6

The Palm Economy

I rigged my cellular to send a message to my PDA, which is online with my PC, to get it to activate the voicemail, which sends the message to the inbox of my email, which routes it to the PDA, which beams it back to the cellular. Then I realized my gadgets have a better social life than I do!

—*Tom Ostad, comic artist*[1]

INSIDE THIS CHAPTER

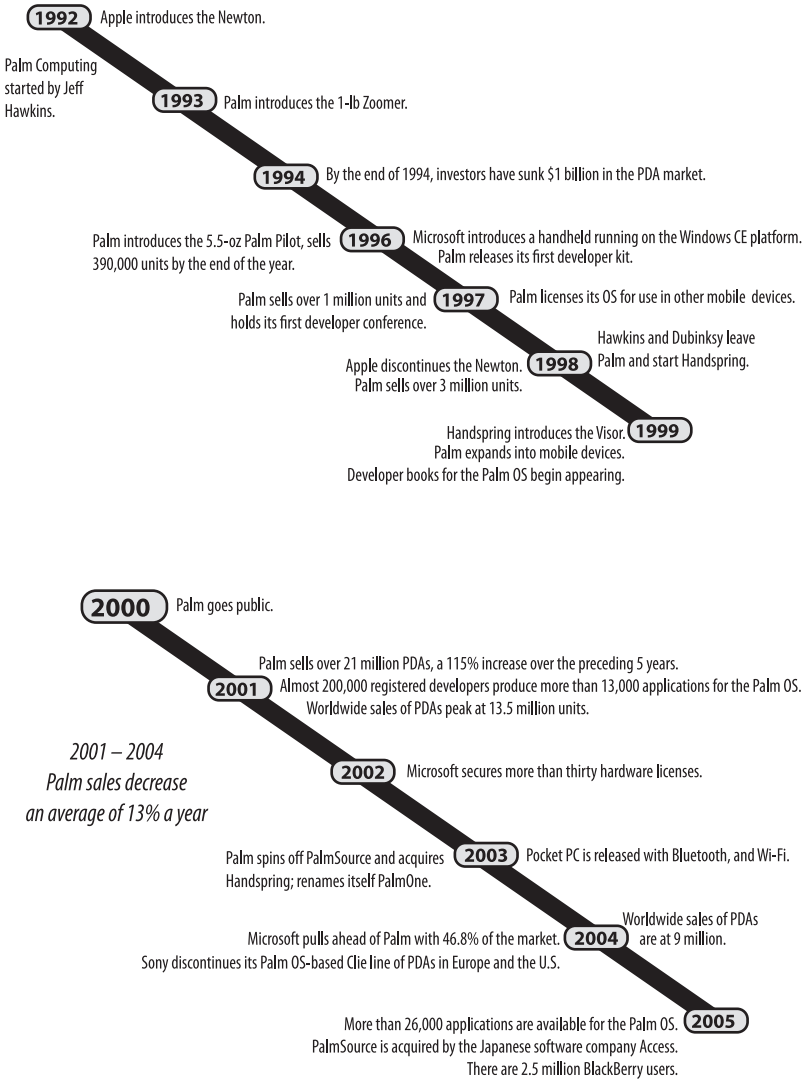
- How PDAs were born and came of age
- Multisided strategies and the "Palm economy"
- Changing patterns of integration over time

During the late 1990s, many a young executive carried a PalmPilot and pecked her appointments into the device's screen using its special handwriting recognition software. PalmPilots were mainly organizers—computerized versions of the once hot FiloFax—that could do a few other things, including email. By 2001 Palm had sold over 21 million of its personal digital assistants (PDAs). Palm's shipments had grown at an average rate of 115 percent in the previous five years. Then growth suddenly stopped and turned into decline. Between 2001 and 2004, Palm sales decreased at an average annual rate of 13 percent. Annual unit sales were more than a million lower in 2004 than in 2003.[2]

1. http://www.uhv.edu/it/IT_staff/quotes.asp.

2. Diana Hwang, "Technology Road Map of Smart Handheld Devices" (IDC report no. 16225), June 1998; Jill House and Diana Hwang, "Pocketful of Palms: The Smart Handheld Devices Market Forecast Update and Outlook, 1999–2003" (IDC report no. 21177), December 1999; Jill House, "Market

Chapter 6: PDA Timeline



This chapter is about the spectacular and surprising rise, and slow but (at least as this is written) uncertain decline of Palm.

It is an interesting story at several levels.

For one, Palm executed a multisided platform strategy with aplomb. It grew quickly as users and developers made it an increasingly valuable platform for each other. It succeeded where many others, including Apple, had failed miserably.

For another, Palm is mainly a software story. Palm got into hardware mainly because it needed to make sure it got the overall initial system right. But its focus was on handwriting software and the underlying operating system. The Palm Economy, as it was called, was built on the Palm OS.

At yet another level Palm illustrates the choices platform providers make in integrating into different elements of the platform. It started out as a pure software company, integrated into hardware, and then divided itself into independent software and hardware companies.

Finally, Palm shows how the flexibility of software and hardware platforms enables them to seize categories quickly but also leaves them open to quick destruction by other categories. PalmPilots were great organizers that did some other things, such as email, well enough. Palm's growth has slowed for a number of reasons, but chief among these is that many consumers prefer great email devices or mobile phones that do organizing well enough.

Mayhem: The Smart Handheld Devices Market Forecast and Analysis, 1999–2004" (IDC report no. 22430), June 2000; Kevin Burden and Alex Slawsby, "Hand Check: The Smart Handheld Devices Market Forecast and Analysis, 2000–2005" (IDC report no. 24859), July 2001; Kevin Burden, Weili Su, Alex Slawsby, and Jennifer Gallo, "Sync or Swim: Worldwide Smart Handheld Devices Forecast and Analysis, 2002–2006" (IDC report no. 26865), April 2002; Alex Slawsby, Randy Giusto, Kevin Burden, Ross Sealfon, and David Linsalata, "Worldwide Smart Handheld Devices Forecast and Analysis, 2003–2007" (IDC report no. 29586), June 2003; Kevin Burden, David Linsalata, Alex Slawsby, and Randy Giusto, "Worldwide Smart Handheld Device 2004–2008 Forecast Update: First Quarter Triggers Downward Revision" (IDC report no. 31554), August 2004; David Linsalata, Kevin Burden, Ramon T. Llamas, and Randy Giusto, "Worldwide Smart Handheld Device 2005–2009 Forecast and Analysis: Passing the Torch" (IDC report no. 33415), May 2005.

Palm could rise again, though. The Palm OS is now competing against other operating systems for smart mobile phones. We leave this transition from PDAs to phones to the next chapter.

