated these markets. Translating that to the mobile phone market, current barriers for the integration of business and private handhelds that are based on software or hardware will be overcome. Future value drivers will come from a more "useful" device. Therefore, the applications on the phone may make or break the market for the cell phone manufacturers.

The users' desire for the convenience of a single handset, as well as vanishing boundaries between private and professional life, will drive the convergence as well. From an accessibility perspective, a one handset solution would be advantageous, as all one's data—pictures, emails, phone numbers, etc.—are stored in one location. Network providers could support this trend with the introduction of twin billing. Twin billing refers to one Sim card hosting two telephone contracts—one private and one business—which are billed separately.

As a one-handset solution becomes more viable, the need for individualized security becomes more important. The convenience of a single location for one's data could result in a more severe loss if one's phone were stolen or lost. This security concern appears to be a major hurdle impeding the progress of convergence to a single handheld device.

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<sup>40</sup> [http://www.qualcomm.com/common/documents/white\\_papers/LTE\\_MobileOFDMA.pdf](http://www.qualcomm.com/common/documents/white_papers/LTE_MobileOFDMA.pdf)