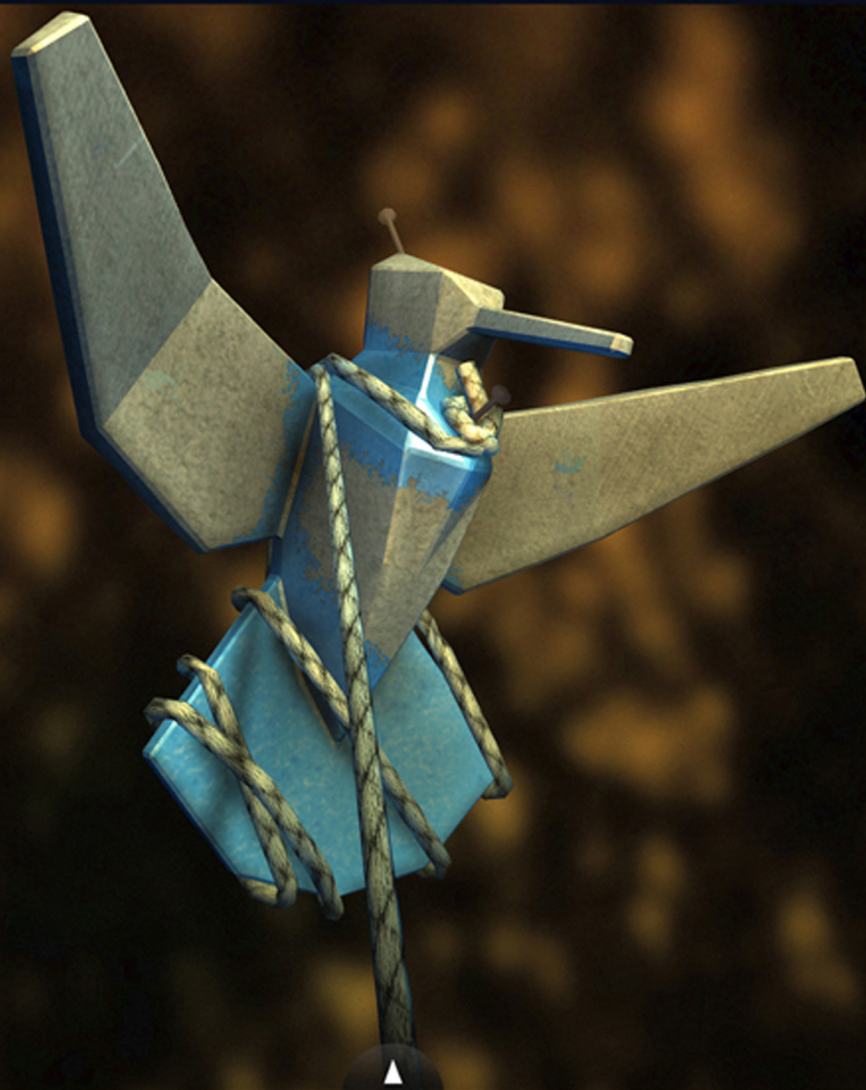# *Game Development Essentials*
Mobile Game Development

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Kimberly Unger
Jeannie Novak

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Mobile Game Development
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CHAPTER

1

Baby Steps

a brief history of mobile games

Key Chapter Questions

- What is the definition of a *mobile game*?

- What are some *issues* that the mobile industry has faced during its history?

- What are some characteristics of *successful* games on early mobile platforms?

- What part do *smartphones* play in the mobile industry?

- How are the current generations of *smartphones and handheld devices* related?

If you had asked "Joe Average" off the street to tell you what a mobile game was just a few years ago, the answer might have been, "It's a game you play on your cell phone, right?" Joe would be correct—but with the broader market penetration of multiple-use phones over the past few years, mobile gaming has taken off and has extended into a whole new ball game. Traditional game publishers have mown through the playing field of mobile publishers, assimilating the most successful of those with the highest throughput and hitting what was previously a barely tapped market with a vengeance— bringing decades of experience and a wealth of skill and creativity to bear on what was previously considered a niche industry.

Where Did It All Begin?

It's impossible to discuss mobile games without going back to the roots of video games and the development of mobile devices. The original idea for *cellular phones* (telephones governed by a linked series of antenna towers or "cells' rather than the more standard transmission lines) was conceived back in 1947. At that time, it was posited to the Federal Communications Commission (FCC; the agency that oversees most types of broadcasting over the airwaves) that a large group of radio frequencies be set aside for this purpose. Unfortunately, the number of frequencies available was so small that only around 20 or so phones could work in any given area at once. This was *not* an easy service to sell.

Techie111 (Wikipedia)

Early portable phones (Motorola Improved Mobile Telephone Service [IMTS], shown) still required a reliable source of power in order to function, which is why most were installed in automobiles.