The Birth of PDAs

Palm started as a software company. The PalmPilot grew out of its inventor's early interest in handwriting recognition software. Jeff Hawkins (no relation to Trip Hawkins of video game fame) had developed software for recognizing hand-printed characters while at the University of California, Berkeley. He joined GriD, a computer company that was making a device for pen computing, and licensed his PalmPrint software to his new employer. Aimed at the corporate market, the $2,500 4.5-pound GriDPad did not catch on. Nor did other pen-operated computing devices, despite Microsoft's hyped entry into the category.

Hawkins began looking for a market that could be served by his software. He started Palm Computing in January 1992 with the idea of taking his software to consumers. The Zoomer (derived from "consumer") appeared late the next year.[3]

Palm collaborated with three other partners to produce this new small computing device. Casio manufactured it. GeoWorks designed an operating system for it based on its GEOS operating system. Tandy distributed it. And Palm made the application software. AOL and Intuit became partners as well, providing applications.[4]

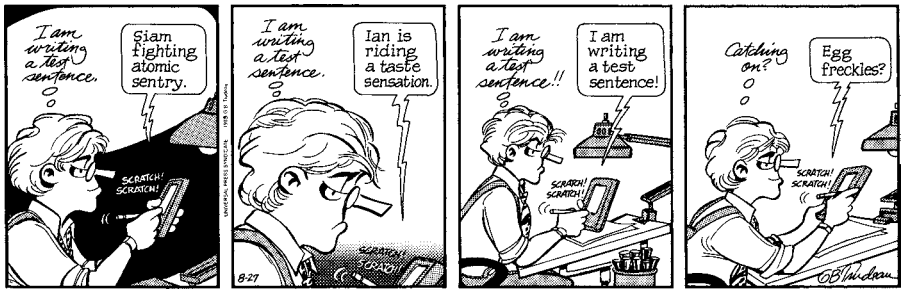
The $700 one-pound Zoomer came loaded with an organizer that had scheduling and address features; a dictionary, spell-checker, and thesaurus; a calculator; and other applications. Intuit provided PocketQuicken for the Zoomer, and AOL provided an email program. Zoomer also came with PalmPrint, which provided the way for users to enter information into the organizer. Unfortunately, this handwriting

3. Andrea Butter and David Pogue, *Piloting Palm* (New York: John Wiley & Sons, 2002), pp. 7, 10.

4. Walter S. Mossberg, "Personal Technology," *The Wall Street Journal*, October 28, 1993; "Tandy, Casio Unveil 'Zoomer' Plans," *Computer Reseller News*, January 18, 1993.

recognition software didn't work well.[5] And the device was loaded with so many features that it was slow. As Jeff Hawkins reflected some years later, "It was the slowest computer ever made by man. It was too big and too expensive. We executed badly."[6]

It was also second to market. Apple had introduced the Apple Newton to great publicity a few months before Palm launched the Zoomer. The $1,000 Apple Newton had the same problems as the Zoomer. Its handwriting recognition software was lampooned in a series of Doonesbury cartoons and an episode of the Simpsons. Apple continued to improve the Newton, but its sales remained dismal—only 85,000 in its first year—and it was discontinued by 1998.[7]



The Newton was a hit, though, compared to the Zoomer. Estimates of sales vary widely, but all reports agree that fewer than 60,000 Zoomers were ever sold. Palm's partners lost interest.[8]

They were not alone. According to an interview with Hawkins's number two, by the end of 1994, venture capitalists and consumer elec-

5. Tom Thompson, Tom R. Halfhill, et al., "Hands-on Evaluations of the Apple Newton MessagePad, Tandy/Casio Zoomer, and the Eo 440 Personal Communicator," *BYTE*, October 1, 1993.

6. http://www.palmloyal.com/modules.php?name=News&file=article&sid=26.

7. John Markoff, "Apple's Newton Reborn: Will It Still the Critics?" *The New York Times*, March 4, 1994; http://www.pdasupport.com/PDAencyclopediaAppleNewton.htm.

8. *PC Week* estimated that 20,000 Zoomers had been sold by November 1993, whereas *PC World* estimated 60,000 units by February 1994, yet *Electronic*

tronics companies had invested $1 billion in the PDA market. No one had anything to show for it.[9] Go, one of the PDA contenders, liquidated itself in 1994. The trade press suggested that PDAs had gone the way of pen-based computers.

The Apple Newton

Like the PalmPilot, the Apple Newton had its roots in software. It became known as the Newton because it was powered by the Newton OS. Apple had been developing the Newton OS as part of a revolutionary new programming environment and operating system based on a "rich object-oriented graphics kernel."[10] The Newton was originally conceived as a sophisticated PC that would be especially useful for architecture and other graphic design uses. Apple reportedly feared the Newton computer would cannibalize Macintosh sales, and diverted the effort toward PDAs.

For developers, Apple offered an object-oriented programming system called NewtonScript. According to one source, programmers complained that "the programming environment was overpriced—on top of purchasing a Newton for nearly $1,000 US [the list price], the Toolbox programming environment cost an additional $1,000 US."[11] Apple developed other toolkits to help application developers and eventually provided the programming environment for free. A number of applications were developed for the Newton; many are still available. Some of these helped transform the Apple Newton into a specialized device for certain businesses or professions. In the medical industry, doctors ran programs like Pocket Doc and Hippocrates to assist with medical records and billing, for instance, and Apple was awarded a $1 million contract to investigate the Newton's use in the medical operations of the Department of Defense.[12]

Engineering Times said no more than 40,000 of the model had been sold by November of that same year. Mike McGuire, "PDA Shipments Are Meeting Goals of Manufacturers and Analysts," *PC Week*, November 8, 1993; James Daly, "Newton PDA Faces Uphill Struggle: Interest in Entire Genre Wanes," *Computer-World*, February 7, 1994; Rick Boyd-Merritt, "PDAs Fall into Disfavor; Concentration on Cellphones, Pagers," *Electronic Engineering Times*, 28 November 1994.

9. Pat Dillon, "The Next Small Thing," *Fast Company*, June 1998 (http://www.fastcompany.com/online/15/smallthing.html).

10. http://en.wikipedia.org/wiki/Apple_Newton.

11. http://www.pdasupport.com/PDAencyclopediaAppleNewton.htm.

12. Mark H. Ebell, "Pocket Doc 1.1," *Journal of Family Practice* 41 (October 1, 1995); Mary Heng, "Apple's Newton Offers Firm A Slice of Software Business," *The Omaha World-Herald*, October 18, 1993, "Apple Computer Gets Defense Contract To Study 'Newton' Use," Dow Jones News Service, December 6, 1993.

