C h a p t e r 1

B u s i n e s s I n f o r m a t i o n S y s t e m s i n Y o u r C a r e e r

LEARNING TRACK 4: THE EMERGING MOBILE DIGITAL PLATFORM

THE EMERGING MOBILE DIGITAL PLATFORM: E-COMMERCE AND BUSINESS IMPACTS

In a few years, the primary means of accessing the Internet both in the U.S. and worldwide will be through highly portable netbooks and Smartphones, and not traditional desktop or laptop PCs[1]. This means that the primary platform for e-commerce products and services will also change to a mobile platform (Figure 1-1).

FIGURE 1-1   U.S. Internet and Mobile Internet Users 2008-2013
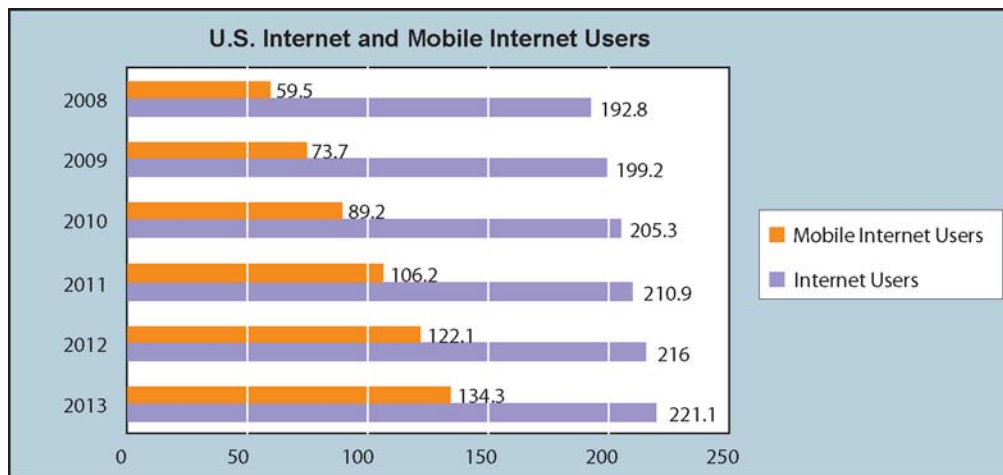
Mobile Internet—smartphones and netbooks—is the fastest growing form of Internet access. Mobile Internet users will grow to 63% of all Internet users by 2013.

Sources: eMarketer, "Mobile Applications Moving Beyond Apple," June 2009.

You can see this sea change in technology platform today whenever you travel and watch business people peck away at their Blackberries in airports and train stations; kids in school text away madly to their friends on cell phones, many using Twitter; high school and college kids buried in movies on their iPhones and reading emails; and people on trains reading the newspaper on their iPhones, or maybe watching movies. Just in case you haven't noticed, mom and dad are no longer at home anymore. Instead they're in a car taking the kids to the next "engagement." And both are working long hours and bring work home with them or come home late. They've learned to shop on the way, ordering everything from pizzas to entire dinners using their cell phones.

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[1]We will not include in this discussion various dedicated e-book devices like Amazon's Kindle and Sony's Ebook Reader although they are a growing part of the emerging digital platform. Currently their numbers, while growing at an unexpected rapid pace, still involve less than a million units a year in worldwide shipments, and hence play a small but interesting role in defining the mobile platform.

Smartphones Replace PCs

The fastest growing segment of the computer and cell phone markets are Smartphones like the RIM Blackberry, Apple iPhone, and Palm Pre (Figure 1-2). Smart phones are a marriage of computers with cell phone software, allowing access to the Internet through broadband cellular telephone networks, and Wi-Fi wireless local networks. Smartphones are a natural evolution of laptop PCs, hand held personal digital assistants (PDAs), cell phones and broadband cellular networks available anywhere in the world, anytime. In 2009 RIM sold its 50 millionth Blackberry, and Apple sold its 17 millionth iPhone.

