

New Frontiers in Open Innovation

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4

Challenges of Funding Open Innovation Platforms

Lessons from Symbian Ltd.

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4.1 INTRODUCTION

Two core concepts of the open innovation paradigm are the centrality of the business model—particularly creating and capturing value—and the need for multiple firms to cooperate in creating value (Chesbrough & Rosenbloom, 2002; Chesbrough, 2003; Chesbrough, 2006b, 2006a). Research in open innovation has examined how firms have used open innovation strategies to create value using external networks, communities, and ecosystems (Vanhaverbeke & Cloudt, 2006; West & Lakhani, 2008; Rohrbeck et al., 2009). This builds on a broader body of research about how firms utilize alliances, networks, communities, consortia, ecosystems, and platforms to support their innovation strategies (Gomes-Casseres, 1993; Powell, 1990; West & Sims, 2012; Pisano & Verganti, 2008; Adner, 2012; Gawer, 2009). Such cooperation is particularly important for sponsors of general purpose computing platforms, who have for more than 30 years run formal ecosystem management programs to obtain third-party complements that complete the value proposition of their platforms (Kawasaki, 1990; Gawer, 2010).

This chapter considers an example of an innovation ecosystem that created value but faced major challenges with the allocation of the value capture—using a case study of Symbian Ltd., a London startup company that created the most successful smartphone platform of 2003–2010. At its peak in 2007, the Symbian platform accounted for 63% all smartphones sold; two years later, the sponsoring company had ceased to exist. By 2011, the platform was orphaned when, in a once-unthinkable move, its largest remaining customer announced plans to discontinue Symbian smartphone sales in favor of Windows.

This study uses a combination of primary and secondary data, internal and public sources to analyze the transitory success of Symbian Ltd. and its Symbian OS platform. It discusses the company's ecosystem strategy during its entire decade of existence, and the internal stresses within the ecosystem over efforts at value capture.

I argue that many of Symbian's difficulties reflect the inherent difficulties of its open innovation approach to platform leadership. As a cash-starved startup, the corporate venture investments by Symbian's customer-shareholders (hand-set makers) both sustained its R&D efforts during its initial six years of losses while heavily constraining its strategic options. Symbian also faced conflicting goals between managing its own survival and that of its ecosystem members. To contrast with Symbian's failed strategy, the chapter identifies the commonly used strategy of "platform chaining" from a previously successful platform that has provided other sponsors the resources necessary to launch a new platform and ecosystem.

4.2 PRIOR RESEARCH

The goal of this chapter is to explain the challenges that one firm faced in creating and managing an ecosystem of external partners to support its platform. Here I review the degree to which open innovation research—particularly the research on firm use of external innovations—has considered the role of ecosystems and related concepts, and how such research can be informed by other bodies of research that consider firm interactions with networks, ecosystems, platforms, and related constructs.

4.2.1 Networks, Ecosystems, and Platforms

To support their innovation efforts, firms have engaged in a range of strategies for managing relationships with external counterparts, including alliances, networks, communities, consortia, ecosystems, and platforms. In each case, the investments by the exchange partners in assets, capabilities, and strategies reflect a pattern of recurrent relationships rather than a single market transaction, demonstrating an interdependency of reciprocity and repeated interactions that helps mitigate the risks of opportunism (Powell, 1990; Jones et al., 1997).

Research on *alliances* generally focuses on the relationship with one partner. These dyadic partnerships tend to be long-lived (multi-year) and created through formal (but incomplete) contracting to manage opportunism. The success of the alliances often depends on the complementarity of the partners,

whether through differing technologies, between innovation creation and commercialization (as in biotech), or through strengths in different parts of the value proposition or value chain (Hagedoorn, 1993; Gomes-Casseres, 1996; Rothaermel & Deeds, 2004).

When firms have a pattern of building multiple alliances, it may be more appropriate to consider these alliances as *networks* of interfirm interactions (Powell, 1990; Gomes-Casseres, 1996). Research on such networks has focused on the complementarity and reciprocal interactions of multiple independent actors, such as the supplier and customer relationships within a given industry, industrial trading group or regional economy (Powell, 1990). Firms in a network may work together to create value through coordinated innovation efforts, particularly in the presence of network effects, increasing product modularity, and when enabled by communications technology (Staudenmayer, Tripsas, & Tucci, 2000; Nambisan & Sawhney, 2011).

Research has identified specific patterns of networks that share common characteristics and theoretical mechanisms. For example, firms work with external self-governing *communities* organized for a common purpose to produce a shared common good; these communities may be composed of firms, individuals, or both (West & Lakhani, 2008; O'Mahony & Lakhani, 2011). Such communities differ from networks both in terms of governance and in their sense of shared social identity (Markus, 2007; von Hippel, 2007). The communities vary markedly in terms of their degree of innovativeness and their alignment to firm innovation goals (West & Sims, 2012). Two of the most frequently studied types of communities are those that produce product compatibility standards (Rosenkopf et al., 2001; Simcoe, 2012) and open source software (Dahlander & Magnusson, 2008; West & O'Mahony, 2008).

Consortia are also a specialized network of organizational members,¹ whose members jointly provide resources to fund research efforts guided through a form of centralized control or governance. Such consortia are driven both by common goals and a desire to share in the outputs of the collaboration (Sakakibara, 1997; Doz et al., 2000). However, they differ from communities (particularly open source communities) in their ability to exclude others from the benefits of joint production (West & Gallagher, 2006b; Pisano & Verganti, 2008). Unlike networks organized for the benefit of a single firm, such consortia tend to be organized as heterarchical networks with no single dominant actor or beneficiary (Müller-Seitz and Sydow, 2012).

An important extension of the network perspective came with the metaphor of the business *ecosystem* of firms that sell complementary goods and services. The success of the member firms both contribute to and depend on the health of the ecosystem, although (as in environmental ecosystems) these ecosystems are marked by constant competition for overall leadership and dominance of specific niches (Moore, 1993; Iansiti & Levien, 2004a).

In some industries, distribution of innovation between ecosystem members is often the direct consequence of technical modularity (Baldwin, 2012). The success of the ecosystems in jointly creating value through innovation depends not just on the ecosystem leader, but also the efforts of the member firms in overcoming their own technical challenges (Iansiti & Levien, 2004b; Adner & Kapoor, 2010). While some ecosystems lack formal governance, others may be associated with a community or consortium and its governance mechanisms; a successful example of such an ecosystem is the Eclipse open source community (Fitzgerald, 2006; West & O'Mahony, 2008). Sharing control of an ecosystem encourages third party participation and a greater provision of complementary goods (West & O'Mahony, 2008; Boudreau, 2010).