In 1968, the FCC reconsidered and agreed to increase the number of frequencies reserved to allow for more mobile phones if AT&T and Bell Labs (which requested these frequencies) continued to develop and improve their technology. Even so, it wasn't until 1973 that the first call on a mobile "cellular" phone took place in the United States. By 1977, the first cellular systems were in place—and commercial cellular service had been approved for the US by 1982. Once cellular service was available to the general public, growth quickly outstripped the technology available—reaching over a million subscribers by the late '80s.

Technology for the Elite

Early cellular networks limited the number of calls on air at any given time to only 23—so while the hardware to make calls was expensive at the time, having cheaper hardware would still not have made cellular capability any more accessible. While the FCC was reluctant to increase the number of frequencies allocated, it opened the door to allowing alternate cellular technologies on the 800 band. This touched off an aggressive campaign by the manufacturers to develop new technologies and solutions to help solve the overcrowding issues—which led to the splitting of mobile into two classes of service: *analog* and *digital*.

Analog

Analog transmission allowed the broadcasters to tweak the radio signals so they can carry information such as voice or data. All analog services within the US were shut down beginning in the 2000s as the biggest carriers finally switched to wholly digital services. This caused some problems in areas where there was excellent analog (but no digital) coverage, but those issues were solved by the expansion of the digital networks. In particular, many alarm system and security companies had been using analog communications. Pre-shutdown examples of analog phones include the Audiovox MVX X502 and the Nokia 101. The analog process is very similar to that of FM radio: The signal is received and gets amplified and interpreted by the handheld; it is then sent to a speaker. One of the primary drawbacks of the analog system is the inefficiency of the transmission; analog signals are harder to compress than digital signals and thus require more bandwidth per communication. In addition, analog services are much less secure. For example, the epidemic of *cloning* (where a cellular account is duplicated on another phone, with the charges going back to the original account holder) cost the industry billions of dollars in the late 1990s. By 2008, most of the analog networks in the US were shut down by the major cellular carriers. While very small analog networks can still be found elsewhere in the world (e.g., Costa Rica), the technology is rapidly being phased out.

Motorola Archives
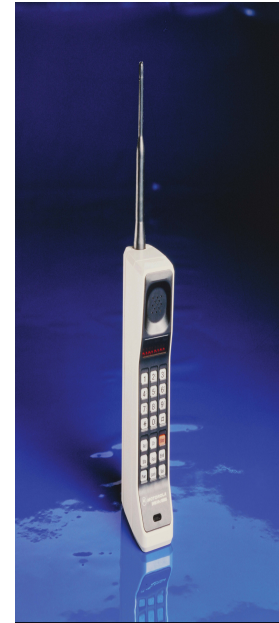
Motorola DynaTAC 8000X

Digital

Most phones currently sold in the marketplace, from the Apple iPhone to the Motorola Razr, employ a *digital* service—where information is transmitted as a string of 1s and 0s. Unlike analog (which is used across all mobile handhelds that employ the service), digital is predominantly broken up into three subtypes (TDMA IS-136, CDMA IS-95, and GSM)—and phones built to work with one type of service are often not compatible with another. There are multiband phones such as the Nokia 6340i that are enabled to work on multiple networks in several countries, but these tend to be more specialized and higher priced units targeted at consumers who regularly travel between countries.

Nokia

Motorola V60T Color

TDMA IS-136

Several major US carriers such as AT&T once utilized *TDMA (time division multiple access) IS-136 (Interim Standard-136)*, but they have since switched over to the GSM standard. (See GSM section on next page.) For a period of time, dual-band phones, like the Siemens S46, offered customers the ability to access either TDMA or GSM. Much like analog before it, the TDMA capabilities were outstripped by the ever-increasing demands on mobile technology—such as streaming video, text messaging, and email. This bandwidth exists on both the 800 and 1900 bands and works by chopping the frequency band into individual time slots, then assigning a user a specific timeslot at regular intervals.

CDMA-2000

CDMA (code division multiple access) was developed by Qualcomm in the 1980s and became a standard in 1993; it was used predominantly in the US by Verizon Wireless, Alltell, Sprint PCS, and a number of other smaller providers. CDMA exists both on the 800 and the 1900 MHz bands and works by assigning digital codes to the voice signals within a broad spectrum. Currently, the CDMA standards are in the process of opening overseas (non-US) markets at close to the same rate that GSM networks (see next page) are penetrating the US and Asian markets. Both technologies provide a similar service, though historically CDMA is slightly faster—particularly where data (rather than voice) is concerned.

Soltys0 (Wikipedia Commons)   Sprint

The Nokia 51 (left) utilizes TDMA IS-136, while the Sprint BlackBerry Curve (right) utilizes CDMA-2000.

GSM

GSM (global system for mobile communications) is based on an improved version of the TDMA technology. The engineers working on the GSM standard based it on a hybrid of the analog and digital technologies available. The GSM standard has been in use in the US since 1996, and systems utilizing it were initially the only ones that could provide voice, wireless, email, fax, and other data access.

Clemens PFEIFFER

Two 1991 GSM mobile phones with several AC adapters.