While the emerging mobile digital platform is certainly a hardware event, it also

FIGURE 1-2   U.S. Cellphone and Smartphone Shipments, 2009-2013
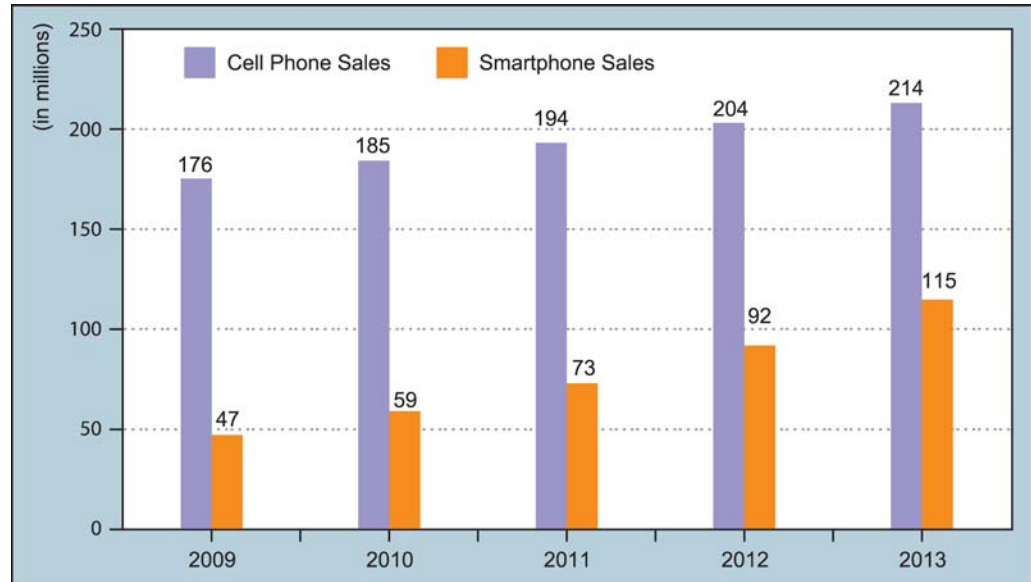
More than half of all cell phone sales in the U.S by 2013 will be smartphone sales, up from 25% in 2009. Traditional cell phone sales are expanding at about 5%, while smartphone sales are growing at 15-20% per year.
Sources: Industry and author estimates; NPD Group, 2009; "US Mobile Phone and Smartphone Shipment Growth, 2008-2010," IDC, 2009.

involves changes in software, as well as changes in our society and culture which sometimes drive the technology in certain directions, and in other cases are driven by the technology to enable and support new kinds of behavior. Soccer moms and dads long preceded the advent of iPhones, but iPhones and Blackberrys enable that style of parenting on the move and sometimes make it more enjoyable. How else would it be possible to coordinate play dates, car pools and dinner on the fly?

What is driving the growth of consumer and business purchases of smartphones? The mobile platform enables changes in work and consuming. Work used to be a place, today it's a set of activities performed anywhere that you get paid for. Consuming used to take place in a marketplace or department store, then it moved to the PC at work and home, and today it's moving to a mobile platform, either a net book or more likely a Smartphone. Consuming today is a set of activities performed anywhere and where you spend money. These social-technological phenomenon have significant implications for e-commerce now and in the near term future five years.

Cellular industry experts believe about 30% of the US labor force, about 41 million people, are "mobile". The new mobile workforce is composed of full and part-time knowledge workers who can work at home, at a coffee shop, airport or on a train; extended day workers who don't stop working when they leave the office; truly mobile workers who live out of briefcases, classic road warriors; and event driven mobile workers who respond to

emergency situations where the traditional infrastructure is disabled or non-existent.

The change in hardware has reached a tipping point. In 2009 worldwide PC sales shipments slumped to 257 million units from over 300 million in 2008. Desktop shipments declined 31% over 2008, while portable laptops rose 3%, and the smaller net book shipments rose 79% to more than 21 million units. US PC markets reflected these changes as well, with overall PC shipments sagging to 67 million units in 2009.

Netbooks are one part of the mobile digital platform because they are designed to hook up to the Internet using wireless networks. Net books are small computers weighing less than 2 lbs, with 8" displays, no hard drives, solid state memory, often using new energy saving non-Intel chips, and a variety of operating systems from Linux to Windows XP. Netbooks are designed to hook up to the wireless Internet (Wi-Fi or cellular) for software applications and data storage although most can also run cut-down office applications locally. Netbooks are priced from $200 to $400. The rapid growth in the netbook market has not made up for lost revenues due to the steep decline in desktop sales and modest growth in laptop sales in 2009.