Finally, firms work with external third parties to create a *platform* in which the joint value creation and integration of complementary products is mediated by compatibility standards that define a systems product (Gawer, 2002; Gawer & Cusumano, 2008). For a “proprietary” or “closed” platform, a single sponsoring firm controls the platform and its standardized interfaces to assure its own value capture, while sharing enough of the returns from the ecosystem to attract third-party complements (Gawer & Cusumano, 2002; West, 2003). An “open” platform is one where control (including defining the interfaces) is shared across a self-governing community; with the assurance of greater access to the benefits of the ecosystem, such shared control is often more successful in attracting external participation and complement production (West & O'Mahony, 2008; Baldwin & Woodard, 2010; Simcoe, 2012). However, in the real world, there is a wide range of intermediate points between these two extremes, as measured by the degree to which one or more central firms can control access to use and benefit from platform innovation—which in turn determines the cost paid by customers and complementors to use the platform (West, 2003, 2007a). For example, some platforms are tightly controlled by multiple sponsors, with the proprietary benefits accruing to multiple firms (Eisenmann, 2008).

Here I am particularly interested in sponsored platforms: the management of the ecosystem of a supply of complementary products by a firm that defines the interfaces. The practice of ecosystem management to support a platform predates formal academic theory on either topic. From the birth of the mainframe application software business with IBM's 1969 unbundling decision through the sale of retail packaged software such as Visicalc for personal computers a decade later, system vendors have increasingly recognized the importance of third-party complements for the success of their products (Campbell-Kelly, 2003). Beginning in 1983, Apple Computer even created a new job category called “evangelist” to attract new ecosystem member companies and to coordinate interactions with the ecosystem sponsor (Kawasaki, 1990).

4.2.2 Research in Open Innovation

To date, open innovation has been less complete in its coverage of networks, ecosystems, and platforms—perhaps because of its origins as a normative theory for profit-maximizing firm managers. Research on firm use of open innovation has tended to emphasize the dyadic exchange (usually market exchange) between the focal firm and external sources of innovation (West et al., 2006; see also Chapters 1 and 2).

For example, in the earliest and most-cited study of open innovation using Europe's Community Innovation Survey, Laursen & Salter (2006) studied firms and their potential collaboration ties with eight different external sources, including suppliers, customers and non-profit research labs. In their review of research on the inbound and coupled modes of open innovation, West & Bogers (2014) found a dyadic emphasis for inbound modes, but a nearly equal split between dyadic and network interactions in research on coupled modes that consider bi-directional flows of knowledge and innovation creation.

In the coupled category there is a limited amount of research that has examined how firms utilize networks to support their open innovation strategies, beginning with the 2006 book *Open Innovation: Researching a New Paradigm* (Chesbrough et al., 2006). In addition to the challenges of sourcing (or selling) innovations with external partners found in the dyadic perspective, firms must also coordinate the activities of the networks “both to develop new technologies . . . and to exploit technology-based business opportunities” (Vanhaverbeke & Cloudt, 2006: 277). Firms externally source technology, components, and products from suppliers and third parties, particularly to create and complement complex assembled systems (West, 2006).

Much of the work of open innovation has examined firms creating a complex integrated product in the information-communications technology (ICT) sector. West and Gallagher (2006b) considered how firms leverage open source communities to support their computing or software products. Meanwhile, two studies examined the collaboration of Nokia in mobile telecommunications: Maula and his colleagues (2006) explained how Nokia planned its own long-term innovation efforts and those of its complementors. Dittrich & Duysters (2007) showed how Nokia shifted how it used external partners—from exploitation to exploration of knowledge—as its traditional radio-based competencies became less valuable.

4.2.3 Research Questions

As Chesbrough (2006b: 1–2) noted in our earlier book, “open innovation explicitly incorporates the business model as the source of both value creation and value capture” (cf. Chesbrough & Rosenbloom, 2002; Simcoe, 2006). Such

a perspective is one of eight ways that the open innovation paradigm differs from earlier innovation studies (Chesbrough, 2006b).

The business model perspective is also essential for explaining the success of an open innovation ecosystem. As with other innovation ecosystems, firms leverage an OI ecosystem for the joint value creation that makes its products more valuable to the prospective customer (Maula et al., 2006). At the same time, an open innovation ecosystems strategy must consider the allocation of value capture that both allows the focal firm to succeed, and also motivates the external partners to continue to participate (Vanhaverbeke & Cloodt, 2006; West & Gallagher, 2006b; see also Iansiti & Levien, 2004a). Firms that manage open innovation ecosystems must confront the inherent tension they face in maximizing both their value creation and value capture (Simcoe, 2006; Henkel et al., 2014), and also the degree to which business models within the ecosystem are aligned or are in conflict in the value capture (Vanhaverbeke & Cloodt, 2006).

I am particularly interested in how ecosystem management is handled by new companies such as Symbian, which by their nature must access, mobilize and then generate resources if they hope to grow to large, successful companies (Garnsey, 1998). Nascent high-tech entrepreneurs are particularly concerned with gaining legitimacy and access to external resources (Liao & Welsch, 2008).

4.3 CASE STUDY: SYMBIAN'S SMARTPHONE PLATFORM

This chapter examines ecosystem strategy in the first decade of a new type of computing platform: the smartphone, which combined the computing capabilities of a personal digital assistant (PDA) with a mobile phone to eventually create an Internet-aware mobile computing device. From 1997–2002, manufacturers Nokia, Qualcomm, Ericsson, Handspring, and Research in Motion released a series of first-generation devices, experimenting with size, form factor, application software, and input modes. Eventually a dominant design emerged that included a color screen, email, and a web browser (West & Mace, 2010).

The focus is on the Symbian smartphone platform during the entire life of its sponsoring company, Symbian Ltd. (1998–2008). From 2007–2013, I compiled data regarding the firm's platform and financing strategies from a wide range of primary data, including information on its website, earlier web pages at the Internet Archive, and interviews with ecosystem managers; this was supplemented by news accounts published during and after the firm's existence (see West & Wood, 2013 for additional information on the data sources).