(continued)

Apple discontinued the Newton PDA in 1998 as a result of its poor sales in the face of the PalmPilot's success. Apple had initially planned to continue the development of the Newton OS, which was designed to work in small mobile devices. However, after Steve Jobs returned to lead the company, it decided to focus its operating system development on the Mac OS and to develop a version of this for small devices. As it turned out, Apple has not become a competitor in this arena. It bought an operating system from another vendor for its iPod device, as we discuss in Chapter 8.

Palm, on the other hand, regrouped. It surveyed Zoomer buyers to find out what they liked and didn't like, what they used and didn't use:

> What these people said opened the company's eyes. More than 90% of Zoomer owners also owned a PC. More than half of them bought Zoomer because of software (offered as an add-on) that transferred data to and from a PC. These were business users, not retail consumers. And they didn't want to replace their PCs—they wanted to complement them. People weren't asking for a PDA that was smart enough to compete with a computer. They wanted a PDA that was simple enough to compete with paper.[13]

Making the Market

Palm couldn't find partners interested in pursuing its new vision of the PDA. Making a virtue out of necessity, Palm decided to go it alone and became a vertically integrated PDA maker.

Development of the PalmPilot

Reflecting on the failure of the Zoomer, Palm decided that to be successful a device had to adhere to several principles. The software had to be simple so the device could run quickly enough. The device had to be small enough to fit into a shirt pocket. And it had to be cheap.

Handwriting recognition software had to recognize a wide variety of writing styles. That necesssarily required complex code. And at the time

13. Dillon, "The Next Small Thing."

even the best handwriting software—the software in the Newton was state-of-the-art—was not very good. Palm decided to reverse the logic. Rather than having software learn how to recognize people's handwriting, have people learn how to write for the device. Hawkins argued that it was easier to teach people to learn a single new writing style than to write software that could recognize their many individual writing styles.

This insight led to the development of Graffiti. Each letter is based on a single stroke, so that an A is written as an inverted V and an F as an inverted L. The simple style made the software efficient and accurate, although of course it required users to go to the trouble of learning this odd script.

The original PDAs were like bricks. The Zoomer weighed a pound and the Newton 0.9 pounds. The Newton was 7.25 inches × 4.5 inches × 0.75 inches. Neither could fit into a shirt pocket. Hawkins reportedly paced the Palm halls, measuring employee pockets against balsa wood prototypes. Palm's new device weighed about 5.5 ounces and measured 4.6 inches × 3.1 inches × 0.6 inches.[14] Its volume was just over a third of the original Newton's.

Hawkins complained that his business partners for the Zoomer had kept insisting on adding more and more features to the product. That's one reason it was large, cumbersome, and slow. Simplicity was key in Palm's second act. The basic applications were a calendar, an address book, a to-do list, and a memo writer, along with easy connectivity to and synchronization with PCs.

The target price for the product was $299.

Starting as a Single Silo

Palm's lead investor advised Hawkins to become a "self-sufficient company that designed, built, and marketed" the new PDA.[15] Rather than taking on partners, as it had done with the Zoomer, Palm outsourced the hardware design and manufacturing to other companies while it focused on the operating system and applications. Palm still

14. http://www.pdasupport.com/Newton.htm; Rich Schwerin, "Portable Pocket Assistant," *PC/Computing*, March 1, 1996.

15. Dillon, "The Next Small Thing."

needed help with marketing. It approached US Robotics, then a leading PC modem manufacturer, about becoming a partner. US Robotics offered instead to buy Palm for $44 million in stock. Palm accepted and became a division of US Robotics.

Several commentators have suggested that Hawkins and his colleagues were not interested in pursuing a platform strategy. Yoffie and Kwak quote Hawkins as saying in the context of competition with Microsoft: "We are not about the operating systems. . . . we are about a highly integrated product that delivers an end user results. . . . In all honesty, if Microsoft walked in today with a great environment that we could build great products on, we'd absolutely consider it."[16] That comment seems dubious in light of Palm's past as a software company through 1995 and its aggressive software platform strategy after 1996. And we doubt that Palm would have wanted to become another Windows CE device manufacturer any more than Apple would have wanted to become yet another manufacturer of Wintel PCs. Instead, it appears that Palm integrated into hardware in part because it wanted to maintain its revolutionary design vision and in part because it had little choice.

The 5.5-ounce PalmPilot debuted in April 1996. Consumers and reviewers agreed that Palm had gotten it just right. Palm sold 390,000 units by year end and could barely keep pace with demand.[17] According to one review, "If you're searching for the ultimate palm-size organizer, look no further."[18] Graffiti was also a hit. Some called it the killer application for the Palm, although it was part of the software platform rather than an application. It was a user interface that had value only because it made it easy for consumers to use the applications on the device.

The PalmPilot quickly dominated the PDA category. It garnered almost one-third of PDA shipments in 1996, and became the market leader only a year after being introduced. It had sold over 1 million units by the end

16. Annabelle Gawer and Michael A. Cusumano, *Platform Leadership*, 2002, p. 195.

17. Diana Hwang, "Technology Road Map of Smart Handheld Devices."

18. Schwerin, "Portable Pocket Assistant."

of 1997 and over 3 million by the end of 1998. Its market share climbed to just over 65 percent by 2000 before it started falling as a result of increased competition (mainly from Windows CE-based devices) in PDAs. Table 6.1 shows how the different PDA software platforms fared in market share terms from 1996 to 2004.

The fact that Palm had produced a breakthrough device was important to its success. But so too was its low-price strategy. At $299 it was one of the least expensive PDAs available. Apple was still asking about $1,000 for its Newton. Donna Dubinsky, Hawkins's right-hand person at Palm, later emphasized that the low price was important to get penetration and secure network effects, a point we return to later. Like the iPod and BlackBerry devices, Palm's PDA became a cultural icon. In 2000, the supermodel Claudia Schiffer released a Palm Vx Claudia Schiffer Edition through her Web site.[19]

Palm made the market for PDAs. Most of the early makers with their own operating systems, such as Apple, exited the business. Palm soon faced competition from Microsoft, which had developed Windows CE for handheld devices. Microsoft followed its traditional strategy of focusing on the software platform and encouraging computer manufacturers to make devices based on it. Moreover, Palm had to endure the management problems that resulted from 3Com's disastrous acquisition of US Robotics in 1997 and the difficulty that Palm's key employees had in working within large established organizations. Hawkins and Dubinsky left Palm in mid-1998, and many of the key engineers and managers left within the next year. Within 3Com, Palm had four presidents over the next year. Nonetheless, Palm managed to maintain its lead in traditional PDAs until 2004, as Table 6.1 shows. But it was a lead in a shrinking category.