While there are an estimated 1.5 billion PCs in the world, the number of cell phones long ago exceeded the population of PCs. In 2009 there were an estimated 3-4 billion cell phone subscribers, nearly 300 million in the U.S., 600 million in China, 400 million in India. The population of cell phone subscribers is at least three times that of PC owners. About 25% or one billion of the world's cell phones are "smart phones," capable of accessing the Internet using broadband cell networks. In the US, about 60 million people in 2010 access the Internet using mobile devices, mostly cell phones. In 2010 there will be more than one billion cell phones sold worldwide, and about 146 million of those, will be smartphones. In 2008, for the first time smart phone shipments exceeded laptop shipments (Figure 1-3).

FIGURE 1-3   Global Smartphone and Laptop Shipments, 2009-2013
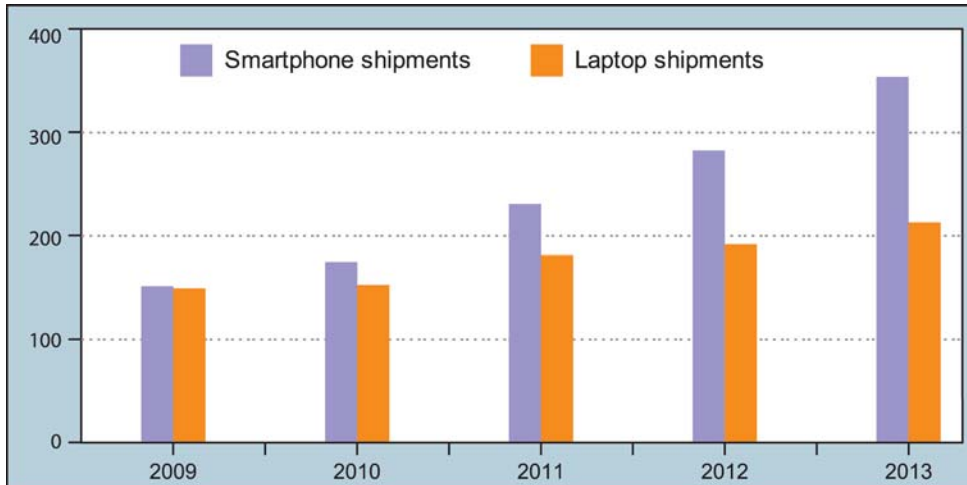
By 2013, smartphone shipments will nearly double laptop shipments as more and more users switch to the mobile digital platform

Source: NPD Group, 2009; IDC, 2009; author estimates.

The Mobile Digital Platform Technology

Smartphones are a disruptive technology which radically alters the personal computing and e-commerce landscape. Smartphones involve a major shift in computer processors, and software that is challenging the forty year dual monopolies established by Intel Corporation and Microsoft whose chips, operating systems and software applications have dominated the PC market since 1982. Virtually no cell phones use Intel chips, which power 90% of the worlds PCs; Only 12% of Smart phones use Microsoft's operating systems and that's

mostly in Asia (Windows mobile). Instead smart phone manufacturers either purchase operating systems like Symbian, the world leader, or build their own like Apple's iPhone OS and Blackberry's OS, typically based on Linux and JAVA platforms. 90% of the billion cell phones shipped each year use some version of ARM (Advanced RISC Machine) chips, licensed by ARM Inc. and manufactured by many firms. For instance, Apple's latest 3G iPhone uses an ARM 11 chip with a 600 mghz processor speed, and uses only 500 milliwatts of power (a milliwatt is equal to 1/1000 of a watt.) A typical laptop dual core mobile Intel processor uses 25 watts—about 50 times more power consumption. Apple has not officially released information on the chip or its manufacturer. Smartphones do not need fans. Cellphones do not use power hungry hard drives but instead use flash memory chips with storage up to 32 megabytes. While the latest Energy Star 4 lap top disk drives consume 500 milliwatts at idle, and 1 watt writing and reading, flash memory chips consume about 50 milliwatts writing and reading data (twenty times less power).