4.3.1 Ecosystem Strategy

Symbian Ltd. was a privately held London-based software developer created in June 1998 as a spinoff of Psion PLC, a successful British maker of keyboard-based personal digital assistants. Psion held licensing negotiations with the world's leading handset makers to adapt its operating system for use to create what later would be called a "smartphone". Symbian was founded as an independent company by approximately 160 employees transferred from Psion's software subsidiary, and it began to adapt the PDA software to support mobile phones with PDA features that would run on GSM (and later W-CDMA) mobile telephone networks.²

Symbian proclaimed itself as an open platform, because it was not controlled by any single firm (as with Microsoft). Unlike the vertically-integrated strategies used for the earliest mobile phone production, Symbian's business model of selling its software to a wide range of manufacturers anchored it explicitly in what later would be called the open innovation paradigm. However, Symbian OS was not open in that the platform's interfaces were controlled by an independent committee such as the POSIX committee that standardized Unix (cf. West, 2007a).

4.3.1.1 Symbian's Partners

Internally and in public, Symbian normally used the term "ecosystem" to refer to its network of customers and complementors (e.g. Northam, 2006). Symbian sometimes used the word "community," but "ecosystem" was generally preferred since "ecosystem" recognized that companies have competitive relationships as well as the "friendly" relations implied by the word "community" (West & Wood, 2013).

The Symbian ecosystem concept was modeled after earlier computing ecosystems, particularly Psion's PDAs. Because Psion was vertically integrated, Symbian's open licensing of its eponymous operating system more closely resembled that of Microsoft Windows, with the operating system sold to system integrators (in this case handset makers) who combined the CPU (and other hardware) with the operating system (and other software) to create value for end-users. Even so, the Symbian ecosystem was far more complex than that for Windows, with nine distinct categories of ecosystem partners (Table 4.1). Some of the increased complexity was a matter of degree, as with the number of CPU vendors (five major suppliers) and the early importance of in-house software development by large enterprises.

Symbian's ecosystem had two types of stakeholders not found in the Windows counterpart. One was network operators that ran the telephone networks to which Symbian smartphones would be connected. Handset makers depended on them for distribution of more than 90% of mobile phone handsets, and they were highly fragmented, with more than 500 networks across

Table 4.1 Categories of Symbian ecosystem members ca. 2002

Partner Category	Product	Customer	Examples
Handset makers ("Licensee")	Handset	Network operator, end user	Nokia, Sony Ericsson, Motorola, LG, Matsushita
CPU vendors	CPU	Handset maker	Infineon, Intel, Motorola, Renesas, Samsung, ST Micro, TI, Toshiba
Other hardware suppliers	Hardware	Handset maker	ATI, CSR, Wacom
User Interface companies	Software	Handset maker	Nokia, NTT DoCoMo, UIQ
"Licensee Suppliers" (pre-loaded software)	Software	Handset maker	Access Systems, Hantro, Macromedia, Opera, RealNetworks, PacketVideo
Independent Software Vendors (ISVs)	Software	End user	AppForge, Borland, Psion, Symantec
Enterprise software developers	Software	End user (self)	
Consulting and training	Service	Handset maker	Atelier, Digia, K3, Omron, Wipro
Network operators	Service	End user	Vodafone, T-Mobile, Orange, Telecom Italia

Source: Categories taken from West & Wood (2013); partner examples adapted from 2008 Symbian internal list of partners

200 countries.³ Although the operators did not make products, they imposed requirements upon Symbian and the handset makers in key areas, such as pre-loaded software and security.

Another new stakeholder was the user interface supplier. To allow customization of the look-and-feel by handset makers, the Symbian OS relied on separate UI software developed by its handset or operator partners. Because Symbian did not control all of the APIs or user experience, over the long term this created major difficulties in evolving both the ecosystem and the underlying technical architecture (West & Wood, 2013).

While the formal ecosystem program evolved in three phases from 1998 to 2008, the most significant changes in the conception of how the ecosystem created value came from 1998–2002 (West & Wood, 2013). This came due to two under-appreciated differences between developing smartphones and the earlier PDA and PC antecedents.

The first was that the creation of a smartphone was far more difficult than a standard PDA device or the (already mature) PC. The smartphone category

was brand new, with a technical complexity that no company had previously mastered. Smartphones were not only computing devices, but also had to control voice, messaging, and data access to the telephone networks. The first devices were released at a time when the 3G network standards were being developed and then the first 3G networks were deployed. Finally, all these functions had to be delivered within the weight, power, and battery constraints of a portable, pocket-sized device.

A second difference was that (unlike with a PC), the operating system software had to be finalized before the handset was manufactured.⁴ This meant that the availability of the operating system and key pre-installed software (such as a Java interpreter or web browser) could become the key bottleneck in the availability of a new handset. In recognition of this bottleneck, in 2000 Symbian revised its ecosystem categories for software developers to distinguish between those who developed preloaded software (licensee suppliers) and those that created software that was downloaded later (independent software vendors).

This final constraint also limited Symbian's leadership of its open innovation ecosystem. Unlike Psion, it did not sell devices directly to consumers, and unlike Microsoft it could not sell its operating system or upgrades directly to end users. This meant that adoption of its latest technology depended on new adoption of smartphones and replacement purchases by existing owners. And because it effectively had no direct relationship with customers, Symbian (unlike Microsoft or Apple) focused its branding efforts on system integrators and made little effort to increase public awareness of the Symbian operating system.

4.3.2 Funding Platform Development

4.3.2.1 Customers as Strategic Investors

A unique⁵ strategy of Symbian's ecosystem was to use its most important partners—its handset licensees—as its investors and shareholders (Table 4.2). Symbian was launched in June 1998 with a joint announcement by the three largest handset makers—Nokia, Motorola,⁶ and Ericsson—and won investments by the Matsushita Electric (owner of Panasonic, then the fourth largest maker) in May 1999 and Samsung (by then the third largest) in February 2003. These corporate venture investments provided Symbian instant legitimacy, ties to prospective licensees and funding to develop its new platform.