Newer, Better, Faster, Stronger

Thus far, a new standard for cellular communications has come to market around every 10 years or so—resulting in a consistent need to improve not only the network technology, but the user's equipment as well. The adaptation of new technologies is not instantaneous; there is no giant "kill switch" that will allow a carrier to shut down one system in favor of another overnight, so the creep forward appears much slower than it actually is—with smaller countries and carriers adopting these new services years later than their larger counterparts.

T-Mobile

The second generation of mobile phones had SMS text messaging capabilities (Motorola Razr, shown), which became one of the most popular forms of communication on mobile devices.

Courtesy of Apple Inc.

While smartphones of the previous generation had the ability to run limited applications, send text messages, and browse the web, the arrival of 3G (iPhone 3G, shown) expanded the tools and systems available to even casual mobile users.

New Generations

You've probably heard of 3G and 4G networks, but do you know that "G" stands for "Generation"? Each generation reflects a dramatic technological shift in the way the information is transmitted to the handsets.

2G

The *second generation (2G)* of mobile phones made its European debut in 1991—followed by its introduction in the US within the next year. At around the same time, the technology took a great leap forward and we began to see the emergence of smaller and smaller handheld devices. SMS text messaging made its first appearance, rapidly becoming the communication method of choice for the youngest generation of mobile phone users. It was in the mid to late '90s that mobile games and applications first appeared on cell phones. This also heralds the rise of the *smartphone*—a mobile device that has the built-in capability not only to communicate, but to mimic the functionality of small computers by managing contacts and providing greater access to the Internet.

3G

As the demand for mobile access continued to grow, users of mobile services began to integrate data access functions such as Internet usage—and 2G technology simply couldn't keep up. In October of 2001, the first of the *third generation (3G)* systems were introduced in Japan by its predominant mobile phone operator (NTT DoCoMo) using the *W-CDMA (Wideband Code Division Multiple Access)* technology base. By the beginning of 2002, Europe and the US had launched their own competing 3G systems on the CDMA2000 using one of its 1x digital wireless standards known as *EV-DO (Evolution-Data Optimized)*.

4G

As mobile networks and features of mobile devices continued to expand, demand rose to meet and max out the capabilities of the 3G network. In the mid-2000s, mobile devices designed to allow laptop and netbook style computers access to mobile networks began to appear—pushing the 3G systems even faster toward maximum capacity. By 2009, it had become readily apparent that the 3G systems in place would not be able to meet the ever growing demand for mobile access. In 2010, the first of the *fourth generation (4G)* systems were brought online by Sprint in the US and by TeliaSonera in Scandinavia.

Sprint

While 4G networks came into play in the US and overseas, the hardware required to take full advantage of system capabilities was slower to reach the hands of the consumer (Samsung Epic 4G, shown).

How Many Gs Do You Need?

It wasn't until the advent of the third generation of networks in 2006 that the term "G" came into use as a service descriptor. "G" is not specific to a single cellular network, but rather it indicates a radical shift in the transmission technology and was applied retroactively to the previous generations (1G and 2G respectively).

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What Makes a Game Mobile?

Biolovepulse(Photobucket)

Mobile games are those played on non-traditional handheld consoles. Products such as cell phones, smartphones, palm computers, and media players (e.g., iPod Touch) all fall into this category. While this book covers the development aspects of other traditional console style handheld devices, this is because they have expanded over time from their original game-centric design to include text messaging, voice communications, and networking. Until 2008, however, the definition of mobile games excluded these handheld devices.

Most mobile games are downloaded through a provider's cellular service and played straight on the handheld. Others might be downloaded from a computer through a specially purchased USB cable or Bluetooth device. While smartphones with larger, "shiny" screens and million dollar advertising campaigns have captured the imaginations of many mobile phone users, the truth is that these devices represent only a small percentage of the overall mobile phone install base. The vast majority of mobile games are downloaded and played on simpler, less technologically advanced "feature" phones.

Mobile games first emerged in 1997 on "feature" phones (Nokia 3310, shown)—which functioned predominantly as phones, with a small LCD screen for simple tools such as reception bars, phone number display, and simple graphics.

Where Did It All Begin?

Game makers are an innovative bunch. Give them a piece of technology, and the first thing to pop into their minds will be, "How can I make a game out of this?" When mobile phones first went truly mobile—small enough to fit into a holster and requiring a battery weighing less than your average Rottweiler—building games for these devices became a reality rather than just a cool idea that was tossed back and forth by indie developers. There were a number of technological constraints that had to be addressed before mobile devices achieved enough market penetration to be viable for the software entrepreneur—but once those were met, the technology moved forward at a blinding pace.

:::::Snake & Its Variants

In 1997, Nokia released the Nokia 6110, which came with an already installed black and white version of *Snake.* For those of you unfamiliar with the game, the purpose is to guide an ever growing snake around the screen for as long as you can until you run out of room to maneuver—causing you to run into yourself. *Centipede* is one of the most familiar forms of this game to the average consumer. Although simple, *Snake* is one of the most mind-boggling games ever developed.