Powerful, energy efficient client devices are only one-half of the emerging digital platform. Without second and third generation cellular networks, and Wi-Fi wireless local networks, mobile platforms enabling computing anywhere and anytime would be impossible. By 2013 there will be 2.5 billion 3G subscribers worldwide, expanding the mobile audience and the capabilities of smartphones. These broadband cellular networks allow users to view traditional full screen Web pages, as well as pictures, videos, and television shows. While the US lags behind Asia and Europe in 3G networks, carriers have finally established their basic 3G footprints. Speed on ATT's 3G network realistically is about 1.2 Mbits down and 700 Kbits up, enough to watch TV shows and movies without a hitch. As with all cellular service, speed and reliability depend on a variety of conditions, such as how far you are from a cell tower, how many other users are connected in your vicinity and how much data they're moving. The next generation 4G networks are expected to reach 7 Mbits, enough to watch HD TV.

Mobile E-commerce

Up until the introduction of the Apple iPhone smartphone in 2007, and the development of iTunes store where millions of iPod and iPhone users could download songs, mobile e-commerce in the United States was more of a dream than a reality. In Asia and northern Europe (particularly Finland and Sweden) mobile payment systems were developed for cell phones in 2000, but there was very little shopping or advertising with traditional cell phones and few applications. Mobile e-commerce failed to develop in part because there was no mobile client hardware with sufficient capacity to communicate, work or shop, and in part because existing cell phone networks lacked the capacity to deal with millions of simultaneous users surfing the Web. That's all changed. There are five new mobile platform revenue streams (and related business models): software applications ("apps"), advertising, location-based services, entertainment, and a much smaller but interesting e-book and other content segment.

(1) Mobile E-commerce: Applications. No less important than the hardware and network shifts are the changes in software. The emerging mobile platform operating systems emphasize touch-user interfaces, and finger-icon computing, where users touch a software application or function they want to launch and use the application. The mouse and pointer devices, not to mention the wand or stick, are gone. Text entry is either through a soft screen keyboard, or miniature QWERTY keyboard. Instead of shipping software applications in boxes, smart phones allow users to download the software from their respective online stores. Instead of building all the software themselves, the smartphone manufacturers have turned to external vendors to build applications for their platforms and sell them at the stores. Initially, the applications were designed to drive hardware sales, but they have since become a major service on their own. Apple is the leader with its iTunes store selling over 100,000 apps, with Blackberry a late entrant offering over 1,000 apps at its store. And software applications are no longer bundled behemoths like Microsoft Office (over 300 megabytes) but tiny single function applications like games, clocks, calendars, GPS based maps, newspaper and book readers, and a host of business applications from calendars to

customer relationship management apps from salesforce.com and others with most under 1 megabyte in size.

The mobile digital platform has created a new a new online marketplace for software services through the purchase of software applets and applications. Global business and consumer mobile application spending (purchases of applications and related services) reached $2.77 billion in 2009, and is expected to grow to $13 billion in 2012. Currently, Apple has 100,000 applications at its iTunes store which have been downloaded over 1 billion times. Blackberry is late to the game with only 1,000 applications, but is growing rapidly. Google is even slower out of the gate with about 300 applications. This makes the sale of mobile applications a major e-commerce segment. Pundits note that the real status in smart phone ownership has shifted from the phone itself to the applications people have discovered and use. The apps have become a kind of social currency where users compete for prestige based on their downloaded apps (My smart phone can do more than yours!). One venture capital firm has put together a $100 million funded devoted to the development of new iPhone applications.

The top five iTunes store apps are Tap Tap Revenge (game), Backgrounds (entertainment), Touch Hockey (game), Facebook (social networking site), and PAC-MAN (game). Looking at the categories of app downloads, games, music, entertainment and weather lead the pack, but fully half of owners download business apps and productivity apps, suggesting the growing importance of business and personal productivity apps (Table 1-1). The growing importance of business applications becomes more apparent when you consider worldwide apps revenue for all smartphones including the Blackberry, and not just the more consumer oriented iPhone (Figure 1-4).

