

Schumpeterian competition within computing markets and organizational diseconomies of scope.

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Abstract:

We address a longstanding question about the causes behind creative destruction. Incumbent dominant firms, long successful in an existing technology, are often much less successful in a new technological era. We examine two of the most important historical episodes in computing markets, respectively, the introduction of the PC and the browser. We examine the internal organization of two contemporaneously leading computing firms, IBM and Microsoft. We show that *organizational diseconomies of scope* between new and old businesses explain the pattern of unsuccessful dominant firms in the two historical cases. Each firm, having been an extremely successful marketer of an old technology, came to have grave difficulties running an organization which could effectively market in both the old and the new technologies. Our analysis locates the problem that each had firmly in the marketing or commercialization of new technologies. It was in the area of the greatest strength of these firms, not in any area of weakness, that the organizational diseconomies of scope arose.

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I. Introduction

Schumpeterian “waves of creative destruction” are periodic bursts of innovative activity that threaten to overwhelm established dominant firms. Schumpeter argued that such waves renew markets and strike fear in even the most entrenched monopolists, motivating them to innovate. These ideas have influence beyond academic circles, and have taken deep hold in the business press and in the popular imagination.

We argue that organizational diseconomies of scope play an essential role in the market events that produce Schumpeterian waves. Organizational diseconomies of scope arise from conflict between two lines of business in a dominant firm. One is an established market, while the other is an innovative market. The latter is associated with the firm’s response to the wave. Operating two lines of business do not need to present problems in every circumstance, but it does so during a wave. We focus on explaining what circumstances contribute to the presence of such diseconomies and why they lead to severe competitive problems. We spend the bulk of this paper illustrating such circumstances in two particular important cases of Schumpeterian waves.

Our analysis begins with a simple premise: Every firm must invest in assets shared across all market activities, both established and new. In saying that, we take a broad conception of a firm’s necessarily shared assets. We include such assets as the firm’s reputation with business partners and others in a supply chain. We also assume that shared assets can take on different attributes, and different attributes imply different organizational processes to support them. While sharing assets does not have to be problematic, it can become the source of challenges for managers when one attribute is desirable to the established line of business (in one set of market circumstances) while another trait is desirable to another line of business (in another set of circumstances), but each attribute is undesirable to the other market.

Examples of this phenomenon are quite easy to appreciate at an intuitive level. For example, if the incumbent firm has a reputation for designing and distributing proprietary and reliable products, then such a reputation will retain its value in an

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established market where users and other business partners know how this business works and what to expect of the incumbent firm. However, the same reputation will interfere with its entry into a market that requires open designs modified by experimental complements supplied by others. Potential business partners and users will justifiably doubt any firm commitment to be open and for a wide variety of reasons. In short, a proprietary and an open line of business are mutually inconsistent lines of business in the same organization, and it is no accident that firms face difficulties attempting both simultaneously.

We seek to understand more deeply the generality of that intuition, and the implications associated with managing the challenges from developing and maintaining two mutually inconsistent lines of business. The managerial challenges shape two observable features of incumbent firm behavior during Schumpeterian waves. First, managers at the incumbent firm who are assigned to the established and new lines of business will conflict over the attributes for those shared assets. Second, management for the established firm eventually will face a choice between maintaining an established market and pursuing the opportunity in the new market, but not both.

We examine two of the most important historical episodes of Schumpeterian competition in computing markets, respectively, the introduction of the personal computer (PC) and the browser. There are many parallels between the two cases. We focus on events when each then-incumbent firm sought to address a newly developing market at an early stage. IBM and Microsoft, the two then-incumbent firms in each case, were successful firms in the two eras in which we examine them. The incumbent firm in each case encountered challenges caused by the creation of a new market. In each case the incumbent entered, and to avoid conflicts, first attempted a “firm within a firm.” In each case, numerous difficulties and conflicts arose related to integrating the divisions for established market and new market together. Those conflicts are symptoms of organizational diseconomies of scope.

In both cases, the illustrations involve commercial organizations contemporaries regarded as extraordinarily effective “strong seconds” if not particularly innovative. Thus, innovation is essential to only one aspect of our setting: Namely, the opportunity

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has the potential to appear attractive to many entrants, and the behavior of those entrants triggers the “strong second” response from the established firm. In that sense, innovation per se’ is also less essential to our analysis than what comes along with it: Namely, changing conditions in these markets give rise to new information that reshapes contracting and monitoring activity at incumbent organizations, eventually motivating conflict over attributes of a firm’s shared assets.

Our framework stresses the organizational challenges of implementing a forward looking commercialization strategy. This approach contrasts with popular theories of Schumpeterian waves in which the leading organizations are backward looking. We do not stress this approach. While it plays a role in events, we tightly circumscribe explanations of decisions that accentuate errors in judgment — by distinguishing between settings with limited information and later conclusions based on twenty-twenty hindsight.

Theories of firm heterogeneity also have been put forward as an explanation for waves.² We argue that heterogeneity explains only part of this phenomenon, namely, why new firms (entrepreneurs or other outsiders to the industry) have the capability to invent technologies existing dominant firms do not. This heterogeneity cannot, however, explain the difficulties of merging a new firm into the incumbent dominant firm or creating a division in the incumbent dominant firm to compete in the new era.

We begin with one additional premise, that IBM and Microsoft were filled with extraordinarily competent managers, and, accordingly, that each adopted rational strategies to address their core markets prior to these episodes, respectively, mainframes and operating systems. That too represents a departure from a strand of prior writing about Schumpeterian waves in which competitors take advantage of an established firm’s weakness. Rather, in our view organizational diseconomies of scope arose in the area of the greatest strength of these firms, not in any area of weakness. These firms can deploy their inherited strengths; they just cannot profitably deploy their strengths to mutually inconsistent market opportunities.

² This is a large literature. See, e.g., Adner and Zemsky, forthcoming, Cussiman and Ueda, Forthcoming, Marino and Matsusaka, 2005, Stein 1997, Stein 2003.

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More to the point, in both cases our analysis locates the problem for each organization firmly in the marketing or commercialization of new technologies. Each firm, having been an extremely successful marketer of an old technology, came to have grave difficulties running an organization which could effectively market in both the old and the new technologies. Our thesis arises numerous times, explaining many salient events. In the case of the IBM PC, we argue that events show that such organizational diseconomies not only *could*, but, in fact, *did* shape outcomes. In the case about Microsoft and the browser, we argue that participants acted as if those concerns were paramount, but whether those costs *did* shape outcomes in the long run is an open question.

Section II provides a review of our framework. Section III illustrates the application to IBM's behavior in the PC markets. Section IV illustrates Microsoft's behavior in the browser markets. Section V identifies a number of implications.

II. Sketching a Model

Here we outline a brief presentation of our framework. A more complete explanation lies in our companion paper (Bresnahan, Greenstein and Henderson, 2008).

Our analysis will not assume that economics or diseconomies of scope are an automatic or foregone conclusion. Instead, we consider the question open *ex ante*. This model has four stages, labeled as: (1) Search; (2) Institute investment; (3) Organizational Experiment; and (4) Assess and Resolve.

We model stage (1) minimally, and say that an outside entrant opens a new market at that time. We take the technical and marketing aspects of that new market as exogenous. The incumbent firms enter the new market in stage (2). Incumbent firms enter stage (2) with assets that possess attributes already determined in their established markets, i.e., chosen exogenously by historical circumstances. Stage (3) serves to inform managers about (unanticipated) conflicts, or, what will often be equivalent, about (unanticipated) costs the attribute imposes on their aspirations in the new market.

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II.1. Conflicts over attributes of shared assets

This framework obviously can describe a wide variety of situations, including settings where the incumbent firm successfully addresses both old and new markets. For the sake of brevity, we only highlight the organizationally most interesting case for our study, when the ideal attributes of the fixed asset are different for product A (the established market) and product B (the new market), but the cost minimizing way to produce product A and product B has them sharing the same fixed asset. The managers of product A and product B have a common interest in having a reputation, but are in conflict over its attributes. In short, the possibility of sharing the fixed asset, F , of a reputation, gives rise to the possibility of economies of scope, while the potential conflict gives rise to the possible diseconomies of scope.