The handset makers shared a common need to make smartphones possible. They also had a common desire to block Microsoft from repeating its PC rent-seeking in the mobile phone world, which is why Bill Gates later cited Symbian as “serious competition” (West & Wood, 2013). However, from the start there were tensions among the investors, reflecting both the divergence of interests between these competing handset makers and between Symbian and

Table 4.2 Shareholders of Symbian Ltd., 1998–2008

Company	HQ	Peak Capital Investment	Equity				
			1998 Q2	1998 Q4	2002	2003	2004 ^{ss}
Psion	UK	£5.8 mil. [§]	40%	30.7%	26.6%	31.1%	
Nokia	Finland	£67.4 mil.	30%	23.1%	20.0%	32.2%	47.9%
Ericsson [†]	Sweden	£44.4 mil.	30%	23.1%	20.0%	17.5%	15.6%
Sony Ericsson	UK	£17.0 mil.				1.5%	13.1%
Motorola	US	£33.2 mil.		23.1%	20.0%		
Matsushita	Japan	£23.8 mil			8.4%	10.5%	10.5%
Siemens ^{††}	Germany	£24.3 mil.			5.0%	4.8%	8.4%
Samsung	Korea	£17.0 mil.				5.0%	4.5%

Source: News coverage, Symbian press releases, Symbian website

Notes:

[†] In 2001, Ericsson transferred its handset business (but not its Symbian investment) to the Sony Ericsson joint venture

^{††} Siemens sold its handset business to BenQ in 2005 but remained a Symbian shareholder

[§] Does not include the value of technology transferred at time of Symbian's founding

^{ss} Shareholding unchanged from July 2004 until Nokia acquired 100% ownership in late 2008

its customers. This divergence was magnified by Nokia's growing influence as the largest Symbian shareholder, developer, and customer.

From Symbian's standpoint, the major role that the investor-manufacturers played was as a source of working capital to help support more than £200 million in Symbian R&D from 1998–2004 until it became profitable (West & Wood, 2013).⁷ The company raised a total of £233 million (\$370 million) from 1998–2004: £154 million from the initial equity purchases of seven handset manufacturers through 2003, plus £79 million from additional shares sold to existing investors in 2000 and 2004 (Table 4.3). Three transactions highlight the tensions between the shareholders.

Near the peak of the dot-com boom, in August 2000 Psion announced plans to cash in its Symbian stake (worth as much as £1.7 billion) by spinning off its shares via IPO that could have valued Symbian Ltd. at £2–6 billion (Daniel, 2000).⁸ The IPO plan was also popular with Symbian employees holding stock options, and would have provided the company future sources of capital. The manufacturer–shareholders (notably Nokia) forced Psion to cancel its spinoff plans (Lettice, 2004), although employees continued to hope that the IPO might be revived.

In 2004, seeking liquidity for its core operations, Psion announced plans to sell its 31.1% share to Nokia—giving it 63.3% of the company—but was swiftly opposed by Ericsson's CEO. After elaborate negotiations, Nokia's holdings

Table 4.3 Changes in Symbian Ltd. capital structure, 1998–2008

Date	Transaction	Proceeds to Symbian	Transaction Amount	Implied Valuation [†]
June 1998	Nokia, Ericsson each buy 30% share in new company	£80 million		£133 million
Oct. 1998	Motorola buys 23.1% share	£28.75 million		£124 million
May 1999	Matsushita buys 8.9% share	£22 million		£244 million
Aug 2000	Psion announces intended IPO of its 28.1% stake			£2-6 billion (est.)
Jan. 2002	<i>Pro rata</i> capital infusion by existing shareholders	£20.75 million		£265 million
Apr 2002	Siemens buys 5% share	£14.25 million		£285 million
Feb 2003	Samsung buys 5% share	£17 million		£340 million
Oct 2003	Nokia, Psion buy Motorola's 19% share	-	£57 million	£300 million
July 2004	Nokia, Sony Ericsson, Panasonic and Siemens buy Psion's 31.1% share	-	£137.7 million	£480 million
	Nokia, Sony Ericsson and Siemens buy new shares from Symbian	£50 million		
June 2008	Nokia proposes to buy 52.1% of shares held by other manufacturers	-	£264 million	£401 million
	Total	£232.75 million		

[†] Post-money valuation implied by transaction amount and share

Source: Symbian press releases, news coverage

were limited to 47.9% when existing investors shared in buying Psion's holdings and new shares from Symbian.

Shareholdings remain unchanged until June 2008 when Nokia announced its plans to buy out rivals for £209 million. Although some shareholders initially objected to the price, Nokia completed its purchase in November 2008, integrating the company into Nokia and launching an (ultimately unsuccessful) effort to establish Symbian as an open source platform (West & Wood, 2013).

4.3.2.2 Formal Control

Openness to customers was a central principle in the creation of Symbian: both the ownership and management control were carefully structured to prevent

proprietary control by any one firm. However, both directly and indirectly, the shareholder-customers made crucial decisions that affected the company's financial viability.

Internally, Symbian had a two-board structure. Its senior managers governed the company through an "Operational Board." The shareholders were represented on the company's "Supervisory Board," whose "role is to set the standard licensing terms and conditions for Symbian OS" (Symbian 2006), such as the company's royalty rates. The investor-manufacturers had a strong influence over the technical direction of the Symbian platform, not only through their role in governing Symbian and its allocation of development resources, but also through their own R&D investments in the various user interfaces and their own handsets (West & Wood, 2013).

In theory, a shared platform would allow each handset maker to leverage common R&D expenses, but would limit the opportunity for differentiation between the vendors (a problem for both PC and handset makers licensing Microsoft's software). As a compromise, the Symbian platform allowed for separate user interfaces—funded directly or indirectly by the handset makers—that allowed makers to offer a distinct "look and feel." Five such interfaces were shipped, with three accounting for more than 99% of the unit sales: Series 60 by Nokia (83%), MOAP by NTT DoCoMo (14.6%) and UIQ by Ericsson (2.2%). Each interface was in effect a sub-platform of the Symbian platform, with its own UI-specific APIs and thus third-party applications (West & Wood, 2013). For example, each UI had its own preferred web browser which later proved a major problem when competing with the browser-centric iPhone.

4.3.2.3 *End Users*

Although it first relied heavily on consulting income from helping licensees develop their handsets, Symbian's path to profitability depended on royalties from sales of Symbian-equipped handsets. From 2002–2010, the Symbian platform reported record unit sales for every year except 2008 (Figure 4.1).

Symbian Ltd. initially hoped to receive \$10 royalty per unit, but dropped its price to \$5 with surcharges for new releases. Still, its royalty income had an annual growth rate of more than 100% from 2002 until 2006, until its shareholder-customers pressed Symbian to adopt a graduated royalty of \$2.50–\$5.00 per unit; Nokia was the only manufacturer with enough volume to receive the lower royalty rate (West & Wood, 2013).