It's impossible to discuss the history of video games without spending a little extra love on *Snake.* The concept of the game is brilliantly simple and yet so engaging that it has spawned a thousand spinoffs and has become one of the longest lasting gameplay styles around. The rules are simple:

1. Move your snake around the play space to find food.

2. Every time you find food your snake gets a little bigger.

3. If the snake touches the walls or itself, it's instant death!

The original version of *Snake* was developed as *Blockade* by Gremlin and released as an arcade game in 1976. Similar games on microcomputers soon followed (under names such as *Nibbled* and *Worm*) that expanded on the gameplay rules as game design continued to become more sophisticated. One of the best known variants of the game, the *Light Cycle* games based on the 1982 movie released by Walt Disney Studios, *Tron*, remains a visually striking piece of entertainment history—reprised in the *Tron: Legacy* film and game remakes.

Nokia

Courtesy of Apple Inc.
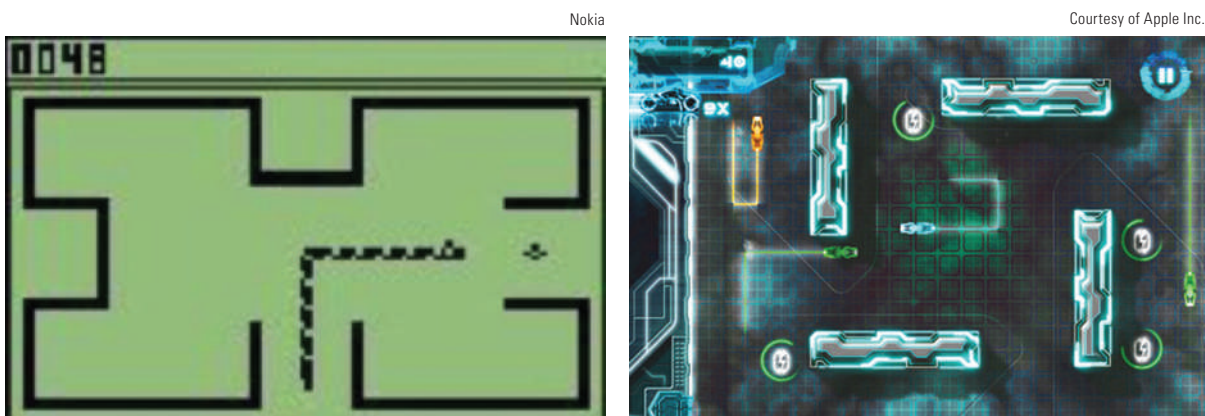
As phones were able to handle larger, more visually complex games, Nokia produced a new version of *Snake* (left) and continues to do so for each new generation of handhelds. *Tron* for iPhone (right) is a modern variant.

Sony Ericsson

Though tiny and grainy images were standard on the first generation of color phones (Ericsson T68m, shown), manufacturers saw the potential and began to increase screen size and pixel depth.

Color Screens

The first break for mobile games came in 1998 when Siemens introduced the first color mobile screens. The advent of color opened up a whole new arena for mobile titles, allowing games to take advantage of more than just varying shades of grey. JavaOS was still the most common *operating system (OS)* used, and games were still around 5 KB in size—but with the extra memory that went along with a color screen, games finally had some room to grow. With the introduction of color screens, original content and updated versions of classic gameplay began to emerge. The most direct route to the consumer was still direct download from the carrier or by OEM (*original equipment manufacturer;* installed on the device when you get it). As more games became available to the consumer, the carriers began to formalize and more aggressively market their individual mobile stores and accompanying campaigns that pushed games, music, ringtones, and other applications directly to the user.

Camera Phones

The first big break after the release of *Snake* came when the *camera phone* was introduced in 2001—aided by the significant increase in the size of the screen, along with the massive jump in memory required to handle digital photography. While there were still many ports of existing games, web-based games started to make the jump as well—with classics such as *Bejeweled* finding a whole new audience while drawing existing fans to the mobile arena. Consumers could install multiple games on their handhelds and charge game purchases directly to their mobile accounts—rather than paying a third party or working with tricky and often confusing web downloads. Since camera phones needed access in order to print photos, the process continued to be streamlined so that consumers who were not as computer savvy could access games and other applications with relative ease.

Sanyo

The first few generations of camera phones (Sanyo SCP 5300, shown) had expanded the memory capacity to allow enough space to store photos.

PDAs

Personal digital assistants (PDAs) maintained a presence separate from mobile phones for years. Blessed with superior screen resolution and far more expansive memory, many games made the jump to PDA long before they became available on mobile. For example, *Serious Sam* was ported to the Palm OS in 2001 but didn't arrive elsewhere in mobile until 2010. However, most PDAs were primarily used in business applications—so while higher quality games were available, they didn't quite set the market on fire. Games were seen as a potential market that never quite reached its peak. Add to this the fact that each PDA (manufactured by Motorola, Palm, Nokia, and others) had different requirements, and the only way to get a game onto a PDA was by purchasing it online and downloading it to the device over a Bluetooth connection or a physical cable—thereby restricting a game players access to new material unless they were physically able to download it from the Internet over a desktop computer.