Consider an illustration. One attribute is the amount of time the firm puts into assessing a new product before introducing it. This attribute is valued differently in different market environments. In addition, each attribute implies a range of organizational processes to support it, some that are distinct and some that overlap.

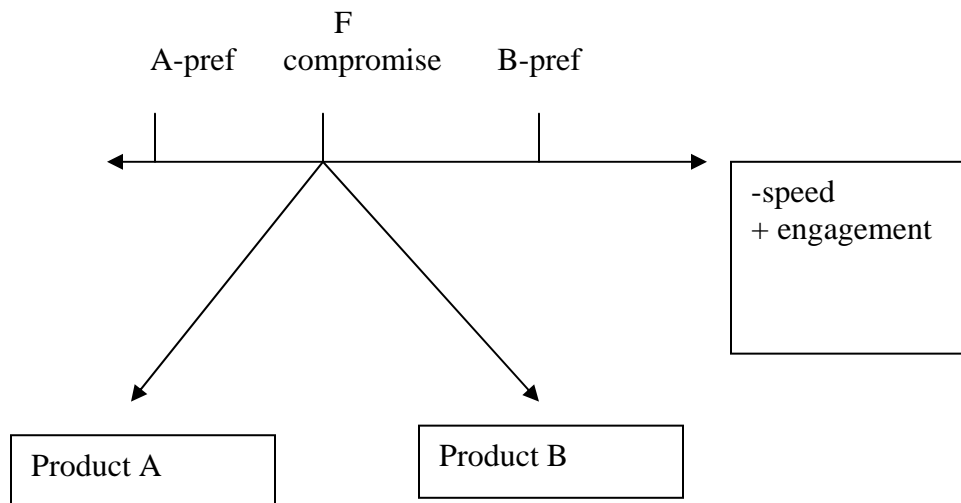
One possibility is that customers value firm behavior like: “The firm quickly introduces innovative new products.” Another possibility is that customers value: “The firm works carefully to ensure new products will perform in many environments.” We call these speed and engagement. Those two outcomes – speed and engagement – are each positive in specific market circumstances, but cannot both apply to the same market. The firm cannot operate an organization that effectively asks everyone everything about what they desire in a new product and realistically get to market quickly. In other words, if the incumbent firm has a reputation for engagement and an organization to support it such a reputation will remain valuable in the established market, but adversely shape its entry into a market that requires speed, and vice versa.

We follow the spirit of standard models of organizational conflict, illustrating the model in figure 1. Let the manager of A prefer point zero and let the manager of B prefer one. Let d take a value between zero and one, and represent the attribute of the shared asset, F . The precise value of d for products A and B are unknown at stage 2 and only

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learned after experience with stage 3. In this model d is chosen at stage 2 for one set of reasons and at stage 4 after experiencing competition.

We posit that the presence of conflict arises partly from the indivisibility of F and partly from the inability of managers to write a contract in advance to transfer resources between managers for A and B to mediate the negative interplay between the two markets. Standard principles in organizational economics lie behind this conflict: Effective innovations involve effort that cannot be effectively monitored and outcomes that cannot be specified in such a way that top management could write enforceable contracts around them. Said another way, under many circumstances top managers cannot give perfect high-powered incentives to everyone in an organization at once.



Those standard principles do not imply firms give up on all innovative opportunities in stage (2), even in the face of potential conflict. Rather, for a wide set of plausible circumstances firms will rationally attempt to innovate “inside their boundaries,” which further implies that divisional managers must make choices as to how much effort to invest in activities complementary to the asset. Such investments are necessarily sub-optimal because senior managers cannot write “perfect” contracts to

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optimize effort across two divisions. For example, when there are two divisions, senior managers cannot give the division manager of either division “whole firm” incentives.³

Lack of whole firm incentives may lead to conflict between divisions assigned to two lines of business, particularly in stage (3). We are agnostic about which of many types of conflicts arise, since that depends on the specifics of the feature of the fixed asset and the managerial arrangement for choosing its feature. For example, if F has been at A’s preferred point and the firm enters product B, the situation will not be entirely positive from manager A’s perspective. He will be asked to compromise in the interest of the broader firm.

We also are agnostic about the allocation of control over assets that leads to conflict. It depends on the specific of the managerial assignment of control over assets, as the literature has emphasized. If A controls the asset, that is one problem. If senior management needs input from A and from B to pick the asset, that is another problem. In any scenario the conflict is costly for some part of the organization.

The form of the conflict matters less than its consequences for stage (4). Conflict can take any number of forms: the managers of A and B spend time lobbying for a movement in F, senior management cannot easily truthfully provide information about the benefits of different attributes for F, etc., etc. Organizational scope diseconomies arise when the costs of conflict become so costly that there is greater value from splitting the firm into two rather than sharing the asset across two divisions. It is second-best efficient not to share because sharing induces organizational conflict related to resolving conflict engendered by diseconomies of scope.

While we also remain agnostic about the resolution of conflict in stage (4), we rule out only one particular outcome, two Fs within the same firm. The firm cannot have

³ The second and related premise follows from the first: Managers can write a relational contract for any activity or outcomes, even an innovative one—but anytime there is a contract there is a temptation to renege on it, so generally managers cannot achieve first best. The fourth statement is more subtle and follows from the first three propositions collectively. If all employees do not act in the organization’s interest at all times, then managers cannot give any employee “whole firm” incentives, as any employee can free ride on the effort of others. The argument at the level of divisions follows a similar reasoning. In essence, there rarely are contractual instruments to resolve all incentive issues, because employees maneuver to control key assets affiliated with retaining rights of residual control. This is taken for granted in many papers. See e.g., Holmstrom (xxxxx), Baker, Gibbons, Murphy (2002), Anand, and Galetovic (2000), and Anton and Yao (1995).

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a reputation both for speed and for engagement, or, in another example, for a commitment to open systems and a commitment to proprietary systems.

We can add one more source of potential organizational conflict if we change the determination of F's attributes from something somebody chooses to something that is determined by operational decisions. A reputation for speedy product introductions could arise from investment by one division in speedy product introductions in the past, while a reputation for engagement with customers to determine products could arise from investment from the other division in past engagement. In this model stages (1) and (2) takes place in the shadow of precedent and stages (3) and (4) may take place in anticipation of future conflict.

Such a model would imply more potential for organizational scope diseconomies. If the attribute of F is determined by supply behavior of both A and B, then the manager of product A cares about the supply behavior in division B and vice versa.

This last model resembles models of “umbrella branding” found in the analytical marketing literature, albeit with a new focus on organizational conflict.⁴ In the marketing literature the firm's management trades off the gains from “extending the brand into a new market” with the potential downside such extension implies for existing markets.⁵ In our case, the extension comes with a potential gain in value from supplying the new market, but also comes at a cost imposed on the entire firm through the presence of diseconomies of scope.

The analytical marketing literature also considers a question related to ours, whether a firm should invest in developing attributes of its brand. Such investment trades off the gains/losses to existing markets with the gains/losses to the new market to which the brand has been extended. This is analogous to our focus on conflicts that arise over what value an attribute should obtain when it is shared across divisions that each supply

⁴ See e.g., xxxxxx.

⁵ For example, a frequently identified trade-off is between extending a reputation for reliability into a new product market while facing the risk of reliability problems with the new good. If those problems should surface, it would sully the reputation of the existing product, at a cost of loss sales to the incumbent firm. See e.g., xxxxxx. A difference between our model and existing umbrella branding models is that we consider purely horizontal product differentiation in our model of “d.” A product attribute which is positive in one market may be negative in another in our model. Umbrella branding models focus on a vertical model of quality, in which all customers

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established and new markets. In comparison, our novelty is stressing the organizational costs and its relationship to Schumpeterian competition.

II.2. Applying Diseconomies of scope

Our illustrations will highlight that diseconomies of scope has competitive implications during Schumpeterian competition. There are several factors relevant to understanding these implications.

First, organizational silence is not evidence of the absence of diseconomies. In the two case studies we will observe a strong senior management preventing overt conflict from being communicated to outsiders. Observing such silence does not mean that the underlying conflict has been averted. Rather, we expect that conflict will be present in the major managerial decisions, even if the public face of the firm remains unchanged. Accordingly, our cases go “deep” inside the firm’s managerial decisions for key details.