Although equity was carefully balanced among manufacturers, the share of Symbian handsets (and royalty payments to Symbian) was highly skewed. From 1998–2008, Nokia accounted for about 80% of Symbian Ltd.'s unit sales, and never less than 75% from 2004 onwards, selling about 350 million Symbian handsets overall. At the peak of Symbian's success, Nokia sold N-series handsets for premium prices that provided its largest handset margins.

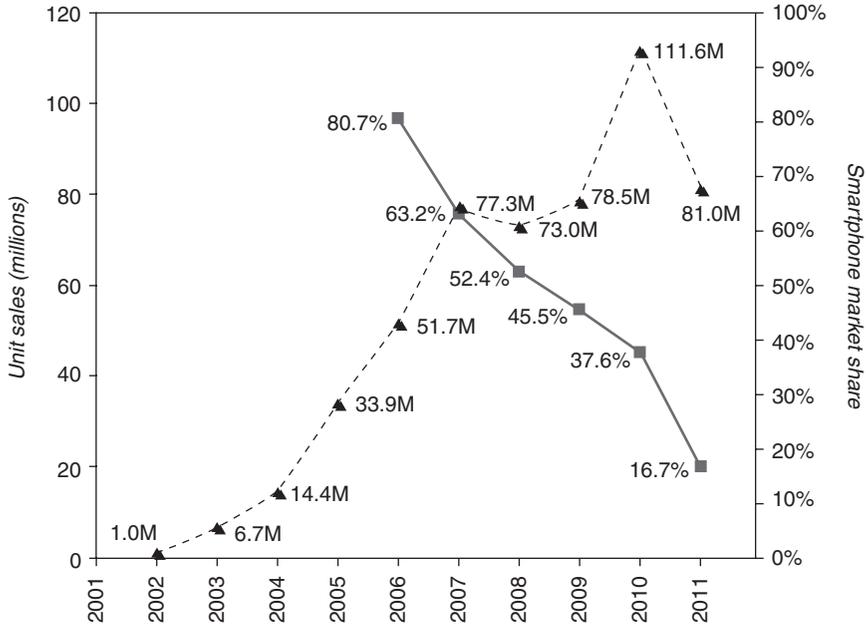


Figure 4.1 Symbian global smartphone unit sales and market share, 2002–2012

Source: Analyst reports (Canalys, Gartner, Tomi Ahonen), Symbian press releases, author's estimates

After Nokia, the next most important customer was NTT DoCoMo and MOAP (Mobile Oriented Applications Platform), whose handsets accounted for 10–20% of Symbian sales each year from 2004–2010. Fujitsu produced 61 MOAP handsets from 2003–2012, Sharp made 37 from 2005–2012, while Sony (later Sony Ericsson) and Mitsubishi together created 30.

From the beginning, Ericsson (later Sony Ericsson) had invested heavily, but reaped few financial rewards. Overall, I estimate that it sold about 15–20 million handsets—about half UIQ handsets (for which it bore nearly all of the UI development expense) and half MOAP handsets in Japan. While Samsung made 15 handset models, the remaining investors shipped even fewer: Motorola (7), Panasonic (3) and Siemens (1) (West & Wood, 2013).

4.3.3 New Rivals and Paradigms

With the iPhone, Symbian faced its first serious market challenge. With its June 2007 launch, the iPhone created the new dominant design for mobile phones: a large touch screen display that provided access to standard web pages. When combined with integration to the Apple music store, the iPhone was an instant PR success that became the best-selling single phone model (West & Mace,

2010). The following year brought the first of a series of phones using Google's (Linux-derived) Android operating system, which provided iPhone-like features with a wide range of vendors, products, and price points (Kenney & Pon, 2011).

In addition to product features, Symbian and Nokia also faced a challenge to their fundamental ecosystem strategy—first from iPhone on openness to complementors, and then from Android on openness to handset vendors. As discussed below, both posed challenges that Symbian was unable to meet.

In July 2008, Apple launched the iPhone App Store, which provided a convenient and inexpensive way for ISVs to sell their software directly to handset owners. While Symbian had taken 7½ years to acquire nearly 10,000 applications, the iPhone app store offered 15,000 apps after six months and 100,000 after 16 months (West & Mace, 2010). In response, other platforms launched their own app stores, but Symbian was blocked by Nokia and its operator partners from creating its own direct-to-consumer store. Symbian had considered launching its own app store in 2005, but dropped the plan due to internal opposition and likely opposition from handset makers and operators (West & Wood, 2013).

The other challenge came from the Android platform, which shipped its first smartphone in 2008. Symbian's "open platform" was a consortium in which source code developed by Symbian and its licensees was available only under non-disclosure and a royalty-bearing license. Meanwhile, Google offered a royalty-free Android license and source code to any external partner. The promise of openness and Google's backing attracted a wide range of handset makers: when the Android sponsoring organization (Open Handset Alliance) launched in 2007, founding members included two Symbian shareholders and licensees—Motorola and Samsung—as well as NTT DoCoMo, Symbian's main sponsor in Japan. Symbian shareholders Ericsson and Sony Ericsson joined 13 months later (Table 4.4). By 2009, Android had achieved what the Symbian platform ultimately failed to do: provide an open innovation platform shared by a wide range of handset makers and controlled by none of them.

Compared to the iPhone and Symbian, Android was widely seen as "open" because its source code was released under an open source license. However, unlike independent open source projects such as Apache or Linux, Google tightly controlled the development process; providing open access to IP but not sharing governance is a common way that firms control open source for their direct benefit (West & O'Mahony, 2008). In an independent analysis of open source community governance in the mobile phone industry, Android was judged to be the least open of eight projects, after Eclipse, Linux, WebKit, Mozilla, MeeGo, Symbian, and Qt (Laffan, 2011). In May 2012, Google completed its purchase of Motorola's handset business, but abandoned vertical integration when it announced plans to sell Motorola in early 2014.