First-generation PDAs (Palm Pilot, shown) had a wide range of functionality that made them ideal for business use—but it took nearly 20 years for the PDA and mobile phone to merge into what is now known as the "smartphone."

Special-Purpose Phones

Once camera phones proved to be popular, phone manufacturers began to diversify—developing different models of hardware based on their functions. Phones targeted at customers interested in downloading and listening to music, using camera functions or playing games became available to the consumer—each with specialized hardware and memory that would best suit the phone's primary task. Purchasing a phone that addressed a specific preference (e.g. high-resolution camera vs. high-quality sound) resulted in significant cost savings over purchasing a phone that could handle a broader range of tasks.

The MP3 player phones (Samsung Uproar, shown) appeared on the market in 1997 and allowed music fans to download and play their music libraries on the go.

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Rise, Fall, Resurrection & Buyout

When it became clear that mobile gaming was not only here to stay but could actually turn a profit, publishers and developers began to flood the market. After all, there was a broad range of pre-existing content that could be re-released for mobile—and it seemed like a low-risk way to expand brand awareness without needing to develop completely new *intellectual property (IP)*. Many of the more traditional video game publishers were slow to enter the race; after all, the phone resolution was low and memory was small—and compared to a big, splashy AAA console title, there didn't seem much point to dedicating an internal team to the process. At the time, there were hundreds of small publishers and independent studios that wanted to get in on the action—and any number of them could be hired to develop a game on an outsourced basis. In fact, the market was initially so glutted with aspiring developers that the competition drove the price of development way down. The end result was the emergence of small teams that would break up after developing one title—with some team members being picked up by publishers or vanishing into obscurity.

The First Cycle

In 2002, the first run of mobile publishers lost their shirts. While games for mobile devices had a great deal of potential—and while there were oodles of people trying to get that first entry into what was being touted as a brave new world—the technology was still in its infancy. Equally important, the user base was often unaware that games were accessible from their mobile devices. The process of getting games onto those handsets was often convoluted for the average mobile user. It wasn't until the carriers began to commit direct support and advertising dollars that games on mobile devices really began to take off. The publishers that survived this first culling eventually went on to become the powerhouses in the industry—and one after another, they all had learned to apply the same lessons regarding depth and breadth of market penetration.

:::::The *Tetris* Phenomenon: No Platform is Safe

The Tetris Company has a single, simple goal for its flagship game: To have a presence on every platform in every country on the entire planet. Mobile phones are no exception. Variations of *Tetris* were some of the first games to appear on the thumb-sized black and white screens of the first generation of mobile phones. Since then, there have been several licensed, high-quality versions of the game for every new generation of mobile—along with a slew of sub-par knockoffs and copies with names such as *Tetrastic* or *Blockytris*—all hoping to cash in on the easy-to-learn, impossible-to-master gameplay that has made this game one of the longest enduring properties on the market. After 25 years, *Tetris* has managed to remain one of the most popular titles available on any game platform. In early 2010, it passed the 100 million download mark, officially making it the most downloaded game in mobile across all handsets, surpassing even *Snake* (but just barely).

Electronic Arts, Inc.
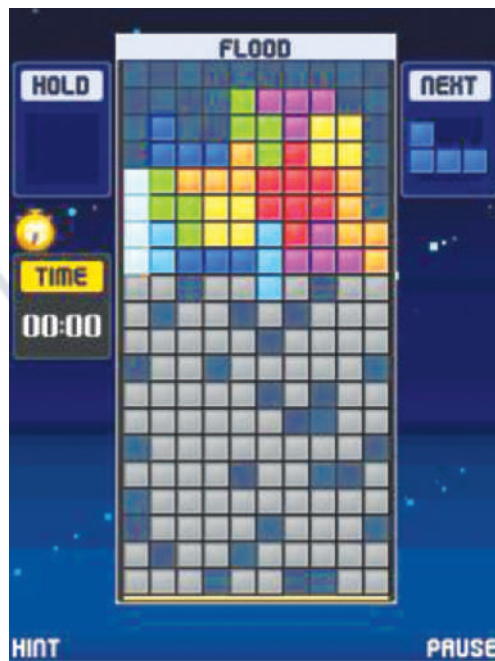
Tetris POP

The Tetris Company licensed its titular product on every phone imaginable—and as of this writing, the game is still one of the top sellers on the market today. This is a classic case of high-end outsourcing. While the Tetris Company has worked with and owned small development studios in the past, its primary business has been in licensing the game's IP for development by various publishers—including Electronic Arts. Most of the time, The Tetris Company has engaged in development in an advisory capacity rather than in a direct, hands-on fashion. This has allowed the company to maintain ownership of the IP and to continue encouraging development over the long term.