Second, our analysis stresses that diseconomies of scope is not the same as cannibalization. Cannibalization is another strategic incentive that shapes the entry into new markets. Our default assumption is that an existing firm with strong senior management can and should see through cannibalization and enter a second market rather than lose to a competitor.

Third, in both our cases we will observe incumbent firms attempt a “strong second” strategy. If organizational issues interfere with the execution of such strategies, however, it means that the presence of organization diseconomies changes the firm’s ability to enter some new markets. This is point that is important for many technically dynamic industries, so we will highlight it in our cases when it arises.

Finally, when taking this framework to historical events we stress that scope economies are not an unvarnished good. They appear as incumbent firms explore the potential for supplying new markets in what we have labeled stage (3). We are sympathetic to the firm’s decision to go back to its traditional business in stage (4), as when diseconomies are found to be unexpectedly large.

We now turn to our illustrations.

III. First Illustration: Development of the IBM PC

IBM entered the PC market in 1981, and demand for the mainframes, minicomputers, work stations, and PCs grew side-by-side throughout the 1980s. We argue that in the early 1980s IBM had a trying but profitable PC business, a result it accomplished by deftly managing two distinctly different businesses among many.⁶

After 1985, however, evidence suggests that the costs of doing so had grown quite difficult to manage. In saying that, we do not seek to assign managerial responsibility, but only to recognize that managing any PC company in the latter part of the 1980s was challenging. Additionally, IBM's managers faced extraordinarily high costs from managing both a large-computing and PC business in the same firm.

In discussing this event, we argue that if IBM had not entered the PC business, other firms could have grown along with the PC business and IBM would have eventually faced a competitive challenge.⁷ It might have involved different or similar firms, alliances, timing. Although there is no way to know, we can be certain that the PC would have been an important corporate technology and a challenge to IBM's core mainframe business by the early 1990s.

Nevertheless, we do not presume IBM entered into the PC market in anticipation of these trends, or, necessarily, for any strategic purpose related to its managers' anticipation of a technological wave. We also do not presume that IBM had no chance of successfully negotiating its way through this wave if its organization were aligned to the market demands. Rather, our analysis focuses on understanding the firm's assessment of the opportunity as it appeared *ex ante*.

III.1. IBM and the Mainframe Business

We begin by discussing how IBM aligned itself with the market opportunities in computing before it launched the PC in 1981. It is difficult to sustain the argument that IBM's strategy, including its limitations, was irrational: IBM held a dominant position in

⁶ This case study presents only essential highlights from a very long sequence of events. We highlight only a fraction of them.

⁷ For an elaboration of this argument, see Bresnahan and Greenstein (1999).

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the most lucrative segment of computing, and it faced strong incentives to continue innovating in that market for its existing customer base. The firm had effective means for gathering information about how technical improvements could serve market needs and its organization and market position enabled IBM to act repeatedly on that information. In many respects IBM's behavior was exemplar of the successful commercial exploitation of economies of scope.

Specifically, IBM dominated the mainframe business for many years. IBM was well aligned to the market opportunity of supplying enterprise data processing, but in a manner that would make later realignment difficult because of sunk costs. That shaped the approach to new initiatives that took advantage of proposed economies of scope. Inside every single IBM division, all employees were aware of the large overhead associated with operating a large enterprise. All proposals inevitably faced questions about how much better IBM had to be than others to gain margins that covered the overhead.

IBM's long-run strategic goal was to dominate all general-purpose technologies in enterprise data processing, and its strategy was to bring all new technologies with general importance to large enterprises into its platform. This called for successfully identifying such technologies and updating the platform to incorporate them. Both tasks were demanding—the first a difficult learning task as it involved both technology and complex customer demand and the second a demanding technical task. IBM could be extremely persistent and foresighted in attempting to bring new technologies into its products (though outsiders groused that IBM often chose to wait and use only the version of a new technology invented in-house.).

IBM's managers did not treat economies of scope as if these were static, fixed, or unchanging. Indeed, historically speaking, IBM had already dealt successfully with wrenching transitions in the technical basis of its core business. The most important technical revolution in that business, the computer, arrived when IBM was the dominant firm in electromechanical data processing devices, and it left IBM the dominant firm in

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enterprise computing.⁸ This historical example suggests the value of using a more nuanced theory of organizational capabilities than assuming that this old firm was somehow stuck with old technologies or old ideas.

Among all such historical examples, nonetheless, one stood out. Not long after IBM shifted to computer technology, it brought forth an innovation, the modular platform, which would support its dominant market position for decades. The IBM System 360 was launched in 1964. It was a multi-million dollar gamble for the firm, but it grew to become the single most profitable product introduction in commercial computing, generating more revenue than any other computer product line for more than two decades.⁹ With senior management supporting the modular platform over the objections of existing product line managers, and the sales organization directing its improvements toward strategic customer needs, the modular platform was well-aligned to IBM's market.

The System 360 was a *system*—a shared architecture and set of instructions common to a set of applications that worked across a range of hardware sizes. Its unified and largely proprietary architecture proved to have enormous appeal to commercial users—large corporations, for the most part—because it provided them with the option to upgrade across a family of systems as their needs changed and thus to preserve their investments in applications programs, data, and so on. The installed base that grew around the 360 architecture and its backward-compatible descendents provided IBM with a substantial competitive advantage: A classic entry barrier rooted in sunk costs.

The dramatic success of the 360-based mainframe business shaped the organizational capabilities of IBM thereafter in very profound ways. As a direct reflection of the market-driven incentives to maintain and extend the installed base, the sales and service organization assumed a particularly dominant role within the firm. Almost all ambitious executives tried to get extensive sales experience, and in the 1970s

⁸ For the origins of this transitions, see the account in Maney (200x). The transition began under Thomas Watson Sr., the first charismatic CEO for IBM, and continued after Jr. became CEO. It was a well known episode in the firm and embedded in the common understanding of its past.

⁹ It is beyond our purpose to tell this entire tale. For explanations, see, e.g., Pugh (1995), Fisher, McGowan and Greenwood (1983), Fisher, McKie, and Mancke (1983), Katz and Phillips (1982), Brock (1975b), or Watson Jr. and Petre (1990).

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and 1980s all the CEOs after Watson Jr. and the majority of top management had extensive sales experience in the mainframe division.

The incentives facing many employees suited the opportunities in the mainframe market extraordinarily well, but, as management would learn later, were not optimal for supplying products and services or assessing changing conditions in the PC market. The IBM sales force was divided by region and industry, and even by company in large industries. Compensation emphasized keeping customers and meeting and exceeding quotas for new sales. This oriented employees toward knowing their (typically corporate) customer well. In this case, customers were the information systems (IS) employees at customer firms, who operated systems, and corporate vice presidents, who controlled budgets for purchases. By the late 1960s, no other firm could match this network of relationships, which, in turn, became a classical sunk-cost-based barrier to entry.

Prior to the emergence of the PC market, IBM's managers consistently acted to protect the profitability of serving the large-system market. They tried to keep most of the business for installing upgrades within the IBM product family. They adopted policies for resisting the use of nonproprietary software specifications and, more broadly, anything offered outside IBM's proprietary designs. They kept the manufacturing of most products in-house, and for most of the 1970s IBM also resisted adopting technical standards put forward by national or international standard-development organizations.¹⁰ IBM also offered only limited support for plug-compatible competitors and third-party peripheral vendors and tried to limit the information that flowed to them. A number of antitrust cases arose over these practices, and over time IBM's behavior changed in response.¹¹

IBM's managers were fully cognizant of the role of economies of scope. Inside IBM there were frequent debates about whether (or how) to respond to new technological opportunities and whether (or how) to respond to a large number of outside firms serving different parts of the computing industry. These debates focused on issues where the

¹⁰ Brock's (1975a) study of IBM's policies for EBCDIC is representative of this type of analysis.

¹¹ IBM's resistance to plug-compatible components dated from an antitrust case over selling punch cards. It arose again with the System 360 and its legacy, as IBM sought to compete with third parties and clone makers. This generated a federal antitrust case and a European commission case, resulting in a series of policies for sharing information with other firms.