Challenged by the iPhone and the threat of Android, Nokia bought out the other Symbian shareholders and integrated Symbian with the S60 development team to create a single platform. It created a non-profit open source

Table 4.4 Licensees of smartphone operating systems

Handset Maker	Home Country	<i>Symbian</i>			<i>Android</i>		<i>Windows</i>
		Symbian Ltd Share- holder	First Handset	Symbian Founda- tion Member	Open Handset Alliance Member	First Handset	First Handset
Nokia	Finland	<i>1998</i>	2001	<i>2008</i>		-	2011
Huawei	China		-		2008	2009	2013
ZTE	China		-		2010	2010	2012
Fujitsu	Japan		2003	2009	ca. 2012	2010	2007
Mitsubishi	Japan		2005			-	-
Matsushita (Panasonic)	Japan	1999	2005			-	2003
Sharp	Japan		2005		2008	2010	2007
Toshiba	Japan		-		2008	2008	2007
LG	Korea		2007	<i>2008</i>	<i>2007</i>	2010	2008
Samsung	Korea	2003	2004	<i>2008</i>	<i>2007</i>	2009	1998
HTC	Taiwan		-		<i>2007</i>	2008	2002
Sony Ericsson [†]	UK	<i>1998</i>	2000	<i>2008</i>	2008	2010	2008
Motorola	US	1998	2003	<i>2008</i>	<i>2007</i>	2009	2003

Founding members shown in *italics*

[†] 50/50 joint venture from 2001–2012; Ericsson (Sweden) before that and Sony (Japan) afterwards

foundation to own the Symbian source code (cf. O'Mahony, 2003) and in February 2010 released 40 million lines of Symbian OS source code in what was then the largest single open source release in history. However, all but Nokia and the DoCoMo manufacturers abandoned the platform, and in February 2011 Nokia announced it would be phasing out its Symbian phones in favor of Microsoft's Windows Phone (West & Wood, 2013). The switch failed to stem Nokia's falling market share, and in September 2013 it decided to sell its entire handset division to Microsoft for €5.44bn (including patent royalties).

4.3.4 Conflicting Ecosystem Interests

As a startup, Symbian leveraged an open innovation strategy both to raise funds and bring its technology to market. In retrospect, these brought two

fundamental problems: the conflicting interests of the investor-manufacturers and a scarcity of resources to support the platform.

In conceiving and implementing a new approach to smartphone design, the vertically integrated Apple had a huge advantage. Decisions about software, hardware, APIs—even distribution of third-party applications—could all be made within one firm. Symbian did not control key aspects of its platform and had to work closely with (or through) handset makers and UI companies to implement other crucial changes and support third-party software.

4.3.4.1 Difficulties Aligning Interests

Many of the difficulties facing Symbian came from the inherent tensions of aligning the conflicting interests of the competing investor–manufacturers, and the processes put into place to manage those tensions. The employees of Symbian Ltd. spent a decade trying to provide a platform that would serve the need of its shareholders who were also direct competitors. Symbian’s CTO from 2003–2008, Charles Davies, said that this tension was unresolved from the very beginning:

There was no understanding or discussion of how the owner-licensees would compete. I don’t think that was ever discussed or resolved. I don’t remember people saying, “OK, so how are our devices going to be different from each other?” (Orlowski, 2011)

Meanwhile, the handset makers fought for market share (Figure 4.2) and thus the interests of the shareholders continued to diverge:

- *Nokia* enjoyed great success with Symbian, having the most successful UI, the most phones, the greatest unit sales and profits. But the sizable resources it applied to smartphones benefitted mainly S60 and its handsets, not the Symbian platform. As Davies recalled, “Nokia were, understandably, more concerned about making a success of their devices rather than making a success of Symbian” (Orlowski, 2011).
- *Ericsson*⁹ and *Motorola* were in decline, as their strategically valuable competencies of the 1980s—deep radio expertise—became largely irrelevant in an era where value was defined by software and not analog radio reception.
- *Samsung* and *LG* were indifferent to platforms: they used Symbian for access to the European smartphone market, Windows for the U.S. market, but switched to Android as the latter gained features, application, and market share.
- The four main Japanese licensees (*Fujitsu*, *Sharp*, *Sony*, and *Mitsubishi*) made phones for DoCoMo using a subplatform and handset designs that were not exported; except for Sony, none was ever a major player in the global handset market.

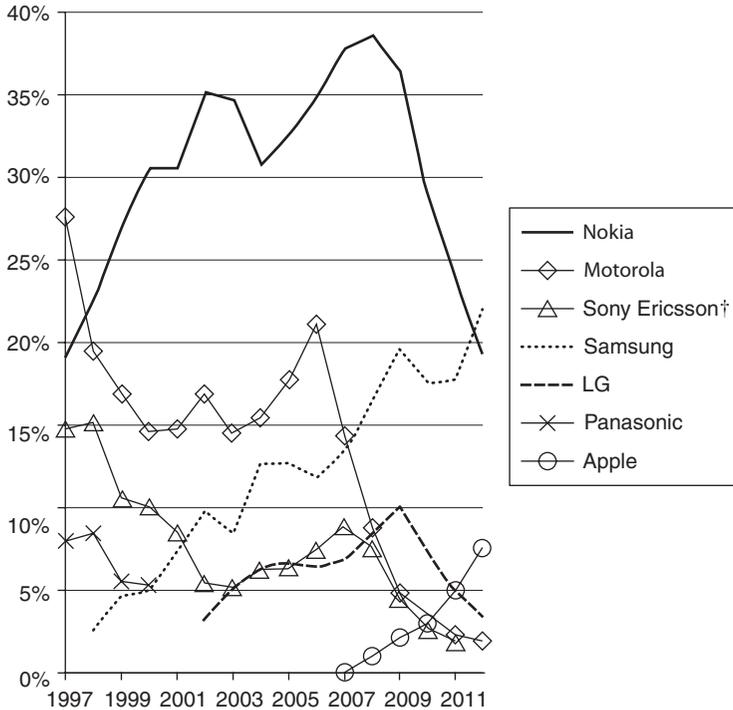


Figure 4.2 Overall market share of leading handset makers, 1997–2012

Source: Global smartphone and other mobile phone sales as reported publicly by Gartner

† Ericsson only market share from 1997–2000

- *Pision* wanted Symbian to be a market and financial success as an independent company, but over time its interests diverged from those of the remaining shareholders and their desires to keep Symbian captive.

4.3.4.2 Health of the Ecosystem

Symbian's success also depended heavily on the success of its ecosystem: as with handset makers, some had more stakes in the success of Symbian than others. Some partners—notably chip makers and network operators—had a strong stake in the success of the smartphone category, but not the health of Symbian *per se*. Instead, each sought to align itself with the most popular handsets and platforms, which meant they were loyal to Symbian when its unit sales were rising, but quickly moved to back the iPhone and Android as they gained momentum.