A Closer Look at the PDA

The first device with PDA functionality emerged in 1984 with the release of the Psion Organiser, which is often considered to be the first device to combine elements common to PDAs such as contacts, calendar, and notes. Even though the term "PDA" didn't arise until Apple's then CEO John Sculley coined it for use with the first Newton OS device (MessagePad 100) in 1993, the Psion is widely regarded as the father of this line of devices. Psion also created the Epoch OS, which was eventually combined with software advances and components from Nokia, Ericsson and Motorola to form the Symbian OS. Psion eventually sold all of its shares in Symbian to Nokia in 2004. For years, Symbian was the OS of choice for almost all PDA devices (and later, the first evolution of the smartphone). PDA developments ran parallel to that of the cellular phone—eventually including wireless networking and communication, Bluetooth, and the ability to sync data to a personal computer. With the Pilot, Palm took the lead in the PDA market—a lead the company maintained until consumer demand for an all-in-one unit that blended mobile access and PDA functionality required a new evolution of the device.

jan_henry_hansen (Photobucket)

Early PDAs (Psion Organiser II, shown) had only a line or two of LCD screen, but the more complete keyboard made it much easier to enter complex data such as names and addresses.

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As mentioned previously, the PDA's deepest market penetration was for business—yet it had much more potential as a game platform. Larger screen sizes, alternate forms of manipulation such as stylus control, and a more "classic" keyboard setup (rather than a flip-style phone keypad, for example) all made the PDA a seemingly perfect fit for mobile games. One advantage of PDAs was the prevalence of manufacturer-owned *application stores*. While these stores often focused on business applications, users were accustomed to going there first to find new software for their PDAs rather than trying to dig through more open marketplaces such as *carrier decks* (stores that are maintained and marketed by the carrier and are directly accessible from the phone itself). This experience of training the user base would prove to be an asset when the inevitable merge between cellular handhelds and PDAs came into play. PDAs maintained a presence apart from mobile phones until the late 1990s. Blessed with superior screen resolution and far more expansive memory, many games made the jump to PDAs long before they became available on cell phones.

The Emergence of the Smartphone

The PDA and the mobile phone were "kissing cousins" for around 10 years. Mobile phones often offered rolodex-like capabilities such as the ability to keep contact information at the user's fingertips, whereas the PDA offered the type of memory, screen sizes, and functionality that many users craved—but without the ability to download content or use the device as a phone, users were required to have two devices. Eventually, mobile phone manufacturers began to build *smartphones* that would allow users to replicate a number of the functions that the PDAs were already providing.

This jump to larger screens and expanded memory was pure gold to game developers, and the makers of mobile phones were well aware of this fact. There was another big development push right around this time as new developers were lured in by the promise of bigger and faster handhelds to work with, and the device manufactures were aggressively seeking game and application content to take advantage of their new hardware capabilities. It has been proven time and time again in this industry that a new and nifty piece of hardware that has no custom software available at release is going to have an extremely hard time getting off the ground. When smartphones first began to appear on the market, they suffered from a similar issue; smartphone manufacturers moved to correct this as quickly as possible by encouraging development.

PDA manufacturers were not about to be left out in the cold. Palm, Microsoft, and Blackberry all jumped into the mobile handheld market with cellular-enabled versions of their own PDA devices; however, bridging the gap between ease of use and depth of functionality proved to be more difficult than anyone suspected.

Diagram by Per Olin

PDA

Mobile Phone

Psion Organiser 1984
Database, calculator, clock, EPROM removable storage

Motorola DynaTAC 1983
First mobile phone, 10 inches high, whip antenna

Apple Newton 1993
OS, stylus/touch screen, more memory

Nokia Cityman 1987
First International Network (NMT) portable phone

Palm Pilot 1996
Serial communications device, 128kb/512kb memory, touch/stylus screen

Nokia 1011 1992
First mass-produced GSM phone

Pocket PC 2000
Store and retrieve email, play multimedia files and games, exchange text messages

Motorola StarTAC 1996
SMS messaging, clamshell design, lithium-ion battery, vibrate

Palm Treo 2002
Phone, database, web, touch input

RIM BlackBerry 2003
Phone, database, email, IM, internet faxing, web browsing

Apple iPhone 2007
Phone, database, touchscreen, email, web

The Evolution of Mobile Gaming

By the end of 2005, the dust had settled on the first round of battle for mobile publication. The thousands of smaller one-shot publishers had either been assimilated by the larger publishers or had gone under—selling their IPs and closing up shop entirely. The big publishers had adopted a strategy of pushing as much content out onto the mobile networks as quickly as possible; in fact, many of the smaller studios were bought up based on their backlog of titles rather than their ability to generate new ones or *re-skins* (games with the art swapped out, resulting in a different aesthetic with the same gameplay and programming behind it) as quickly as the market demanded. The mobile market moved faster than any game market to date. A game could be expected to keep a "Top 25" spot on a carrier deck only for a matter of weeks; while having a clearly recognizable publisher name such as Jamdat or Digital Chocolate certainly served to make it easier for the consumer to find a mobile developer's titles, it did not necessarily add to the longevity of the games.