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extent of economies of scope play a crucial role—such as the breadth of IBM’s product line, which customer needs to address, and which technical opportunities to investigate. Indeed, the debate that led IBM’s managers to introduce a PC began in the summer of 1980 just as many of these prior debates had begun; and an objective observer might have conjectured that this one also had a high probability of expending many resources but not fundamentally altering IBM’s business.

The decision-making processes inside IBM possessed features that exploited economies of scope. It centralized strategic decisions. Watson Sr., the CEO who built IBM over several decades and began its foray into computing markets, had encouraged contentious debate, ruling through his personal authority (and infamous temper). When Watson Jr. became CEO in 1956, he tried to reduce some of the *ad hoc* features of strategic decision making by establishing the CMC (for Corporate Management Committee). By the late 1970s this process touched every aspect of strategy in IBM.

Centralization shaped many incentives. “Escalating a dispute” to the CMC became a known tactic throughout IBM. Professional reputations at IBM were made or ruined from presenting well to the CMC or from wasting its time. Known for its decisive decisions (especially in the era of Watson Jr.), the CMC also spawned layers of management below it. These layers decided which disputes received attention.¹² It also became famous for its “task forces,” which generated reports aimed at gaining more information in an open dispute.

Consequently, IBM’s top managers, in general, aggregated a wide range of customer concerns *and* coordinated large-scale product development strategies for the entire customer base. In the mainframe market, more specifically, this process gave rise to products that were, broadly speaking, high quality, backwardly compatible, technically conservative, and highly priced. Introducing products with backward compatibility (1) supported IBM’s competitive position by renewing and extending the installed base and (2) kept customers happy by enabling them to preserve their large local investments.

¹² This process continued to guide the formulation and implementation of strategy for IBM until an outsider, Lou Gerstner, became CEO in the early 1990s. He eliminated the entire process.

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Users had the option to buy software from IBM or to build it themselves and, in either case, refine practices through trial and error.

The technical constraints imposed by respecting backward compatibility meant that IBM's offerings were not always on the technological frontier. In addition, the collection of information and the development of large-scale projects often took time, further putting product introductions behind the ever-shifting frontier. Mainframe customers, however, were generally willing to wait a short period for the next upgrade—as long as they were not too far from the technical frontier. For IBM, then, there was little strategic cost from focusing primarily on lowering the probabilities of costly error. Thus, IBM developed elaborate quality-assurance processes to ensure that they shipped robust products.

IBM's organization empowered the sales function to make critical decisions about the direction of technical progress. This in turn enabled the organization to pursue numerous internal technical initiatives and choose among them—commercializing some in a customer-friendly fashion, often to the great unhappiness of the technologists whose projects were not chosen.

This organizational form contributed to IBM being serially effective at exploiting new market opportunities in enterprise computing. Major technical advances, whether invented inside the firm or not, ultimately became part of an increasingly capable IBM platform that served enterprise customers well. Note, for example, the high-value strategic response to computer networking: As the PC wave loomed, IBM was engaged in platform improvements for electronic commerce supporting valuable applications (e.g., the computerized reservation system for airlines, the automatic teller machine network for banks). These adaptations to a new environment were successful for IBM and its customers. It was with some merit, then, that IBM's employees believed they understood—in ways that others did not—the combination of organizational traits and technological features necessary for commercial success in large-computing systems.

That said, in the late 1970s IBM's management was not excessively smug about the capabilities of its organization. In their view, sampling widely often raised legitimate issues that required coordination between different parts of IBM. These issues reflected

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both organizational and market-oriented concerns. The process, however, also had some readily apparent drawbacks, such as its slow and inevitably painful movement toward a result. The need to coordinate input from the sales-side with new technological opportunity also put great pressure on senior management's ability to comprehend and select among conflicting opportunities, as well as settle disputes.

Indeed, partly for such reasons, management's levels of steadfastness to using such a centralized organizational process changed over time. For the PC, management waned in its commitment, choosing at first to bypass this process before recommitting later. As we discuss subsequently, these changes affected the timing and severity of events in the PC market.

Lack of commitment to this process also occurred because IBM's efforts to compete outside its core enterprise computing market had a rather mixed record, with a substantial number of failures. This was not due to lack of experimentation. In practice, IBM relied on its own executives' judgment and its own task forces to decide what to do on the basis of steady experimentation with new technologies, overwhelmingly done in-house after soliciting heterogeneous voices reflecting a wide array of perspectives and financial incentives. Ultimately, some of these initiatives may have failed because the technology was challenging or the customer not well connected to IBM. For example, there was even a single-user computer—not remotely a PC—that did not find much of a market in the mid 1970s. Yet, the pattern was quite broad. Attempts to make minicomputers and other smaller systems also had long histories of commercial failure.¹³

One particular market failure cast a long shadow over many early decisions regarding PCs. The minicomputer market arose outside the mainframe market, thereby generating a crisis within the CMC to initiate a response. The IBM 4300 was designed to compete with DEC's VAX, a general purpose mini-computer. Many in IBM forecasted that the VAX would move from its dominant position of selling to engineers to

¹³ We will discuss some of these experiments below, but notable successful experiments included early word processors and some early small computers, such as the 1620. However, IBM's competitive difficulties responding to Wang and other providers of words processors were well known. We will also discuss some of its difficulties with general purpose mini-computers below. See Haigh (2006) for an analysis of IBM's position compared to various initiatives from other firms in office computing.

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competing for IBM's primary customer base within offices. The 4300 was introduced in 1976–77 but stumbled in the marketplace because it was forced to align with IBM's existing organization and technology. In contrast, DEC, whose product was aligned with the emerging midrange market, succeeded admirably in growing into a system that both engineers and non engineers used.

As a result of the IBM 4300's failure, many within the management took several lessons that shaped their decisions regarding the PC. They concluded that the decision-making process itself had led the firm to develop an ineffective product. The IBM 4300 was a compromise between many organizational demands and market needs, while the competition simply responded to market needs. For example, the 4300 was a *partially* compatible system. At the insistence of the Mainframe Division, it respected some of IBM's existing mainframe technologies. Yet its designers gave up on full compatibility in order to embed technical advances in the system. As another example, IBM's planners also compromised on the pricing to keep it competitive with potential entry by a VAX. So, the Marketing Division embedded some overhead and service in the standard contract, which cost more than the other general-purpose minicomputer firms but not as much as a mainframe. Users, however, largely rejected these compromises for competitive alternatives.

Altogether, as the PC revolution began, issues about the economies of scope at IBM were pervasive. The organizational capabilities were fully aligned with a profitable market opportunity in large-systems and had a strategy to remain dominant. The organization was permeated with powerful incentives to serve the existing customer well: The sales organization was the strongest organizational actor, and decision making was slow, contentious, and—in the context of its existing market—very successful. Yet, would these same strengths help or hamper IBM's ability to reposition itself successfully in the face of new opportunities? That was an open question.

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III.2. The Advent of the PC

Why did IBM finally enter the PC market—and in so doing embrace the open systems¹⁴ business and organizational models that the firm had long rejected? That question is the focus of this section. It is a puzzling choice from any perspective that emphasizes inertia in managerial decision making and organizational design. In addition, given that IBM's entry gave enormous impetus to the PC revolution, though other firms ultimately earned the enormous profits as well, IBM's strategy is difficult to understand either looking forward from their initial behavior or with twenty-twenty hindsight.

Part of the answer about the timing of this decision must lie in the success of the PC before IBM entered the market. This is intimately linked with the question of why IBM at first ignored the PC—which is ultimately connected to organizational limits on economies of scope and the managerial response to awareness about such limits.

The origins of the technology were unprecedented, and, by the same token, initially unthreatening. Between 1975 and 1979, when the PC industry first began to emerge, IBM's managers did not have any reason to believe the PC could become a large business opportunity—and certainly no reason to believe that it could be a threat to the profitability of the mainframe business.