Some software vendors were similarly platform neutral, particularly those with a two-sided revenue model based on free mobile clients and expensive server-side software: Macromedia (maker of Flash software for multimedia

web pages) was happy to work with any provider, as was Oracle (which made mobile phone clients for its mainframe databases). Other smaller software companies—that relied on revenues from selling a mobile-based application—tended to be loyal to a single platform and thus invested in the stake of that platform. Among these, Symbian won the early loyalty of smartphone app makers—particularly in Europe.¹⁰

Overall, as a startup Symbian lacked the resources to do everything it might have liked to support its ecosystem. Because of its open innovation strategy, it depended on partners to bring its core product (Symbian OS) to market—partners that (due to other alternatives) were not fully committed to platform success. And because its primary funding came from its customers, its strategic choices were heavily constrained. The decision to unify the platform under a single set of APIs—making it easier for third-party suppliers, but reducing the differentiation between handset makers—came only after Symbian was no longer an independent company, but a wholly-owned subsidiary of its largest customer and investor.

4.4 DISCUSSION

4.4.1 Contrasting Open Innovation Platform Strategies

While competing vertically integrated platforms were the norm in the early computer era, Intel CEO Andy Grove (1996) argued that it was more cost-effective if systems providers shared a common component supplier (such as Intel) and thus amortized R&D cost across a broader customer base. When combined with network effects and other demand-side economies of scale, this would encourage the use of open innovation in platform industries (West, 2006).

In the twentieth century, there were three notable exceptions to the vertically integrated pattern: Windows, Unix, and Linux. Unix was licensed by AT&T to IBM's mainframe competitors who sought to create a rival to IBM. The IBM PC platform evolved into the "Wintel" platform as Windows replaced MS-DOS and IBM lost control of its platform. Meanwhile, Linux became a low-cost server alternative¹¹ both to Unix and Windows by combining an open source knock-off of Unix with the Wintel hardware (Bresnahan & Greenstein, 1999; Gawer & Cusumano, 2008; West, 2003; West & Dedrick, 2001). In response to the success of Windows and theories of platform strategies (such as Grove's), the twenty-first century smartphone platform wars brought three open innovation software platforms: Windows, Symbian, and Android.¹² Most of these devices shared the same CPU architecture, based on an open innovation licensing strategy by ARM Ltd. (Chesbrough, 2006a).

Table 4.5 Successful open innovation platforms

Category	Mainframe	PC	PC Servers	Smart-phone	Smart-phone	Smart-phone
Platform (product dates)	Unix (1972–)	MS-DOS (1981–2000) Windows (1991–)	Linux (1994–)	Windows CE, PocketPC, Windows Mobile, Windows Phone (2002?–)	Symbian (2000–2012)	Android (2008–)
Sponsor	AT&T, Unix Systems Laboratories, Open Group	Microsoft, Intel	Intel, IBM, Linux Foundation	Microsoft	Symbian	Google
Rival platforms	IBM S/360	Mac OS	Windows NT, Windows Server	Palm, iPhone OS, BlackBerry, (various) Linux		
Market share	10–90+%, depending on segment	90+%	0–50%	4–15%	40–67%	75%

Together, these comprise six major open innovation computing platforms of the past 40 years (Table 4.5). All six platforms registered notable successes. Unix was too late to displace IBM's mainframe lead, but (thanks to buyer demands) dominated the final years of the minicomputer era and had nearly 100% share in engineering workstations, while enjoying a disproportionate impact on computing tools and computer science education. Leveraging IBM's legitimacy, MS-DOS and then Windows attracted the widest range of desktop (later laptop) PC systems and complements, garnering the largest market share of any major platform category. More recently, Linux has garnered nearly a 50% market share against Windows in the market for PC servers. In all cases, the platforms benefitted from a wider range of complements, lower switching costs, and bandwagon effects from multiple supporters.

Discerning a pattern in smartphones is less clear-cut: while Symbian defeated Windows and Android defeated Symbian, the cause and effect are not clear. Handset manufacturers both feared Microsoft's monopoly rents (as in PCs) and high royalties, discouraging adoption. Compared to Symbian, Android offered lower direct royalties,¹³ an improved Internet-centric user experience, and also a newer, more Unix-like architecture for software developers. Meanwhile, the second most popular smartphone platform in 2013 (the

iPhone) was vertically integrated, but offered the best user experience and easiest distribution for third party software.

This pattern suggests that open innovation as a platform strategy is here to stay, but that further research is needed to discern how important openness is to platform success when compared to other factors such as platform capabilities and attractiveness to ISVs (cf. Gallagher & West, 2009; Gawer, 2010; West, 2003).

4.4.2 Ecosystem Challenges of Startup Companies

Entrepreneurs have been long advised that to succeed, they must focus their attention and limited resources (Bird, 1988). Or, as various experts have advised entrepreneurs, “If you have more than three priorities, you don’t have any.”

In some cases, limited resources can be an advantage in that young firms come up with new ways of creating value that transcend existing conceptions of the market (Baker & Nelson, 2005). However, I believe that in orchestrating the development of a complex ecosystem, this entrepreneurial focus is a major disadvantage.

In Symbian’s case, it was focused on trying to ship new revisions of its operating system, keep its investor-customers happy and (for the first six years) find cash to pay for R&D as it continued to lose money. It had attracted a large number of handset makers and independent software vendors—as well as the most end-user adopters of any smartphone platform—and so by many measures it had a vibrant smartphone ecosystem.

However, the partners most dependent on Symbian—the small ISVs—were not generating enough revenues to become successful companies. Symbian considered creating its own online app store, but it would be difficult without cooperation from Symbian’s downstream partners—the manufacturers and network operators—and so Symbian management concluded this was not its priority. Several years later, Apple (a *Fortune* 500 company with decades of ISV support) created its iPhone App Store that attracted 100 times as many applications and became a key differentiator for its platform.

4.4.3 Funding New Platforms

Finally, I consider the challenges of a startup firm finding the resources to launch a new platform. Needing more capital than the European VC market could support, from 1998–2004, Symbian raised some \$370 million in outside funds. All of that came from corporate venture capital (CVC), and all but Psion’s 2.5% (in 2002) came from handset manufacturing customers. Symbian had greater difficulty launching and funding its platform than did Facebook

(and its numerous social media imitators) because of more complex software and the dependence on manufacturing and distribution partners to reach customers, and was also forced to share the value capture with these downstream partners throughout its existence.