Apple is silent on the actual revenues derived from its applications store. Apple takes 30% of the revenue from sales ranging from $0.99 to $10. In the first month of operation

TABLE 1-1 LEADING MOBILE APPLICATION CATEGORIES DOWNLOADEDED BY U.S. IPHONE USERS

Download Category	iPhone Owners
Games	79%
Entertainment	78%
Weather	57%
Music	55%
News	43%
Utilities	42%
Social Networking	35%
Navigation	33%
Finance	32%
Travel	29%
Lifestyle	29%
Reference	28%
Productivity	27%
Business	25%
Sports	23%
Education	23%
Books	23%
Photography	20%
Healthcare and Fitness	19%
Other	2%

Source: Compete, Inc., "Smartphone Intelligence Report" as cited by MediaPost, May 5, 2009.

FIGURE 1-4   Business and Consumer Mobile Application Spending Worldwide 2009-2013
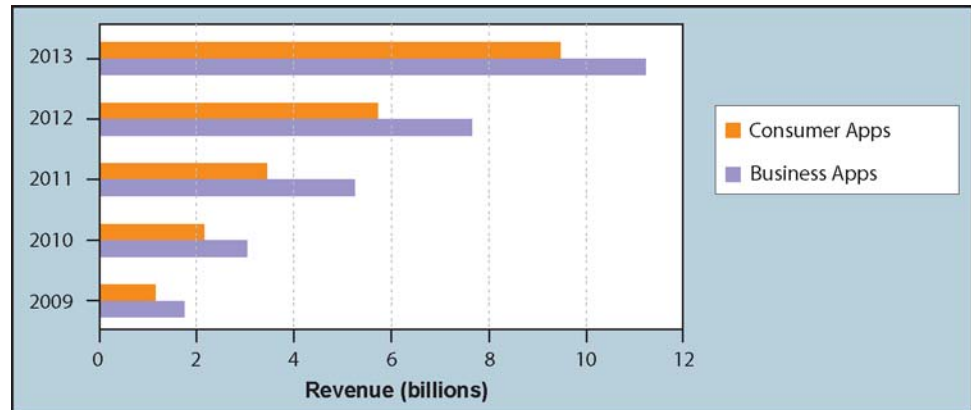
Smartphone business apps will outpace the growth in consumer apps as more managers switch from PCs to smartphones.
Source: "One Billion Mobile Apps: What's Next," eMarketer, June 9, 2009.

in 2008, Apple sold $30 million in apps. For 2009 sales estimates vary from $500 million to $1 billion in gross revenues.

(2) Mobile E-commerce: Mobile Advertising and the Fourth Screen. The emerging mobile digital platform is a new advertising platform that will produce significant revenue as markets learn how to use the new medium. The mobile Internet population in the US is an audience of 60 million smart phone users, growing at the rate of 25% annually, much faster than traditional Internet audience. E-commerce marketers, retailers, and service vendors, are discovering that smartphones represent a new channel for selling and paying for goods and services, the so-called "fourth screen" (Hollywood movies, television, and personal computers being the first three screens). The growth in the fourth screen far exceeds the other three screens. Increasingly, the smartphone fourth screen is becoming a supplemental viewing device for the first three screens with users watching older movies, television shows, and Internet applications on their phones.

Smartphone advertising in the form of banner ads is being developed in a number of ways, including mobile Internet use, email like Google's gmail which contain ads, instant messaging, ringtones, games, and music downloads. A new avenue for distinctly app banner advertising is accomplished through proprietary applications which users download. Applications like the VirtualZippo lighter, Audi's A4 challenge, Kraft food's iFood Assistant, and Levi's Dockers Shakeable apps are the vehicle for presenting the brand to users. Charmin (the toilet paper brand) decided not to build an application showing its products at work, but has instead sponsored the popular SitorSquat application, a user generated public restroom locator Website. User's create the sites content by rating and commenting on rest rooms. Over 50,000 rest rooms worldwide have been rated, and the application has been downloaded 80,000 times.

US mobile advertising spending is about $800 million in 2009 (compared to $25 billion for all online advertising), and is expected to grow at 40% a year to 2013, reaching a total spend of $3.3 billion (roughly four times faster than all online ad spending; see Figure 1.5). Examples include banner ads displayed when using applications (not interfering with phone use, SMS or email) and exposure to ads while using smart phones for viewing the Web. There are also product specific apps which carry the marketing message. There are also product specific applications which are sponsored by firms directly and their marketing firms (described below).