Mattel

Handheld Game Systems

It's impossible to look closely at the advent of mobile games without going a bit further into the past and tracing the roots of *handheld* games. Beginning in the 1980s, *LCD (liquid crystal display)* technology reached a point where small, single-purpose video games could be made available to the consumer. Initially, these were variations on football and other sports or watered-down versions of popular arcade titles such as *Missile Command* and *Galaga*. Despite their limitations, these handhelds were wildly popular—driving continued innovation and technologies that would eventually be copied in the PDA and mobile phone markets.

Early single-use handhelds from Mattel include *Football* (above) and *Sub Chase* (below)

Mattel

Single-Use Handhelds

The first generation of handheld games consisted of *single-use handhelds*. A static, painted-on screen and a series of LED lights were the only indicators the player received—from "character" movement to keeping score. Nevertheless, as proven by Mattel's popular *Football* handheld, consumers were eager to play games on portable systems rather than sticking to arcades and home consoles—even though the system limitations were far greater.

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Bandai

Tamagotchi was one of the most popular keychain games.

Single-use handheld games still maintain a presence in the marketplace, though they no longer hold a dominant position. Keychain games such as the massively popular *Tamagotchi* or the 2008 release of *My Meebas* by Mattel (which combined an evolution-style LCD game with the reward of releasing a plush version of the creature the player "raised" from the capsule attached to the game) have shown that even with the limitations of a monochromatic screen and simple 1-4 button gameplay, these products possess a longevity that bodes well for all game systems to come.

The Rise of the Cartridge

Gtapia (Photobucket)

Milton Bradley's Microvision was the first handheld to feature multiple games on cartridges.

While Nintendo is often remembered as the leader of swappable game systems, the first handheld to feature multiple games that could be changed out via a cartridge was Milton Bradley's Microvision; handhelds were single-game only until its release in 1979. The Microvision ended up sacrificing depth of gameplay (such as it was at the time) for the ability to swap in multiple cartridges. Although the unit was a poor seller, it opened the door for more advanced cartridge-based handhelds to follow.

In 1989, Nintendo released the Game Boy—which utilized game cartridges and a now-familiar "D-pad" style directional controller, as well as two buttons that could be remapped by the game. For example, the "A" and "B" buttons might be mapped to "jump" and "shoot" in a side-scrolling platformer such as *Mario Bros.*, but they could be used as "boost" and "fire" in a top-down space shooter. The original Game Boy line sold over a million units and wasn't retired until around 1998, when the Game Boy Color was released.

Nintendo

Nintendo's first entries in the cartridge arena: Game Boy (left), Game Boy Advance (middle), and & Game Boy Micro (right).

The same year the Game Boy was released, Atari came out with the Lynx—the first handheld game console with a color LCD display. Although both systems were commendable (and it was thought initially that the color display might be enough to give the Lynx an advantage in terms of market share), the Lynx never managed to garner the same broad appeal of the Game Boy.

Evan-Amos (Wikipedia Commons) Evan-Amos (Wikipedia Commons)

The Lynx (left), released in 1989, was the first handheld with a color LCD display. The Sega Game Gear (right), released in 1990, gave the Game Boy a run for its money—boasting a color LCD screen and a library of titles ripped from the then popular Sega Master System home console.

At this point in the history of the handheld console, the groundwork was put into place—with newer handhelds making inroads to processing power and memory— but these leaps were still largely incremental. For example, the Atari Lynx II (1991) was smaller and lighter—reflecting the use of smaller, faster processors—and the Game Boy Color (1998) boasted increased memory, a color screen, and improved battery life; these were improvements, but not innovations.

Atari Nintendo

The Lynx II (above), released in 1991, had faster processors and was smaller and lighter than the Lynx. The Game Boy Color (right), released in 1998, had increased memory, a color screen, and improved battery life relative to previous Game Boy systems.

Console Crossovers

In 2003, Nokia released what was widely considered the first "console crossover" product. The Nokia N-Gage was the first production attempt at developing an all-in-one device that not only targeted the game market but included the functionalities of the mobile phone as well. While the first-generation system sold almost three million units and provided easy access to games, the product designed to take market share away from Nintendo's Game Boy Advance (a pure gaming machine) failed to find its predicted runaway success; this was partially due to the cumbersome design—which made it necessary to remove the battery compartment in order to insert a game *and* engage in "sidetalking" because the speaker and microphone were positioned on the side edge of the phone.

The N-Gage was the first mobile phone that attempted to duplicate a full handheld console gaming experience. While Nokia ceased developing new games for the handheld by the end of 2010, the relative popularity and critical commentary that the N-Gage initially received helped open the door between the mobile and console industries.

Nokia

Evan-Amos (Wikipedia Commons)

The N-Gage (left), released in 2003, was the first mobile phone that attempted to duplicate a full console gaming experience. The N-Gage QD (right), released in 2004, beefed up the mobile phone components while dropping other features.

In 2004, Nokia followed with the release of the N-Gage QD—a device that removed or changed a number of the built-in components, such as the ability to play MP3s; the mobile phone aspect was now market-targeted. Rather than being able to access all three bands of GSM, the device now sold as a dual band product, with specific versions being developed for US or the European and Asian markets.