Many firms with appropriate technical capabilities such as Texas Instruments and Hewlett Packard had stayed away from the product area. Like IBM, they did not perceive

¹⁴ There is an ongoing controversy over the definition of the word *open* in the computer business, and sometimes it appears there are about as many working definitions as there are experts in this area. Given this lack of a widely accepted definition, we state what we mean and intend to use it consistently. We use the definition of an *open systems platform* as one on which any firm can improve and for which no firm controls a bottleneck on improvements. In that sense, the IBM PC was an open systems platform in the 1980s, as it contained numerous expansion slots, as well as allowed for rather large amounts of unimpeded customization (by users) with the purchase of software applications and other components from vendors other than IBM. In saying this, we recognize that the scope of the user's ability to customize continued to expand after 1981, encompassing all aspects of hardware by the late 1980s, and then it continued to shrink thereafter. The Windows PC is not an open system platform today, as Microsoft maintains a bottleneck on many forms of additional components and customization. (Some observers would use a different definition of *open* and say the Windows PC is open because there is no proprietary hardware firm with a bottleneck.) Similarly, in the 1980s, IBM mainframes were a proprietary system, not an open one, while in the 1990s, the World Wide Web was an open platform not a proprietary one.

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any commercial opportunity.¹⁵ Instead, a hobbyist (almost amateurish) community had given rise to a “bottom-up” process for invention. The customers were hobbyists and gamers, and the largest market appeared to be in the home. The PC market had its own magazines, such as *Byte*, and also its own social network, such as at the Homebrew Computer Club. As such, the PC market appeared distinct from existing computing markets.

The architectures for PCs initially met no technical ideal that a large-systems manager at IBM would have ever articulated in advance. Instead, they met the pragmatic goal of satisfying the individualistic (and somewhat quirky) demands of technically savvy hobbyists, allowing such a user to perform some basic computing functions for very little expense, at their own convenience, and, importantly, without oversight from IS managers (with whom IBM had strong existing relationships).

The identities of the extant PC suppliers were not large established firms with corporate clients (IBM’s familiar competitors). Apple was a start-up, Atari was an entrepreneurial game company that expanded into computing, Commodore was an entrepreneurial calculator company that had expanded into computing; and these hardware suppliers used another operating system, CP/M. Only Tandy had an established business in its Radio Shack chain, but this chain was nothing like any of the mainframe firms.

Moreover, while Apple had begun writing its own applications and encouraging others, the CP/M community was uncoordinated, often descended from hobbyist electronics communities. No single supplier provided the lion’s share of the proprietary parts. The microchips came from Motorola (and others), while the other parts, such as disk drives and monitors, came from an assortment of low-cost standardized suppliers. There were few proprietary parts or designs. Moreover, the PC was distributed through catalogues and (at that stage) a limited number of independent retailers (in addition to Radio Shack).

¹⁵ None of the other familiar competitors served this need, not Burroughs, Sperry-Univac, Honeywell, and so on. It also did not come from the places where the typical technological revolution in computing science originates, such as MIT’s or Stanford’s laboratories, IBM’s own labs, or the Department of Defense.

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Overall, in relation to the mainframe, the earliest PC firms did not sell a computer that represented a drastic or incremental technological change in any possible meaning of the concept. The PC, such as it was, was not even remotely competitive with the IBM mainframe, and the PC's customers were users with whom IBM, DEC, Wang, and others did not bother. In short, the product was not targeted at IBM's customers and arguably, could not meet their needs without changes. No existing computer firm entered in the early stages, which lasted several years. Indeed, of the more important supply sources of PC entrepreneurs were junior engineers from established computer companies, who asked their employers if they could work on a PC project in-house and were refused.¹⁶

All of this started to change in the late 1970s when the existing PC began to find a market inside the corporation, attracting notice from programmers with a variety of backgrounds and interests.¹⁷ Commercial, rather than hobbyist, users bought application software from third-party vendors such as Visicalc, the most popular application for the Apple II. In the early 1980s, word processing started to look like a useful technology in bureaucracies, and the leading word processing program for the time, WordStar, began improving itself so it resembled a nascent emerging corporate software vendor. A number of corporate PC efforts were announced, including one from Apple, the Apple III. Suddenly, the PC was being sold to IBM's customers.

Our only point so far is that Apple and others were the "entrants," as in the standard model of technology waves. Furthermore, it is not surprising, in retrospect, that forward-looking firms would seek to enter the PC market after observing the entrants' experience and their recent change in strategies. Almost simultaneously, a number of established computer firms entered the PC business, including DEC. By far the most successful, however, was IBM.

Once again, it is hard to maintain that IBM's actions in the PC market were irrational. If anything, it is easier to interpret these events simply: IBM's management

¹⁶ In a canonical story, Wozniak approached his bosses within HP for support to produce the earliest PCs and was rebuffed. Jobs had worked there several summers prior to founding Apple, but by 1976 worked at Atari. He and Wozniak both quit their jobs in order to start Apple.

¹⁷ Indeed, Lowe and Sherburne (2007) note that eventually IBM CEO Frank Cary expressed concern that the creeping encroachment of the PC into corporate organizations had also infected IBM, and the Apple II has "captured the hearts and minds of IBM programmers."

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supported forward-looking experimentation in its subdivisions (and one of those unexpectedly bore fruit). Looking closely, however, this simple interpretation also does not hold up. From the outset, the situation was more nuanced, and many aspects of the decision are most readily explained as an outgrowth of management's concerns about the limits of IBM's economies of scope.

IBM had a group based in Boca Raton whose primary goal was to follow small-system developments and propose responses. In the late 1970s, the managers in Boca Raton took notice of the PC industry.¹⁸ Deliberate in its activities, the group became intimately familiar with the workings of every available PC, studying the technical foundations of each project and its marketing strategies, such as they were. Indeed, there was nothing particularly secret (or technically spectacular) about Boca's activities at this time. All in all, this was precisely the type of activity expected of a major firm that was attempting to monitor commercial activity in related markets, but most of it was speculative. Most other employees outside of Boca did not care about what happened there.

After considering a variety of actions, this division arranged for a presentation in front of the CMC, and the invitation to present came with the active support of the CEO, Frank Carey. The leader of the Boca Raton group, Bill Lowe, made one of the most fateful presentations in the history of corporate computing. He was able to persuade the CMC to consider making a significant investment in the PC. After the first presentation in July, he was asked to return in a few weeks with a fully developed plan. Because the group was already intimately familiar with the workings of every small system, both IBM's prior attempts and all the others coming from firms at that time, Lowe's group was able to develop a fully viable plan in what seemed like such a short time. That plan looked remarkable to those who had not been familiar with Boca Raton's activities until then, since it included detailed estimates for costs and time to completion.¹⁹ It is more

¹⁸ The contemporary media also shaped perceptions. Atari and Apple computer were the darlings of the business press. See, e.g., Cringley (1992) or Frieberger and Swaine (1984).

¹⁹ At this time Lowe was systems manager for what was called "Entry Level Systems" and he was later appointed to lab director for the site in November of 1981, before his departure. For a full recounting of this episode, see Lowe and Sherburne (2007). We thank Bill Lowe and Cary Sherburne for providing the

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properly interpreted, however, as IBM's managers exercising an option on an investment that the company had been making for some time.

This experiment had several novel features. Among them, the CMC authorized the division to use an entirely different organizational and business model. Why? And most important for our purposes, Why was it destroyed within five years? In answering that question we explain both the timing of the PC and develop much of the answer for why the organization faced so many challenges sustaining the division thereafter.

There were, apparently, multiple reasons for going ahead. IBM's CMC left few paper records, so most of what is known comes from many contemporary second-hand accounts²⁰ and one retrospective first-hand account from Bill Lowe.²¹ The following are among the salient issues discussed:

(a) Some technically adept users crossed the line between hobbyist and work use. The PC was about to be marketed to people inside IBM's customers.

(b) PCs were already easier to use than "green screen" terminals. As an intelligent terminal, the PC potentially threatened revenues for CRT (Cathode ray tube) terminals, which was a huge business for many sales representatives.

(c) Although the revenues were small, PCs were getting attention from futurists and popular trade magazines. This was especially true of the Apple II and the plans for the Apple III. Apple and others were loudly pursuing business users, gaining a hearing if not yet much in the way of sales.