Disintegration

Palm started moving away from its single silo approach in late 1997, when it decided to license the Palm OS for other mobile

19. Ian Fried, "Palm Shows New OS with Wireless Voice, Data Feature," CNET News.com, December 12, 2000.

Table 6.1
Market Share by Operating System

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Palm	25.7%	34.2%	46.3%	60.6%	66.5%	55.1%	57.5%	51.0%	46.0%
Microsoft Powered	4.5%	17.5%	25.8%	19.3%	16.6%	16.6%	23.3%	38.0%	46.8%
EPOC	19.0%	12.2%	8.3%	8.5%	—	—	—	—	—
Synergy (Zaurus)	32.5%	15.2%	—	—	—	—	—	—	—
Newton	4.4%	—	—	—	—	—	—	—	—
Linux	—	—	—	—	0.3%	0.1%	1.1%	1.6%	1.1%
DOS	10.1%	1.2%	0.5%	0.3%	—	—	—	—	—
Other	3.9%	19.9%	19.1%	11.4%	16.7%	28.1%	18.0%	9.5%	6.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: IDC reports.

devices, such as bar code scanners, smart cards, and mobile phones.[20] Palm soon signed up Symbol, Nokia, Sony, and Motorola.

Even more aggressive licensing followed, partly precipitated by disagreements between Palm's founders, Hawkins and Dubinsky, and 3Com's management. The pair tried to persuade 3Com to spin off the Palm division. When it refused, they decided to leave. They persuaded 3Com to grant them a license to the Palm OS. (Ironically, 3Com's leaders had earlier advocated licensing the Palm OS widely, but Hawkins and Dubinsky had opposed this.) They started a new company called Handspring in October 1998 and introduced the Visor PDA the next year;[21] they focused on innovative hardware design.

Meanwhile, 3Com decided to spin Palm off as a separate company that would license the Palm OS to other PDA manufacturers. In the next five years these would include Handspring, Sony, Kyocera, Nokia, Symbol, and Qualcomm. Hardware makers like Handspring produced popular models running the Palm OS. The Handspring Visor Deluxe, released in 2001, came with a springboard expansion slot that was not a part of Palm's PDAs. This expansion slot allowed owners of the Handspring Visor Deluxe to attach other hardware modules to make their PDA a pager, mobile phone, or voice recorder. The Handspring Visor Deluxe was also available in five colors. By 2001, the Palm OS was on 55 percent of PDAs sold that year; and 40 percent of those were not made by Palm.[22]

Palm went public in 2000. A year later Palm divided itself into two companies—one making and licensing the operating system and the other making the hardware—although both were still under common ownership. The rationale for the separation was that hardware manufacturers would be more comfortable licensing the Palm OS

20. "In the Palm of its Hand: Why Windows CE Has Been Unable to Unseat the Palm Operating System," Red Herring, December 1, 1998.

21. Stephanie Miles, "PalmPilot Creators Form New Firm," CNET News.com, November 6, 1998; Dawn Kawamoto, "New Handheld Device Firm Formed," CNET News.com, October 9, 1998 (http://news.com.com/New+handheld+device+firm+formed/2100-1001_3-216527.html?tag=st.rn).

22. Alex Slawsby, Randy Giusto, Kevin Burden, Ross Sealfon, and Dave Linsalata, "Worldwide Smart Handheld Devices Forecast and Analysis, 2003–2007."

from a company that didn't compete with them.[23] It completed this process of disintegration in 2003 when it spun off the operating system as PalmSource. Palm, the remaining hardware company, acquired Handspring and renamed itself PalmOne. PalmOne received a license to the Palm OS (which it renewed in May 2005 through 2009) and agreed that if it used a different operating system it would not brand its PDA as Palm.

This last and radical step was supposed to enable the Palm OS to be licensed widely, giving it the scale necessary to face growing competition from the charging legions of Windows CE–based devices. However, when we asked David Nagel, until recently CEO of PalmSource, his view was that the separation of Palm was too slow (it took about two years) and was completed too late. With Palm's purchase of Handspring and Sony's decision to discontinue sales of its Palm OS–based PDAs in Europe and the United States in 2004 (and Japan in 2005), the fortunes of the Palm OS software platform remained essentially tied to a single hardware maker, PalmOne.

Meanwhile, by 2004 the market was rife with rumors that PalmOne was about to release devices based on Windows CE, which would end its exclusive allegiance to the Palm OS software platform. That year, the Palm OS's share of sales for PDA devices fell behind Windows CE for the first time.

Although the formal announcement that PalmOne would build devices running on Windows CE did not come until September 2005 (and no such device has been sold as of this writing), this lingering rumor weakened PalmSource considerably in the eyes of investors and consumers. This led to the purchase of PalmSource by the Japanese software company Access in September 2005 for about $324 million.[24] On the one hand, this acquisition reflected investors' lack of confidence that the Palm OS could survive as a stand-alone software platform. On the other hand, Access's prominence in software for mobile devices

23. Authors' interviews with David Nagel, CEO of PalmSource, December 2001 to May 2005 passim; Piu-Wing Tam, "Palm Plans Split Into Two Firms: Holders Will Be Asked to Approve Separation of Gadget Division from Company's Software Unit," *Wall Street Journal Europe*, October 28, 2003.

24. http://www.palmsource.com/press/2005/111405_access.html.

may breathe new life into the Palm OS and help it break into other domains of mobile computing beyond PDAs. Indeed, Access produces the highly regarded NetFront Web browser for use on a variety of electronic devices (from digital television to car navigation systems), the most prominent of which are NTT DoCoMo's third-generation i-mode mobile phones, which we will encounter in the next chapter.[25]

Palm's Platform Strategy

Palm adopted a sophisticated multisided platform strategy to secure its position in handhelds. According to Dubinsky, "We are a platform business. The idea in the beginning of a platform business is to get as much market share and installed base as possible, to draw as many developers as possible."[26]

The tactics were similar to those we have seen already for PCs and video games: adding features that helped software companies develop valuable applications, providing them with tools and other assistance for writing programs, and evangelizing the platform.