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Right up against the release of the N-Gage QD, Sony unveiled the PSP (PlayStation Portable) as its entry into the handheld market. Unlike the N-Gage, the PSP focused strictly on games—though it did expand its features to include wireless Internet capabilities and the ability to browse the Web. The system originally shipped with *VoIP* (*voice over Internet Protocol,* the ability to make phone calls over the Internet).

Sony Computer Entertainment America

Sony Computer Entertainment America

The PlayStation Portable [PSP] (left), released in 2004, included wireless Internet capabilities. The PSPGo (right), released in 2009, had no cartridges—loading games from files downloaded directly from Sony.

The PSPGo, Sony's successor to the PSP, took the small handheld system one step closer to the smartphone market by eliminating the need for cartridges. The smaller and lighter game console was a download-only device, and games needed to be purchased through Sony's online store—much the same way that games are purchased for the iPhone through Apple's App Store (see next section).

The App Store

The consumers' ability to find games for their mobile devices continued to be problematic. When the PDAs entered the cellular market, they brought their device-specific *app stores*. Driven by a user base already accustomed to going to the manufacturer for applications to install on their devices rather than relying on the often massive carrier decks, app stores made it simple to find products that would run on the consumer's specific device. Handheld manufacturers, which had previously relied primarily on carrier placement, began to develop their own storehouses of games and applications—networking them with publisher web sites. As the ubiquitous all-in-one smartphone came to the forefront, the app store became an easier way for users to take full advantage of their handheld devices.

:::::Apple's App Store

It is worth noting that most device manufacturers and mobile carriers currently have their own version of an App Store, but none have put forth the massive marketing push that went along with Apple's App Store on the release of the iPhone. With a perceived single point of purchase for the consumer (not including sources for phones that have been legally "hacked" to allow for a broader range of content), Apple mostly fixed the purchase path for the average consumer—not only setting an idiot-proof standard but educating iOS users on how to load up on both paid and free apps.

Courtesy of Apple Inc.

Apple' App Store is the clear leader in application marketing, and the premier destination for all iPhone and iPad purchases.

The App Store might be thought of as a "walled garden"—a place carved out on the Internet where carriers, manufacturers or developers can promote products targeted at a single system or line of systems. Each carrier has its own store (e.g., Verizon's "Get it Now," Sony's PSN [PlayStation Network]); each of these storefronts is easily accessible from the user's mobile device and allows purchases to be charged directly to the user's account rather than going through a third party such as PayPal. Charging the fee through the carrier is one of the elements that separates an app store from a carrier deck. In the case of carrier decks, the charge shows up as a part of the phone bill—sometimes resulting in unpleasant surprises for users given to impulse purchasing!

The State of the Game

The mobile game industry has truly taken off. Huge, touch-enabled color screens and built-in app stores have turned the smartphone into a portable game console that may soon rival traditional handhelds such as the PlayStation Vita (PSVita) and the Nintendo 3DS—which are moving to cash in on the newfound user capabilities by offering Wi-Fi access, text messaging, email communications, and download-able content. Two key features that these handhelds do not (and may never) offer are business functionality and cellular bandwidth. While Sony has been moving toward a closer emulation of the lighter, more versatile devices, Nintendo has been pushing (as always) new and untested technologies such as 3D rather than trying to compete on even footing with established technology.

Sony Computer Entertainment America

PSVita

Samsung

Galaxy S II

Samsung

Galaxy Tab

Courtesy of Apple Inc.

iPhone 4

Courtesy of Apple Inc.

iPad 2

Nintendo

Nintendo 3DS

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As the smartphone, PDA, and handheld console markets complete for the hearts and minds of consumers, mobile technology continues to advance—churning out newer and better versions of the hardware, and resulting in some genuine leaps of brilliance along the way. In Chapter 2, we will take a look at the current state of mobile hardware and some of the capabilities and restrictions that must be kept in mind during mobile development.

:::CHAPTER REVIEW EXERCISES:::

1. What was the first mobile game you ever played? How did it capture your attention? What are some non-mobile games that were popular when you were a kid? Do you feel that the thrill of any of these games has been captured in mobile form?

2. Pretend you are a developer working on a game for the first generation of mobile "feature" phones. Why do you think the gameplay behind *Snake* was used in so many mobile games during this era? Knowing the limitations of the time, describe the type of game you would create— and the type of game you wouldn't create.

3. How were mobile games controlled before the advent of touchscreens? If you were developing a current mobile game with this constraint, what types of controls would you have players use? Map the controls to different actions in the game (e.g., menu choice, character movement, selection, prop use).

4. Before app stores, how did players purchase mobile games? How was the rise of the app store pivotal in the expansion of the mobile game industry? What other factors contributed to this rapid growth?

5. What is your favorite mobile game? Do you play it on a smartphone, tablet, handheld console, or other device? Why do you enjoy playing this game? Describe your mobile playing "style": Where are you when you play mobile games, and how long do you play without interruption?

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