(d) The PCs involved a loose collection of entrepreneurial and less-established firms. Bill Lowe argued that the introduction of professional distribution and servicing, which was IBM's traditional strength, could significantly alter the value proposition of a well-positioned design similar to what was already provided.

authors with a draft of this account in advance of publication of their book. The account comes from Chapter 2 of the book. Hereafter we refer to this as Lowe and Sherburne (2007).

²⁰ This episode has been reported widely, but not the details behind managerial decision making. See, in particular, the accounts found in Chposky and Leonsis (1988) and Carroll (1993).

²¹ Lowe and Sherburne (2007).

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(e) A nightmare scenario was easy to sketch. Futurists had been forecasting a computing market based on microprocessors. Left unchecked, IBM's own customers might soon ask IBM to design products that worked closely with technical standards from others. As in the minicomputer market, the bulk of the revenue would flow elsewhere unless IBM acted to control standards.

(f) Clarity about the nature of the future market opportunity may have mattered much less than the leadership's (in particular, Frank Carey's) desire/obsession to fill a hole in a product line that had defied many prior product development attempts. They were willing to experiment to get it done.

This last point is a critical one, because the CEO's protection of the IBM PC Division permitted it to act in ways that did not follow "the IBM-way," as understood by IBM employees elsewhere within the company. The protection even continued after Frank Carey stepped down as CEO in January of 1981, but remained as Chairman of the Board. John Opel became CEO and continued with the policy, though (in due time) eventually began to modify it. We will provide details of this protection in the next section.

More broadly, this list also shows that IBM's introduction of the PC was not an event determined solely by the competitive dynamics of the marketplace. Rather, it arose from a complex interaction of the organizational dynamics within the firm coupled with a reasonably accurate, if indistinct, perception of the PC market's role as opportunity and long-run threat.

III.3. A Firm-within-a-Firm

The 4300 experience had fueled a debate inside IBM. Many blamed a planning process that (1) was unaccustomed to delivering decisions with any sense of urgency, (2) represented too many voices, (especially those of existing account managers concerned with cannibalizing existing sales), and (3) allowed for too many technical compromises. The experience in the midrange market also illustrated the dangers of letting a firm other than IBM establish, manage, and grow a platform with backwardly compatible features.

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IBM's early decisions in the PC market were shaped by this prior experience. For one, they encouraged the CEO to create an independent division—the term inside the company was an *independent business unit*, or IBU—with considerable autonomy. That departure from norms was coupled with another. Most dramatically, the managers in Boca Raton were given an executive mandate to produce a design for commercialization in less than a year—by the summer of 1981. There was no precedent for such speed at IBM: Some observers speculated that designing a PC using IBM's normal engineering approaches would involve a two- to three-year decision-making cycle.

In conjunction with this extraordinary goal, Boca Raton's managers were also given a direct reporting line to the CEO. When others in IBM tried to challenge the PC group, Carey and then Opel both backed the PC group's decision *without* calling for any presentations at the CMC, and remained loyal to a precommitted schedule for review every few months.²²

This structure also departed from a core social and procedural norm at IBM, one that supported transparent and ubiquitous accountability. IBM was a company where everything was inspected or potentially subject to inspection, formally and informally, at all times. Said another way, all employees expected to be held accountable for achieving targets, and managers anticipated inspecting and controlling processes with the intent of reaching targets. Against that history, the protection for the IBU was a dramatic departure. No division had ever been given discretion to make decisions over a time period of medium length without the potential for immediate review.²³ Hence, the PC group was given a license to *de facto* “act like an entrant.” And, at least initially, the division did, suggesting that—apparently counter to our central argument—IBM's

²² More specifically, with a normal initiative other senior managers within IBM were allowed to raise objections and, in so doing, initiate a process to bring issues to the CMC. Frank Carey let it be known in advance that this procedure would be modified for the PC initiative—ostensibly in light of its tight deadline and importance of the initiative to the senior management. The rule was thus changed: As always, any IBM senior manager was allowed to raise an objection about the PC initiative. However, as a new condition, they would be required to travel immediately to headquarters in Armonk (potentially even the next day) to explain/defend their objection. Consequently, and in sharp contrast to all other major initiatives at IBM at the time, not a single objection was brought to the CMC for consideration regarding the PC over the next year. See Lowe and Sherburne (2007).

²³ We thank Jim Cortada for pointing out how important was this particular departure from norms.

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existing organizational processes were not constraining the firm's response. Looking more closely, however, IBM's managers did not and perhaps *could not*—leave the PC Division alone once its business became important. Those later events explain the timing and shape of the events that followed.

The Boca design team made many decisions for design, development, and production which departed radically from IBM precedent. Following other early entrants, it used inexpensive (instead of frontier) components, except in a few key places such as the microprocessor.²⁴ IBM also sourced parts from other suppliers for things such as memory, disk drives, and printers and, in general, used off-the-shelf parts, except in a few key places such as the ROM-BIOS, which was a proprietary IBM design. Breaking with precedent, IBM also invited other vendors to make compatible software and peripherals for the new PC. To do so, it made many technical details about its PC available to numerous other firms, which was yet another break with IBM's general practice of secrecy.²⁵

A firm-within-a-firm like the IBU corresponds to one of the archetypes of the economics of organization. In the early days, IBM appeared to bear no organizational scope diseconomies. On the contrary, the firm appeared to gain large economies of scope from its reputation, an extremely valuable asset in a young market, as customers in corporations turned to IBM for a PC, and application developers wrote for a platform whose success they forecast.

Although correct, that analysis is too simple. First, some of the costs from this choice were not apparent in the short run, particularly while the division was small and its sales nonexistent. At that stage, the IBU was only interacting with other parts of the

²⁴ This chip design was close to the frontier in the sense that it came close to the fastest available, but also off the shelf in the sense that (a) it was not the absolute fastest (using the 8088 instead of the 8086); and (b) it already existed at Intel and then, at IBM's insistence, at a second source, AMD.

²⁵ The key word in that sentence is *invited*. By this point there was also a third-party software industry for IBM mainframes, but the relationship between those firms and IBM had emerged after numerous ups and downs in cooperation. The relationships with PC software firms looked quite different. Though IBM attempted to supply some application software, it did not overtly discourage PC software entrants. Indeed, as noted in various places in the narrative, IBM took actions, such as releasing technical specifications, to overcome some of the existing mistrust. These differences were widely recognized at the time. See the accounts in Chposky and Leonsis (1988) and Carroll (1993), for example.

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organization and some outsiders. Yet, as long as their foundations lay unaddressed, these costs could reappear at some point. Indeed, as we discuss for much of this narrative, those costs would reappear soon, and repeatedly. We defer a list of these costs for the time being.

More immediately, there were also some costs in the short run. Problems arose from IBM's established reputation. IBM sought as partners the leading suppliers of key PC complements. They succeeded in signing up the foremost makers of the microprocessor (Intel), programming tools (Microsoft), and spreadsheet (VisiCalc.)

Yet IBM's reputation as a proprietary systems company led to problems negotiating with the foremost makers of the leading operating system (CP/M) and word processor (WordStar).²⁶ Failing with its first choice for the operating system, the team from Boca Raton turned from CP/M to its next choice for the operating system. This firm was as motley a company as any of the other software vendors, which signaled how far the IBM team was willing to go for the sake of speed. The PC group procured their operating system from a Seattle-based company (Microsoft) consisting of a 32-employee firm when IBM first called in July of 1980. Microsoft was managed by a young Harvard dropout from a local family (Bill Gates), his teenage techie buddy who would soon quit for health reasons (Paul Allen), and a Harvard friend and Stanford MBA dropout (Steve Ballmer). Microsoft's lack of conventional credentials was not unusual in a market where the co-founders (Jobs and Wozniak) of one leading firm (Apple) also were college dropouts and had once briefly sold "blue-boxes" to hack the telephone system. Microsoft's sketchiness was exceeded only by the supplier of IBM's word processor, whose owner's previous activity had been as "Captain Crunch," a notorious "phone phreak" (or telephone hacker.)