Palm supported developers from the beginning of its introduction of the PalmPilot. In early 1996, it released its first software development kit (SDK) for developers. This free software included the source code for the applications it had bundled with the Palm, including the calendar, to-do list, address book, and memo pad. Developers could use these applications as reference models for building their own application. As Dubinsky explained,

> This [application] source code was in the SDK, so [it] was under a license, but a royalty-free license. We found many developers that took advantage of this. Some would just use the source code for specific elements, such as picking up the code for a scroll bar. Others looked at it as sample code, and others took a whole application and created an enhanced version.[27]

25. It is noteworthy that as of November 30, 2005, NTT DoCoMo has increased its investment share in Access from 7.12 percent to 11.66 percent (http://www.nttdocomo.com/presscenter/pressreleases/press/pressrelease.html?param%5Bno%5D=597).

26. Gawer and Cusumano, *Platform Leadership*, p. 198.

27. Gawer and Cusumano, *Platform Leadership*, p. 199.

The Palm OS included software services made available to developers through APIs. Like the PalmPilot itself, the API-based services were simple but highly functional. Although there were few frills, the APIs gave developers access to a rich set of tools to use to build programs. Palm also provided documentation, white papers, frequently asked questions, tech notes, a tutorial, and an emulator environment through its Web site. By 2000, Palm was also making its Conduit Development Kit available for free; it had cost $99 just a year previously.[28] (Each application designed for a Pilot has two parts: the part that runs on the handheld, and the "conduit," which allows the handheld application to sync with a computer. Palm included a default conduit in the operating system, so that if a developer did not design a specific conduit portion of his or her application the Palm would still synchronize the relevant data.)

Within 18 months of its introduction in 1996 Palm had gotten developers on board its platform. According to an article in *Wired*, "On its way to becoming the bestselling handheld computer of all time, the 3Com PalmPilot has spawned an intense, emotional, and fanatical developer following not seen since the glory days of the Mac."[29] By then there were hundreds of third-party applications for the PalmPilot.[30] Books geared for developers who wanted to write programs for the Palm OS started appearing. *Palm OS Programming: The Developers Guide*, for example, was published in January 1999.

After Palm had established itself as the leading PDA, it started to spend more effort on evangelizing its operating system. It held its first developer conference in late 1997. Palm also offered business development

28. Neil Rhodes and Julie McKeehan, *Palm Programming: The Developers Guide* (Sebastopol, Calif.: O'Reilly & Associates, 1999), pp. 19, 27–29; Robert Mykland, *Palm OS Programming from the Ground Up* (Berkeley, Calif.: Osborne/McGraw-Hill, 2000), pp. 389–390.

29. "How PalmPilot Became a Hacker Cult," *Wired*, February 20, 1998.

30. In March 1997, only 11 months after its introduction, there were 180 applications for the PalmPilot ("Personal Organizer: U.S. Robotics Adds Support to Palm OS Enabling Development of Internet- and Network-Based Software Applications; More than 2,000 Developers Creating Software for PalmPilot Connected Organizers," EDGE: Work-Group Computing Report, March 17, 1997), later articles just generalize to hundreds. "3Com Corporation Releases Spanish Language Version of the Best-Selling PalmPilot Professional Edition Connected Organizer," *Business Wire*, November 3, 1997.

resources to developers, including joint development, marketing, and bundling. By 1998 it had 3,595 registered developers. In 2000, Palm launched PluggedIn@Palm, a program providing resources and advice to its developers. During the same year, Palm also set up a $50 million venture capital unit called Palm Ventures to support businesses focusing on Palm OS applications. It offered Palm OS development classes regularly and encouraged other activities among its community of users through developer portals.[31]

The growth in developers is shown in Figure 6.1. In 2001 there were almost 200,000 registered developers of software applications, who had

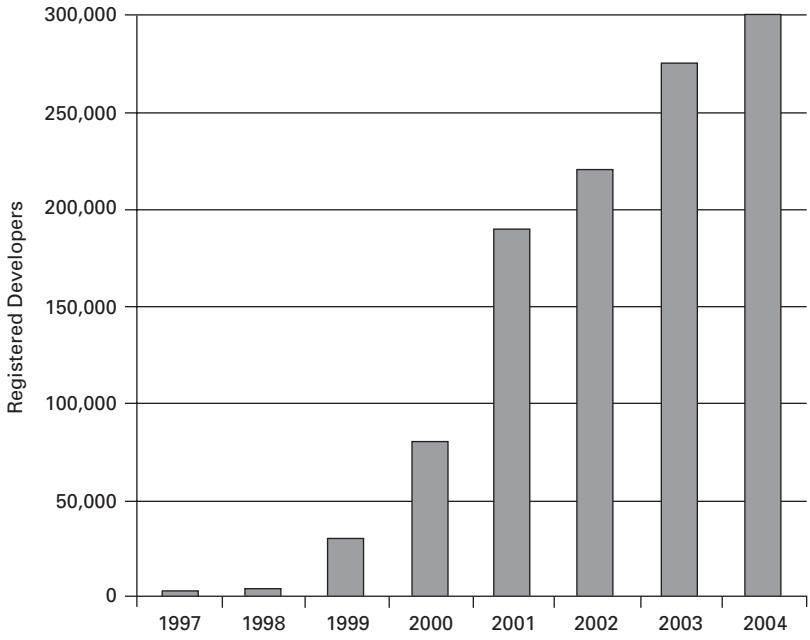


Figure 6.1
Growth of Palm registered developers. (Source: Palm press releases and SEC filings.)

31. http://www.palmone.com/us/company/pr/1998/devpr.html; http://www.palmone.com/us/company/corporate/timeline.html; Richard Shim, "Microsoft Crashes Palm Developer Party," CNET News.com, December 7, 2000; Gawer and Cusumano, *Platform Leadership*, pp. 203–206.

Table 6.2
Selected Top-Selling Palm OS Applications

2004	2005
SplashID (information security)	AOL (account access)
Splash Wallet Suite (productivity apps)	Agendus Professional Edition (PIM enhancement)
Agendus Standard Edition (PIM enhancement)	Ringo Pro (ringtone manager)
Agendus Professional Edition (PIM enhancement)	Agendus for Windows Outlook (contact manager)
Diet & Exercise Asst. (fitness and diet manager)	PocketMirror Std. (Outlook synchronization)

Source: Handango.com.

produced more than 13,000 commercial applications for the Palm OS. The existence of a large variety of applications was integral to fueling further sales of Palm OS PDAs. Applications like those listed in Table 6.2 encouraged consumers to purchase PDAs running the Palm OS. As of February 2005, people could choose from over 26,000 applications for the Palm OS.