As noted earlier, Symbian and 3DO are the only examples I could find where a startup platform company was funded by its customers (which for 3DO included not just hardware companies, but content creators and distributors). Symbian's strategies and access to funds were constrained by the same partners who were part of its business model, which contributed to (but did not determine) its strategic challenges.

Symbian's challenges highlight the need for an ongoing stream of resources to support platform development. Unlike the one-time standardization as in VHS vs. Betamax, computing platforms reflect a series of linked contests (Gallagher & West, 2009). These point to an underappreciated aspect of the Gawer and Cusumano (2002) conception: platform leadership requires an ongoing investment in both the architecture and ecosystem.

Prior platform research has also emphasized sustained competitive advantage (and thus profits) as the outcome of successful platform leadership. However, such profits are not just a consequence, *but a necessary antecedent of platform success*. In particular, I believe that Symbian demonstrates that a key role of a platform leader is to extract profits from the value chain and reinvest those profits into expanding the technical and organizational reach of the platform. Instead, while one CVC investor (Psion) sought the greatest possible financial success for Symbian—as would an independent VC—the remaining CVC investors favored their interests as customers, explicitly structuring Psion to prevent Wintel-type profits.

In fact, I suggest an empirical regularity in the role of cross-subsidies in launching and sustaining a new platform. Table 4.6 lists various examples where the “cash cow” profits from an earlier platform were successfully used by companies diversifying into a related industry segment, a process I term “platform chaining.”¹⁴ Conversely, the case of Real Networks cited by Eisenmann and colleagues (2011) is another example of a firm that lacked either an existing cash cow or a sizable revenue stream from existing customers to maintain its early platform lead.

More generally, I believe this has important implications for a broader class of challenges facing companies seeking to profit from their innovations. In the Teece (1986) profiting from innovation framework, “the implicit assumption was made that risk capital was available” to fund a firm's commercialization efforts (Teece, 2006: 1140). Symbian's use of strategic corporate venture capital should have been a way to obtain such capital, but its investors' control (including blocking its hopes for an IPO) ultimately limited the success of its business model. While the CVC literature has acknowledged risks to startups from receiving such investments, it has mostly focused on risks

Table 4.6 Examples of successful chaining from a cash cow platform to a new platform

Company	Cash Cow Platform	New Platform	Reference
IBM	System/360	IBM PC (1981)	Moschella (1997)
Apple	Apple II	Macintosh (1984)	Malone (1999)
Intel [†]	Wintel-compatible PCs	Lintel servers (1995)	West & Dedrick (2001)
Sun	Solaris	Java (1995)	Southwick (1999)
Microsoft	Windows	Xbox (2001)	Takahashi (2002)
Apple	Macintosh	iPhone (2007)	West & Mace (2010)
Google	Google search engine	Android (2007)	Kenney & Pon (2011)

[†] Wintel: Windows on Intel; Lintel: Linux on Intel

due to misappropriation (e.g. Katila et al., 2008; Maula et al., 2009) rather than the divergence of interests between partner–investors and startups. As Chesbrough (2000) posits, corporate venture capitalists are far more likely to constrain the business model choices of startups than are independent venture capitalists solely focused on financial returns; as suggested here, they may also constrain their exit strategies as well. This suggests opportunities for future research on both constraints.

NOTES

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1. In addition to corporate members, consortia often include university or non-profit research labs (cf. Dimancescu & Botkin, 1986).
2. For a summary of the transition from the 2nd generation GSM into the 3rd generation 3GSM (WCDMA) network standards, see Bekkers (2001) and Bekkers and West (2009).
3. For example, in December 2008, the trade association for GSM mobile phone network operators reported that it represented “more than 750 mobile networks across 219 countries and territories,” according to an Archive.org copy of the GSMA.com website. Many of these networks were owned completely or in part by larger holding companies such as Vodafone, Orange, Deutsche Telekom, and Telefónica, but handset procurement decisions were influenced (and sometimes determined) by the local subsidiaries.
4. Eventually handset makers developed technology and processes to update the operating system software over 3G or WiFi networks, as with the first update to the iPhone OS in 2008.

5. Nearly all computing platforms since the 1960s have been vertically integrated, with only a handful (such as AT&T's Unix or Microsoft Windows) being licensed to external parties (cf. West, 2003, 2007a). The only other example I can identify of a platform funded by investor-customers is 3DO, an unsuccessful videogame console (1993–1995) funded by Matsushita (Panasonic), Goldstar (later LG), AT&T and various content providers.
6. Although Motorola was not mentioned in the June 24, 1998 press release, it was prominently featured in news coverage of the announcement. It signed a shareholder agreement August 28 and announced its investment on October 28.
7. Symbian's first profitable year was 2005, with a £15.3 million net income vs. a £23 million loss the year before (West & Wood, 2013). The company's audited financials distributed to shareholders showed that it had a positive cash flow from operations of £2.6 million, vs. an outflow of £32 million the year before.
8. Although that valuation was far greater than ever used by Symbian's shareholders, the £6 billion (\$9 billion) was much less than the \$42 billion public valuation of Palm Computing, its most direct competitor.
9. In response to increased competition, Ericsson combined its handset business with Sony in 2001, and then exited the handset business in February 2012 by selling its half of the joint venture to Sony. In May 2012, Motorola's handset business was acquired by Google, more for its patent holdings than its product revenues.
10. In the US, ISVs were focused on Palm and Windows from 1998–2005, and on the iPhone and Android after 2008. While Symbian was popular in Japan, DoCoMo's closed Symbian-based MOAP platform prevented the creation and installation of native downloadable applications.
11. Linux has since been used for other applications, such as embedded computing (Henkel, 2006). Android itself was a derivative of Linux that was incompatible with Linux until the latter developers merged the two code bases in early 2012 (Kennedy, 2012).
12. For a summary of open innovation and vertically integrated smartphone platform strategies, see Kenney and Pon (2011).
13. Since 2010, the actual cost of smartphone platforms has included patent royalties paid to competing platform owners such as Apple and Microsoft, but the specific rates have not been publicly disclosed. New entrants in the smartphone market—using Android and without large patent portfolios of their own—have been particularly vulnerable to such patent litigation.
14. This is not meant to minimize the examples of failed attempts at platform chaining—such as Apple into PDAs (with the Newton) or Intel into mobile phone CPUs. As with any other strategy, adequate resources are necessary but not sufficient for success.