²⁶ Senior managers at both companies were concerned that working with IBM would simply lead to the divulgence of all their proprietary knowledge to IBM. They sought *ex ante* contractual protection against such outcomes. Those issues, in turn, led IBM's PC managers to eventually give up on any agreement, which led them to choices they considered less favorable. And, indeed, such concerns had merit in practice. For example, delays in contracting for the operating system led to delays in finally getting a potential arrangement in place (in this case, with the second choice of supplier, Microsoft), which led to delays in starting the final design of the system, and kept the operating system a major source of concern during this year of planning for the launch.

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How did IBM succeed in having a firm-within-a-firm with only the (small) reputation disadvantages and (large) reputation advantages of being in IBM? Why was the team allowed to act so differently from the more “normal” modes of operation of the Mainframe Division? The answer arose from the interplay of the market circumstances and the organization’s normal processes. The failure of the 4300 almost certainly played a role. So, perhaps, did the extensive history within the firm of separate divisions attacking niche markets. IBM had an active Office Products Division, for example, whose prototypes were state-of-the-art for their time and included variations on some of the best electric typewriters in the business.

There was also a social mechanism within the firm to legitimize “different” activities. Both Watson Sr. and Jr. had frequently used the term *wild ducks* for employees who differed from social norms but performed valuable activities (which were often unique or unusual or technically advanced). Boca Raton applied the label to itself and so did others, giving it social license to differ during this period of experimentation.²⁷

Thus, Carey and Opel took a few risks: They irritated other parts of IBM, but at little cost in the short run. IBM’s every attempt at small systems prior to the PC had failed, and if this attempt failed too, then any conflicts with other parts of IBM were moot points. If it worked, it would result in the development of a product where none was expected. In short, precisely because the attempt was *not* seen as directly related to the future success of IBM’s core business, it was shielded from IBM’s most important organizational capabilities. As we argue, as soon as that perception began to shift, the division’s independence came under attack, and that attack illustrates the organizational limits of economies of scope.

²⁷ The term *wild duck* seems mostly to refer to social behavior (i.e., a wild duck does not fly in formation). At IBM, that implied that, unlike all the sales representatives, the individual did not wear blue suits and white shirts every day. More broadly, it was a social convention for permitting creative technical talent to contribute to the enterprise in spite of a sometimes awkward social fit with the sales division.

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III.4. Problems of Realignment

The launch of the IBM PC and its sales for the next few years went spectacularly well, far better than any official prediction had dared to state prior to its launch.²⁸ The success of the PC Division could have led to one of two outcomes. IBM's top managers could have concluded that the success of the division arose from many of its unique features. In that case, the lessons learned in the new division would need to be transported to the rest of IBM, or at least maintained on a second track. Alternatively, they could have concluded that many of the successes at the PC Division arose in spite of its unique organizational features. In that case, many of the features of the existing organization would need to be transported to the new. In fact, the latter occurred.

In common with many other observers, our interpretation below traces many of the failures at the PC Division to the imposition of procedures that are normal for larger systems. We will, however, interpret these procedures in terms of the costs of coordinating two divisions in two distinct market environments, where one division is well aligned to the established market, while the other serves the new market—to which it is also well aligned. Forcing the new division to coordinate with the existing imposed costs on the new, and these costs contributed to the new division's decline.

We recount these events in light of many prior portrayals. IBM's PC troubles attracted considerable press attention after 1988. IBM's financial distress in the 1990s attracted attention and had huge implications for the computing marketplace. In addition, there were many arresting stories written about the seeming absurdity of IBM's managers' actions in the face of the overwhelming evidence of crisis in the early 1990s, which later culminated in a changing of CEOs. In comparison, those earlier events between 1985 and 1988 did not receive as much attention.

While the latter events are certainly engaging illustrations of behavior at a formerly dominant company going through a crisis, they provide little illustration about

²⁸ Even at this early stage, existing organizational perceptions shaped forecasting. Boca Raton's managers believed the market potential was large, but dared not say so in their first presentations to the CMC in deference to the prevailing sensibilities. The division's official forecast for sales was deliberately chosen to not exceed the total number of IBM worldwide installations at the time, just over two hundred thousand. In fact, sales of the first models eventually exceeded several million units. See Lowe and Sherburne (2007).

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the foundations for the organizational limits of economies of scope, which is our goal. We accordingly concentrate on earlier events. In doing so, we also shed light on what later observers missed and misunderstood as irrational behavior, and what made the latter events so severe.

III.4.a. Tensions from Aligning with Two Opportunities

The firm-within-a-firm came to an end in early 1985. Less than five years after agreeing to initiate the project, the IBM PC company was completely brought back to the familiar IBM style of management, with no independent decision making and limited discretion for the division. How did that come about?

Even at the outset, though IBM's PC design was supposed to respond to market needs, it also deferred to some of the existing practices at IBM. For example, the original proposal for the design of the PC explicitly *did not* propose a leading-edge design at the frontier of microprocessors for fear that doing so would get the entire project politically derailed over cannibalizing IBM's (already sputtering) minicomputer product line.²⁹

Many of the pre-existing parts were also chosen because they had passed marketplace tests and could easily pass internal IBM reliability standards. In effect, the PC group backed into a design with both frontier and conservative features, which some marketers believe helped sell it to business buyers. This gave the strategy an internal organizational logic that might best be described as partly "under the radar." The rapid and incremental design was also reasonably well aligned to the needs of the PC market at that time.

IBM announced the product in August of 1981. It shipped that fall. There was strong demand—surprising many within IBM. But even strong demand could not overcome rising tensions with the rest of the organization.

One tension arose in the early planning for production. The PC group had avoided using internal supply if the costs were not the lowest. The PC group made many enemies at the divisions that were turned down. Even when divisions won rights to supply parts, it did not earn the PC group many friends because the group made internal

²⁹ Hence, when choosing between two 16-bit microprocessors, which pushed the frontier of the time, the designers picked the 8088, which had an 8 bit data bus, unlike the 8086, which had a 16 bit bus. That choice slowed down the system in comparison to what it could have achieved.

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suppliers act like external suppliers. This was not the norm in mainframe production. Throughout the 1970s, the mainframe group had covered everyone else's variable expenses, overhead, and cost overruns in a single company-wide profit statement. . When the PC group eventually enjoyed enormous profits, several of these component groups raised questions about whether the PC Division profited by not accepting standard practice for allocating the overhead of other manufacturing units.

Another major source of tension arose from the failure of the PC-jr, which was ostensibly aimed at the home user. IBM had aimed its first PC at the business user and perceived an additional market for a compatible design. This was launched in 1983, and became the focus of many news stories throughout 1984. The product did not sell well and a great deal of inventory had to be written off. It was also a source of much public embarrassment for IBM.

There were many causes behind the PC-jr's failure, but four deserve note. First, expectations were out of scale with reality. A small firm with the sales of the PC-jr would have considered it a success. Second, and most concretely, it had a poorly designed keyboard. Known as the chicklet keyboard for its diminutive size, it was ridiculed inside and outside the company. Third, PC-jr was not compatible with the business PC, so it sacrificed whatever market advantage it had, competing directly with other systems better suited to the home market. Fourth, the specifics of these failures are less important than their inevitability due to the group's entrepreneurial behavior. Like any entrepreneurial organization, this one experimented with balancing new designs, new choices for suppliers of parts, educated guesses about the nature of demand, and compromises between cost-saving goals and desirability-enhancing features. The PC group also came close to operating according to the norms of an entrepreneurial enterprise by emphasizing quick decisions, resolving disputes through verbal debate, using minimal documentation, and deliberately taking risks. Thus, some failure was almost inevitable, a byproduct of the PC group's attempt to take market risks and act like an entrepreneurial company.

As in most young market, these failures taught all market participants a great deal about market demand and supply. Yet, most of those lessons would be used by the next generation of products. Just as IBM had learned from watching prior pioneers, the

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pioneering activities in Boca Raton did not have to be the one to supply the subsequent generation, and, in fact, it largely was not.³⁰

As long as it succeeded, the group was safe from second-guessing. But publicized errors made it vulnerable to assessment according to the older norms. For example, when the PC-jr did not generate large home sales, the PC group was accused of not studying and understanding its market using appropriate marketing techniques. A couple of years later, when quality problems arose at the (sole) supplier of hard drives for the PC/AT, which affected the quality of the whole product, the division was accused of violating company norms for having second sources for key components.