PalmSource has continued to pursue an aggressive two-sided platform strategy since Palm spun off this operating system company. It had 400,000 registered developers as of April 2005. It courts these developers in several ways. First, it provides them a range of development tools. The Palm OS Developer Suite, for example, "provides a convenient and streamlined path to create compelling, robust, and professional applications for Palm OS smart phones and traditional Palm OS devices."[32] These tools are all available at no charge. However, PalmSource offers additional priority access to certain developers' tools through its Inside Track program for a $149 annual fee. Second, it maintains regular contact with developers through conferences and other ways. Its recent developer conference in May 2005 attracted over 1,000 developers. Third, it hosts a software store on its Web site that helps promote the sale of third-party applications.[33]

32. http://www.palmos.com/dev/tools/dev_suite.html.

33. The Palm OS Developer Suite is free to members of the Palm OS Developer's Program, which is free to register for at the lowest level (http://www.palmos.com/dev/programs/pdp/). http://www.palmos.com/dev/programs/insidetrack/learn.

As a result, developers continue to write applications for the Palm OS. More than 650 new applications appeared in the first quarter of 2005. Recent arrivals in 2005 include the Galaga game, for $14.99, and a free guide to the FIFA World Cup football (soccer, for American readers) championship.[34]

From a two-sided platform pricing perspective, Palm has therefore followed the model of PC operating system vendors such as Microsoft. Palm (and later PalmSource) charges software and hardware developers little or nothing for the various forms of support it provides.[35] And, just as Microsoft charges computer manufacturers a licensing fee for installing Windows on computers, PalmSource charges a license fee of approximately $11 per PDA for its Palm OS. In both cases, we would expect manufacturers to pass most of these fees on to end users. From 2002 to 2004, PalmSource made an average of 93 percent of its revenues and 96 percent of its gross margins from licensing and royalties on its Palm OS and therefore, in effect, from end users. Palm received the remaining 7 percent of its revenues and 4 percent of its gross margin from developer and manufacturer support.[36] As with all the software platforms we

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html; "Palmsource Affirms Linux Commitment," Linuxdevices.com, May 24, 2005; http://palmsource.palmgear.com/.

34. PalmSource 10-Q, January 2005, p. 9; PalmSource 10-Q, April 2005, p. 41; PalmSource 10-Q January 12, 2005. http://www.handango.com/SoftwareCatalog.jsp?siteId=1&jid=46AF5AX2F73CACD44A29426F29CDF764&platformId=1&N=96804&Ntk=All&Ntt=Galaga; http://www.freewarepalm.com/database/fifaconfederationscup2005.shtml

35. One could, however, argue that venture capital support to (selected) developers possesses a variable fee dimension, since it provides Palm with an equity position in these firms. This would generally enable it to capitalize on at least some successful complements, much as video game console makers capitalize on successful games through royalties. We were unable to find any detailed data regarding the funding deals made by Palm Ventures; this suggests that net revenues from venture capital deals are small compared to revenues from licensing the Palm OS.

36. We can approximate the royalty fee by taking the revenue from royalties (e.g., $15,952,000 for three months ending May 2005) and dividing by number of devices shipped in that same time period (e.g., 1.4 million), for an average royalty of $11.40 per device (PalmSource 8-K, March 2005; PalmSource 10-K 2004). Gross margin here is computed by dividing total revenue minus cost of revenue by total revenue from each business section.

encounter in this book, the business model is based on highly skewed pricing.

Windows CE

Following launches by Apple, Palm and other PDA manufacturers, Microsoft made its own entry into the handheld device market in November 1996 with Windows CE, a new operating system for small, handheld computers.[37] And, like Palm, Microsoft didn't get it right from the beginning. Microsoft spent five years and three iterations building a software platform that could compete with the Palm OS for PDAs.

Initially, Microsoft's lack of integration and reliance on third-party hardware manufacturers seemed to be a relative disadvantage. Following its customary PC-like approach, Microsoft developed the software platform and teamed up with computer makers that produced devices based on its hardware specifications. However, until the release of Windows CE 3.0 and Pocket PC 2000, Microsoft and the computer makers had concentrated their efforts on the "wrong" handheld platform. They were building handheld PCs, a rather bulky and expensive species, closer to PCs than to true pocket-size PDAs like the PalmPilot. Microsoft even avoided using the term "PDA" and preferred talking about "PC companions" and later about "Palm-tops." The Windows CE software platform itself was viewed as too complex for the needs of PDA users, especially when compared to the simplicity of the Palm OS.

Despite Microsoft's having six big-name computer manufacturers—Casio, Compaq, HP, LG, NEC, and Phillips—on board, fewer than 500,000 Windows CE-based handheld PCs were sold in 1997.[38] Palm,

37. Contrary to what is commonly believed, Windows CE was built from the ground up and was not a trimmed-down version of Windows 98 (http://www.hpcfactor.com/support/windowsce/). Stephanie Miles, "Microsoft Unveils Anticipated Pocket PC for Handhelds," CNET News.com, April 19, 2000.

38. Windows CE was started as the project Pegasus within Microsoft. OEMs were selected based on the work carried out up to the fourth beta (i.e., preliminary) release of the new operating system. http://www.hpcfactor.com/support/windowsce/; Jill House and Diana Hwang, "Pocketful of Palms: The Smart Handheld Devices Market Forecast Update and Outlook, 1999–2003" (IDC report no. 21177), December 1999.

by contrast, sold almost one million units that year. Over the next three years, Palm's PDA sales rose spectacularly, while sales of Windows CE devices were sluggish. From 1997 to 2000, shipments of Palm-powered PDAs exceeded those of Windows CE–based devices by an average of one million units per year.

Failure to attract end users meant that Windows CE also had a hard time getting developers on board. Ed Colligan, vice president for marketing at Palm, put it very plainly: "They'd offer funding for the initial development. They [Microsoft] held all the development kitchens. They always put on a big dog-and-pony show, and we our little nothing thing. [. . .] In the end, all the schmoozing and all the tools and all those things really don't matter if the products aren't selling."[39]

Faced with a stagnating platform, Microsoft shifted gears. In the Pocket PC operating system and corresponding hardware specifications that it released in April 2000, it abandoned the familiar desktop Windows look in favor of a simpler GUI better adapted for PDAs.[40] The devices were no longer to be called Palm-tops but Pocket PCs. Microsoft's hardware partners took advantage of the new software platform to release smaller PDAs, such as HP's Jordana and Compaq's iPAQ.

The sleeker Pocket PC platform has permitted Microsoft to compete with the Palm OS and its entourage. Microsoft offered comprehensive development tools such as Platform Builder 3.0 and eMbedded Visual Tools 3.0, which allowed developers and hardware manufacturers to build "rich embedded devices that demand dynamic applications and Internet services."[41] For example, Pocket PC sported an upgraded version of Windows Media Player, a new Internet browser, and improved email software.