(3) Mobile E-Commerce: Entertainment. The mobile platform has also created a significant new revenue stream based on downloaded entertainment. Internet entertainment

FIGURE 1-5   Mobile Ad Spending 2008-2013 (millions)
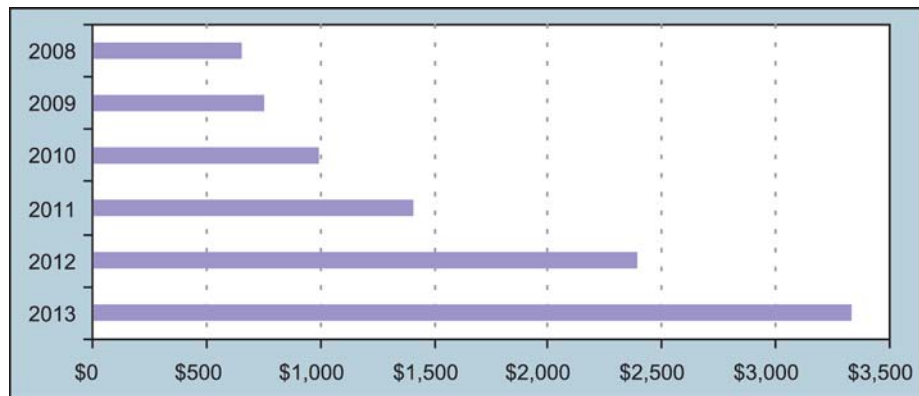
Mobile Internet advertising is the fastest growing online ad channel.
Source: eMarketer, February 2009.

(music, videos, TV, news, sports, and games, not including ringtones) reached $4 billion in 2009 (see Figure 1-6), but the percentage of this revenue purchased and used specifically by smart phones is not known.

    Games, music, and entertainment (video and television shows) are the top three downloads for smartphone users in the U.S. and the world. Major music labels, and video pro-

FIGURE 1-6   Mobile Entertainment Revenues, 2009-2013
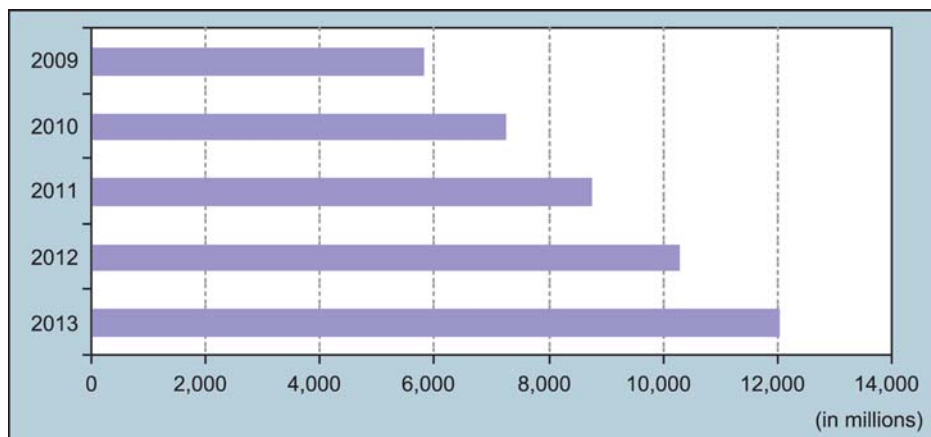
Mobile entertainment revenues are growing rapidly as content creators and owners strike deals with iTunes, the major cell phone carriers, and other mobile Web entertainment creators and distributors.
Source: eMarketer, "Video Content: Harnessing the Video Audience." December 2008.

duction studios are finally striking deals with Internet entertainment sites like Hulu.com, South Park Studios, ireel.com, watch-movies-links.net, Netflix, and YouTube.com to permit legal streaming and downloading of high-quality video content.

    In 2010, 167 million Internet users will view videos on line (85% of the U.S. Internet audience) and increasingly these video viewers are moving beyond YouTube user-generated videos to the viewing of film trailers, and renting or paying for full length feature films or television series. 25% of Internet users report watching TV shows online, and 17% report watching full length feature films. Not all of this viewing involves a smartphone, but increasingly smartphones are one avenue of online video viewing.

(4) Mobile E-commerce: Location-Based Services. A major growth area for e-commerce and advertising is Location-based services (LBS) (Figure 1-7). Location-based services (LBS) use the location of the mobile device provided by the smart phone's built-in GPS (required in all US cell phones since 2001). Verizon's VZ Navigator is an example of location based driving directions, and costs $9.99 per month which is automatically billed to your phone account. While the largest category of LBS is navigation and maps, other services include point-of-interest content, family/friend finder, traffic and weather, and roadside assistance.

Quattro Wireless provides an example of the potential for location-based services. Quattro Wireless, a mobile advertising network, had combined its service with one of the

FIGURE 1-7   U.S. Location-Based Mobile Platform Revenues 2009-2013 (millions)
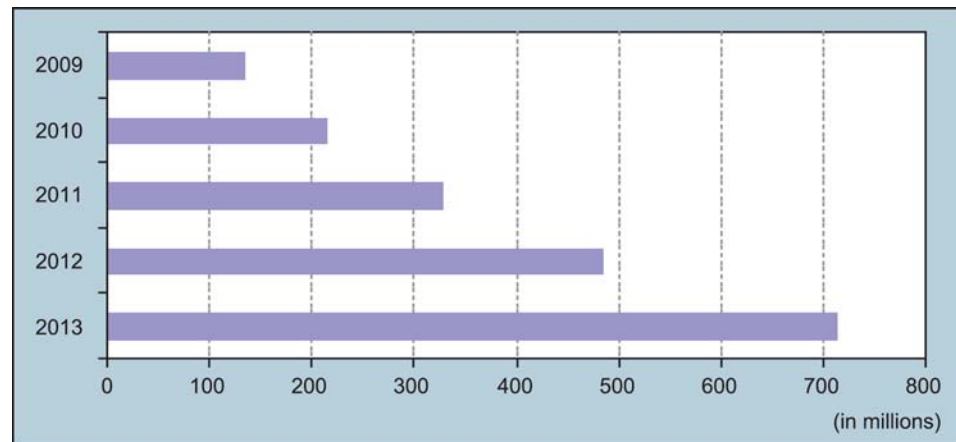
Location-based services are just now being developed, but in the next few years will expand rapidly.
Source: eMarketer, "Mobile Location-Based Services" October 2008.

iPhone's most popular app called WHERE. WHERE is a mobile app that provides users with information about the people, places and things around them. Local content available through WHERE includes everything from the weather, news, and restaurant reviews, to the cheapest gas, movie show times, and the ability to connect with other users through Buddy Beacon™ and the WHERE Wall™. The combined service sells location-based keyword searchs,sponsored widgets, and local search terms. For instance, a consumer pharmacy chain like Walgreen can purchase mobile keywords like "headache," "stomach ache" or "back pain" to drive consumers to the nearest Walgreen's pharmacy.

Location based shopping tools like Slifter, Nearbynow, and Krillion also help consumers find deals at local, nearby stores for products they are searching for. Slifter for instance lists over 370 million products at over 200,000 physical stores in the US. The premise is that most commerce takes place inside physical stores, and a location based search capability is immediately useful to consumers. Slifter is free to consumers, and makes money by charging stores a commission on sales, and through banner advertising. Applications like ShopSavvy allow users to take a picture of a UPC code of a product on the shelf and then searches local stores and the Web to find the best prices.

(5) Mobile E-commerce: e-Books and Text Content. The smallest revenue stream for mobile commerce involves e-books, and other text-based content such as reviews, editorial analysis, and opinions, which does not fit into the "entertainment" category. While most observers had given up completely on the concept of a dedicated e-book reader, the Amazon Kindle and to a lesser extent, the Sony E-book Reader, have shown acceptance by avid book readers. Sites like epinions.com, and Consumer Reports, are generating rev-

enues on a subscription basis. Sales of e-books are expected to reach $150 million in 2010, and to grow at around 50% a year (Figure 1.8). Amazon has over 250,000 books available at its store, and Google has scanned over 1.5 million books which it plans to sell. Both Amazon and Google are preparing smartphone readers for iPhones and Google Android smartphones.