39. Gawer and Cusumano, *Platform Leadership*, pp. 199–200.

40. Pocket PC was the direct successor of Windows CE 2.0 (September 1998) and 3.0 (April 2000). These latter incarnations of the Windows CE software platform were modular, enabling hardware makers to pick the parts they needed and use them to power a variety of devices, including ATMs, cars, video game consoles such as Sega's Dreamcast, and even kitchen utensils. Miles, "Microsoft Unveils Anticipated Pocket PC for Handhelds."

41. http://members.fortunecity.com/pcmuseum/windows.htm.

Still, Palm's lead remained more than comfortable. In 2001, end-user market shares were 55 percent for Palm versus 16 percent for Pocket PC.[42] At the time, Palm OS had about 190,000 developers providing 13,000 commercial applications, whereas Pocket PC had only 1,600 developers. And Palm devices remained significantly cheaper, starting as low as $99, while Pocket PCs did not go below $200.[43]

Microsoft intensified its efforts on all fronts. It started courting PDA software developers more actively, in particular those that had been supporting the Palm OS platform exclusively and had been a major source of the latter's strong competitive advantage over Windows CE. For example, Vindingo, the vendor of the popular electronic city guides on Palm, decided to start offering them on Pocket PC devices as well in 2001.

Microsoft expanded the number of its hardware licensees from six in 2000 to more than thirty in 2002, and it added major hardware makers such as Toshiba, Dell, Gateway Computers, Samsung, and JVC. Some of these computer manufacturers started making inroads into the low-cost PDA category, long Palm's exclusive territory.[44]

Most important, over time Microsoft integrated a number of new features into its software platform that made it particularly attractive for corporate mobile workers. The 2001 and 2003 subsequent releases of Pocket PC added virtual private networking, instant messaging, remote control of office PCs, and the wireless technologies Wi-Fi and Bluetooth. Microsoft also made the hardware specifications for Pocket

42. Although some sources claim that Palm had a 71% market share in 2001 and Pocket PC had only a 15% share, these figures are based on a more narrow definition of the handheld market. http://palmtops.about.com/cs/pdafacts/a/Palm_Pocket_PC_p.htm; Alex Slawsby, Randy Giusto, Kevin Burden, Ross Sealfon, and Dave Linsalata, "Worldwide Smart Handheld Devices Forecast and Analysis, 2003–2007."

43. Arthur Gasch, "Receiving Stations to PDAs, New Products Set the Pace at ACEP (Personal Digital Assistants) (American College of Emergency Physicians)," *The BBI Newsletter*, January 1, 2003; http://www.palmsource.com/press/2002/012102.html; http://palmtops.about.com/cs/pdafacts/a/Palm_Pocket_PC_p.htm.

44. Richard Shim, "Microsoft Extends Hand on Low-Cost PDAs," CNET News.com, November 11, 2002; Mitch Irsfeld, "New Foodservice Tools Could Flow from Microsoft's Expanded PDA Initiative," *Nation's Restaurant News*, May 29, 2000.

PCs more stringent, requiring its licensees to use more powerful microprocessors.[45]

These additions and improvements were a key factor in raising Pocket PC's fortunes against Palm OS. Windows pulled ahead, with a full-year market share of 46.8 percent, compared to Palm's share of 46.0 percent in 2004.[46]

Palm emphasized simplicity and ease of use when it started. That was a wise re-entry strategy, given the failure of the bulky Newton and Zoomer. Microsoft focused on providing lots of features. That didn't help at first. But as happened with Windows, the hardware platform eventually caught up to the software platform. The learning and development of the richer platform eventually paid off, enabling Microsoft's Pocket PC to close the gap with the Palm OS.

The BlackBerry

The other significant competitor to Palm, attacking from a different angle, is the BlackBerry handheld device, the product of the Canadian firm Research in Motion. BlackBerry—also known as CrackBerry, an allusion to its addictive nature—is a PDA, the star feature of which is mobile email: users send and receive their email through the device's always-on wireless connection. The mere access to email, however, did not make BlackBerrry unique or drive its popularity. Its killer feature has been that email is "pushed" onto the device as soon as it arrives at the server, while users of other PDAs have had to contact their server to see whether they had email. While well-known, especially to likely readers of this book, the BlackBerry remains a niche product. There were 5 million BlackBerry users in May 2006.[47] RIM produces the devices, then sells them either directly, in bunches, to companies, which can also buy RIM's email software to integrate with their corporate email servers, as well as to mobile network operators, which then resell them to their customers, just as they do with mobile phones.

45. http://news.com.com/Pocket+PC+2002+debuts/2100-1040_3-273912.html; http://news.com.com/Microsoft+preps+new+handheld+OS/2100-1041_3-1015726.html.

46. David Linsalata, Kevin Burden, Ramon T. Llamas, and Randy Giusto, "Worldwide Smart Handheld Device 2005–2009 Forecast and Analysis: Passing the Torch."

47. http://www.blackberry.com/news/press/2006/pr_30_05_2006_01.shtml.

(continued)

Like Palm, RIM started by selling Blackberries as fully integrated systems: hardware plus software. The company manufactures the hardware and has developed a proprietary operating system that takes advantage of the device's unique input system, particularly its thumbwheel. In addition, RIM licenses the BlackBerry Enterprise Server (BES) software, which allows organizations to integrate their employees' BlackBerry devices with their email system. In other words, if your company does BlackBerry, then you have a small box on your corporate email server that handles email transit to and from BlackBerries and also ensures that emails sent from a user's BlackBerry will also appear in his PC mailbox. There are versions of BES for most major email servers: Microsoft Exchange, Lotus Domino, and Novell Groupwise.

Initially, RIM provided all BlackBerry applications bundled with the device. Recently, however, the rising popularity of the device has attracted many third-party applications software providers, which have turned the BlackBerry into a true two-sided platform, very similar to the way in which Palm became two-sided. RIM seems to be following in Palm's footsteps with respect to its hardware strategy as well. In an effort to expand the market for its technology, the firm recently started licensing the BlackBerry software (the operating system and BES) to prominent mobile phone manufacturers such as Nokia, Motorola, and Samsung.[48] The devices built by the latter are therefore competing against the BlackBerry, just as PDAs running Palm OS and built by Sony and Handspring were competing against Palm's own Pilot. RIM's hope seems to be to move into the mass market and focus more on the software platform and related services, as the hardware becomes commoditized.