Mobile Digital Platform: Impacts on E-commerce 2009-2013

Up until 2007 there was very little mobile e-commerce simply because there was no truly mobile (hand held) device capable of viewing the Internet, very few Internet-based services

FIGURE 1-8   E-book Sales 2009-2013 (million)
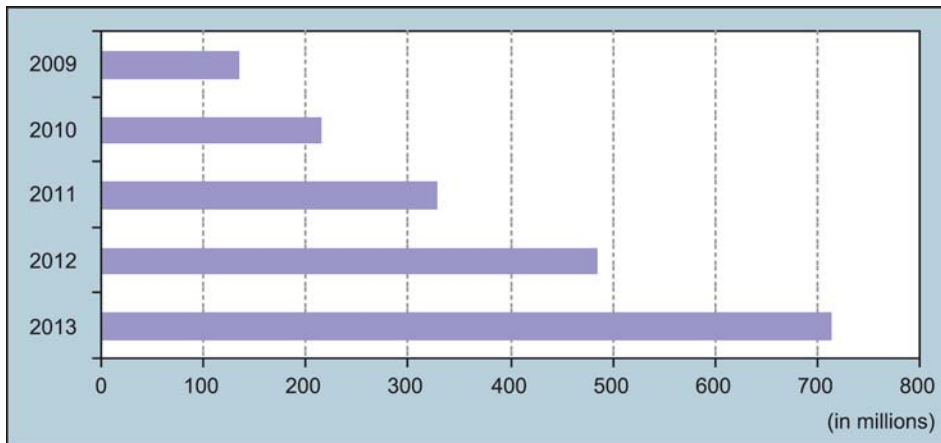
While mobile e-book sales are relatively small compared to mobile applications and entertainment revenues, they will nevertheless provide an avenue for book writers and publishers to reach a wider audience.

or applications, and slow 2G cellular networks.   Once the devices appear beginning in 2007 with the iPhone, a flood of devices from many manufacturers arrived, along with thousands of applications (many of them free), and 3G and even 4G networks came online. Table 1-2 summarizes current and future size of the five mobile platform revenue streams we have identified in this essay.

From nearly zero mobile commerce prior to 2007, mobile e-commerce today is about $9.8 billion (about 4% of all e-commerce). By 2013 mobile e-commerce will grow to 37 billion (about 10% of all e-commerce).

The implications for e-commerce of the "always on" mobile platform are very positive:

TABLE 1-2 MOBILE PLATFORM E-COMMERCE REVENUES, U.S. 2009-2013 (MILLIONS)

	2009	2010	2011	2012	2013
Mobile advertising	760	995	1,410	2,390	3,330
Entertainment	5,826	7,256	8,753	10,298	12,038
Location-based services	134	215	329	486	714
E-book sales	100	150	225	338	506
App Sales	3,000	5,000	9,000	13,000	21,000
Total Mobile commerce revenues	$9,820	$13,616	$19,717	$26,512	$37,589
Total E-commerce revenues	$253,000	$275,000	$311,000	$347,000	$384,000
% Mobile Commerce	4%	5%	6%	8%	10%

for the first time consumers will truly be able to shop from anywhere, anytime, and from any location. The transaction costs and infrastructure costs of shopping will decline significantly, making e-commerce even more comfortable and affordable than fixed-place, physical shopping venues. Mobile e-commerce, talked about for years, is finally poised to take off.

Mobile Digital Platform: Impact on Business, Management, and Management Information Systems

The emerging digital platform is distinguished from earlier Internet devices because it's always on, always connected to the Internet. For users of this platform, they are also expected to be always connected. "I sent you an email over an hour ago! What took you so long getting back to me? Don't I matter?" Looking for a job? There's nothing quite so impressive than getting back to a recruiter or potential employee within minutes of a potential interview request with an email that says "Sent from my Blackberry."

Employers like people who are connected, tuned in. There are of course social negatives as the "online culture" transforms itself into the "always on culture." Manhattan lawyers, (due to the recession having taken a 30% haircut in their billing, reduced to $1,000 a hour), are expected to respond to clients 24x7 within the hour, week ends included. There's even more reason now for managers at all levels to be "always on" and capable of responding 24x7. On the positive side, for lawyers, managers, and other professionals, the mobile digital platform increases the speed of information flow, the velocity of decisions, the efficiency of decisions, and hopefully improves the quality of decision making.

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