Like Palm and all other software platforms we have encountered except for video games, RIM derives the largest share of its revenues from end users, either directly (through sales of BlackBerry devices, licensing of the BES software and subscription revenues) or indirectly (through licensing of the BlackBerry operating system to third-party handheld manufacturers). For example, in 2004, handhelds accounted for 57.7 percent of BlackBerry's revenues; the remainder came from service (28.8 percent) and software (13.5 percent).[49] The service revenues came from individual subscribers to the BlackBerry Wireless Solution: either they are collected directly from the customer or the customer pays a third-party carrier that in turn pays BlackBerry. The software revenue comes from the licensing of BES, maintenance, and upgrades.

48. "Attack of the BlackBerry Killers," *The Economist*, March 17, 2005.

49. http://www.rim.net/investors/pdf/2004rim_ar.pdf.

(continued)

This is not surprising given that RIM charges very low (if any) prices to independent software developers. The SDK and the emulator are downloadable free of charge from BlackBerry's Web site. The only restriction imposed by RIM is that certain controlled APIs must be "signed" in order to become functional on a BlackBerry handheld. To obtain and use these controlled APIs, developers must register and pay a $100 registration fee.[50]

Bundling

Much of the competitive dynamics between Palm and its rivals and much of the innovation that has taken place in PDAs has involved bundling new features. The holy grail of PDA makers has been a collection of features that consumers wanted in a handheld device that could deliver them well. The Apple Newton and Zoomer failed because they misjudged the applications that people ultimately cared about and because they bundled more into their products than the hardware could deliver well. The same goes for Microsoft and its Windows CE hardware licensees before Pocket PC came on the market.

The PalmPilot was the first PDA to strike the right balance between the key applications that consumers wanted and the device speed that made these applications attractive. One of the key features that Palm included—and that was copied by all that followed—was PC connectivity. Consumers wanted to be able to move data between their PCs and PDAs and, most important, to synchronize their address books and calendars. That required bundling software and hardware features to make this possible. The PalmPilot came with a cradle in which the user put the device to sync it with the user's PC.

Table 6.3 shows the history of key product features for users in PDAs from 1993 to 2004. (A similar set of features offered to developers was included in the operating system.)

50. http://www.blackberry.com/developers/downloads/jde/api.shtml.

Table 6.3
Timeline of major features added to PDAs

	Operating System	Capabilities
1993	Apple Newton, Palm Zoomer	Handwriting recognition, Infrared beaming, Organizer, Address book, Dictionary, Thesaurus, Spellcheck, Calculator
1996	Palm OS 1, Windows CE 1.0	Graffitti handwriting recognition, computer synchronization, Basic email, Spreadsheet, Word processor, Expansion cards, Networking
1997	Palm OS 2, Windows CE 2.0	32-bit color, on-screen keyboard, True Type fonts, TCP/IP and Ethernet support
1998	Palm OS 3, Windows CE 2.1	USB support, Network printing, Better audio support, Encryption, Device-device synchronization
1999	Windows CE 2.12	Wireless networking, Text messaging
2000	Palm OS 3.5, Windows CE 3.0: Pocket PC 2000 Edition	Media Player, HTTP Server, Language localization, XML support, E-Book support
2001	Palm OS 4, Windows CE: Pocket PC 2002 Edition	Bluetooth support, Third party 128-bit encryption, 160 × 160 resolution, MP3 playback
2002	Palm OS 5, Windows CE 4.0	Voice recording, 320 × 320 resolution, Camera
2003	Palm OS 6, Windows CE 4.2	Basic voiceover IP, Java virtual machine
2004	Palm OS 6.1: Cobalt, Windows CE 5.0	USB on-the-go support, Asian language, QVGA, HVGA resolution

Convergence of Categories

The worldwide sales of PDAs peaked in 2001 at 13.5 million units. It fell to 9 million units as of 2004.[51] It is generally expected to continue to fall.

This decline illustrates some important principles about computer-based platforms in general and software platforms in particular. These platforms are bundles of features that appeal to different users for

51. David Linsalata, Kevin Burden, Ramon T. Llamas, and Randy Giusto, "Worldwide Smart Handheld Device 2005–2009 Forecast and Analysis.

different reasons. It is easy to add or subtract features. The PDA was originally conceived of as a bundle of hardware and software features that would compete with PCs. The idea was that some people didn't need all the power that came with a PC and would be happy with something smaller that did less. That assumption was wrong. People didn't like the feature bundles they got from the Newton or Zoomer. After Zoomer, Palm tried a different bundle of features that turned out to give consumers what they wanted: a complement to their PCs rather than a substitute.

It turns out, however, that the PDA was a much less stable category than video games or PCs. People liked handheld devices, but over time they found other bundles of characteristics more appealing than those that came with a PDA. The RIM BlackBerry has been a major turn-of-the-century hit. These handheld devices mainly send and receive email, but they can organize contacts and maintain calendars as well. They have their own operating system, and RIM is pursuing its own platform strategy, as we saw above. A more important hit has been mobile phones—or, more precisely, smart mobile phones, which have operating systems and can run applications. As a result of this competition, PDAs and BlackBerries have started bundling mobile telephone features. The PalmOne Treo 650 smart phone has all the capabilities of a PDA: organizer, messenger, Web access, and Bluetooth technology.

As the Treo shows, Palm OS isn't limited to running PDAs. Palm diversified into other mobile devices in late 1999, as we noted earlier. As the smart mobile telephone business has taken off, Palm has increased its efforts to persuade phone manufacturers and wireless carriers to rely on its operating system. There are advantages (the large base of Palm applications and end users familiar with them) and disadvantages (there are other operating systems that were designed specifically for mobile phones) to doing so. Palm secured a 6 percent share of mobile telephone operating systems in 2004.[52] But it faces tough competition, to which we now turn.

52. Ibid.

INSIGHTS

• Palm made the market for PDAs in the mid-1990s after the first generation of personal organizers flopped in the early 1990s. Handwriting recognition was the device's "killer app"; it made a variety of applications easy to use.

• Palm, which started as an application software company, created its hit Pilot as an integrated hardware/application/software platform and then disintegrated by encouraging others to develop applications and make hardware.

• Palm followed multisided strategies of promoting its platform to developers and encouraging the creation of third-party applications. It also innovated by adding features to its hardware and software platforms.

• Palm's PDA success has proven short-lived, both because Microsoft's competing software platform has gained traction and because smart phones and other handheld devices have reduced the demand for PDAs.

• RIM's popular BlackBerry has attracted a developer following that has turned it into a two-sided platform. BlackBerry's decision to license its operating system to mobile phone manufacturers has turned these customers into competitors, just as Palm created competitors when it licensed its OS to Nokia, Motorola, and Sony.

• Bundling decisions are at the core of competition in the PDA segment. Early PDAs failed because they came with more features than the hardware could support. When PDAs included only features that people really wanted on devices fast enough to make those features attractive to users, sales took off.