The internal perception thus began to arise that the division's failure to use IBM's existing organizational competencies was hurting its performance. At the same time, others inside IBM began to believe that the PC Division risked actively harming the core mainframe business.

In the view of the established divisions of IBM, the well-publicized Chaplinesque errors at the PC Division (especially over the PC-jr's design and the AT's problems in quality control) diminished years of careful image building for all of IBM, hurting the firm's reputation for reliability—something that was essential to the marketing of large-systems. The publicity that the division received (e.g., the IBM PC made the cover of *Time Magazine's* "Man of the Year" as "Computer of the Year") was thought to have interfered with important aspects of IBM's marketing strategy with respect to its traditional customer base.

The specifics of these examples are less essential than their general feature. Once the division had any failures that threatened the reputation of the larger organization, senior management heard about it from other parts of the organization. Although the failures and the subsequent backlash do not make change inevitable, they do make senior management aware of the organizational costs. This meant that the management would have to (at a minimum) consider changes to the formal assignment of authority or other actions to protect its asset—its reputation.

³⁰ Indeed, under Estridge's leadership, the PC had become so focused on the PC-jr that it had not started planning for the next generation of business PCs early enough. See the account in Lowe and Sherburne (2007).

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Distribution was another major cause for concern. Boca Raton—in keeping with its mission to “act like an entrant”—did not initially depend on IBM’s own distribution network, instead arranging for distribution through third-party retailers, Sears and Computerland. Once again, it is not our goal to second-guess this initial choice, which served the strategy to launch well. Rather, we highlight the deferred and inevitable organizational costs: Channel conflict was inevitable in this arrangement, as multiple channels served growing demand, especially because demand grew well beyond what had been forecast when it was first established, and, not trivially, because the external channel worked better than even the PC group had intended. Quickly, Sears and Computerland grew accustomed to selling and servicing PCs in large volumes. Many businesses then used these outlets for purchase instead of going through IBM’s distribution system.

Multiple issues arose that never before had arisen at IBM because no division had ever before been given the autonomy the PC Division possessed. By 1984, the PC Division had revenues of more than four billion dollars—making it the third-largest computer company in the world, had it been a stand-alone company. That sounds terrific on an organizational level, but it was not success that necessarily flowed to employees outside the division, and that gave rise to another significant cost at an organizational level. A significant fraction of that revenue was not contributing to sales commissions, a factor that was generating conflicts with the established distribution division for IBM.

Although both the Sales Division and Sears could sell PCs, the internal IBM divisions received the PCs at a discount. The large accounts—those for CRTs, for example—were held by the Sales Division, but smaller firms and independent buyers could purchase from Sears. Thus, IBM had an internal division competing with an external company for the sale of its product. In addition, it mattered how these sales were counted. For example, when sales personnel had to make arrangements with Boca Raton to ship PCs to a customer, who was billed for shipping the product from Boca Raton? Boca Raton, the Sales Division that was handling the account, or the customer? Who received credit for selling the product? Boca Raton or the Sales Division? The result shaped commission levels, which shaped the ability of sales people to reach quotas. There had to be arrangements made across the entire company for sales to get “revenue

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equivalent” credit for a sale against a salesperson’s quota target, so the sales force had incentives to push PCs. In addition, when credit for selling was shared, Accounting had to be careful not to double-report the sale.

Another more subtle form of channel conflict also arose. The PC group was accused of not policing the gray market for PC hardware. The gray market resells PCs and is operated by vendors who purchase excess inventories at a discount from established dealers. This brings down prices, so the PC group had less incentive than IBM’s distribution channel to police the gray market.³¹ It is unclear whether these accusations had any truth to them, but the accusation continued to be raised in Armonk, even after Boca Raton revoked the authorization of a few specific outlets for violating IBM’s resale restrictions.³²

Once again, the specific feature of each aspect of channel conflict is less important than the general lesson behind the illustration. IBM’s distribution channel relationships were a key firm-wide asset, and the PC business and the rest of the company had powerful and misaligned incentives regarding how to use it. That does not make change inevitable, but it puts the costs in front of management. In brief, issues about changing the structure of formal authority over distribution were inevitable once the PC division demonstrated any significant commercial success.

Senior management did react to these costs, and rather quickly. In 1983, less than two years after launching its key product, the division was reformed and renamed the Entry Systems Division (ESD), and it lost its direct reporting relationship with CEO Opel. Estridge, the group’s director now reported to a supervisor who reported to a CMC member who reported to Opel. While the division retained its discretion over forecasting, pricing and servicing, this change began the integration of Boca Raton back into normal IBM operating procedures.

³¹ Evidence for this accusation is ambiguous. See the discussion in Carroll (1993).

³² There were continuing conflicts over channels, especially during the planning for the PC-jr. In one view, the channel for the PC-jr should have been expanded to other mass-market retailers, such as K-Mart and JC Penny. In another view, which eventually prevailed, such channels could not provide the after-sale service that IBM wanted from outlets selling its products.

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This earliest change was not just window-dressing on the assignment of formal authority. It affected daily operations. Rather than running the division directly, Estridge, the newly appointed president of ESD, began to spend several days a week in Armonk, taking care of internal political and operational issues, gaining approval for actions, leaving others in charge in Boca Raton of many details. He was appointed IBM vice president in 1984. Through much of 1984, he fought attempts to make the PC a part of an office automation strategy and attempts to coordinate distribution of the PC with other parts of the company.

IBM's senior management experimented with this formal assignment, and, once again, reacted, and rather quickly. In January of 1985, a little over three years after first selling an IBM PC, Estridge lost this broad fight, and the National Distribution Division gained control over retail dealer sales of all PC products. That officially ended the experiment with the IBU, though, as noted, many aspects of the IBU had ended some time earlier.

These formal changes involved more than just assignment of divisional responsibilities. Key personnel and geographic proximity were altered. Not long thereafter, Estridge was moved to another position.³³ The original manager for Boca Raton, William Lowe, was moved back as president of ESD.³⁴ Along with Lowe's reappointment came a reporting structure for the PC Division similar to those used with other IBM divisions. In June, two hundred of the top executives were moved out of Florida and to a facility near Armonk.³⁵

While few written records about the CMC decision were kept, it was clearly quite controversial with employees in Boca Raton. As with the decision to initiate the project,

³³ Estridge was given the title, Vice President, Manufacturing, and a job involving world-wide manufacturing. Most employees within the company and IBM-watchers outside the company viewed it as a demotion, though, characteristically, Estridge was good natured about it. Tragically, several months later, on their way to their first vacation in years, he and his wife were killed in an air crash at Dallas airport.

³⁴ Lowe had spent the last few years as a General Manager of IBM's facility in Rochester, Minnesota, and then as Vice President, Systems, and later, Development, for the System Products Division in White Plains, N.Y. Prior to moving back to Boca he was Assistant Group Executive for the Information Systems and Communications Group, a position he assumed in August 1983.

³⁵ Lowe never bought a house in Florida after arriving in March. Later, most observers inferred that Lowe took the position in Florida knowing an announcement about a move might come soon thereafter.

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there are several contemporary secondary sources and one primary source for understanding its change. Among the reasons are the following:

- This division now accounted for an increasing fraction of IBM's revenue and publicity. Corporate managers wanted division managers who were sensitive to IBM's corporate norms, such as documenting all decisions—something Estridge resisted.
- There was precedent at IBM for tolerating only a few wild ducks, as the original Boca Raton group liked to think of itself, in R&D activity. There was no precedent for tolerating them in a large and profitable *operation* as the PC Division had become.
- With the antitrust suit behind it, IBM had a banner year in its traditional businesses, mainframe computers. Most sales employees expected it to get only better if they coordinated distribution of the PC through all channels.
- Most employees with experience in large-systems had little sympathy for the view that the PC group had succeeded by adopting nonstandard operating practices. Few of them perceived the costs from imposing normal operating practices on the growing PC operation, whose operations imposed costs on the rest of the organization.
- Lowe's appointment coincided with the promotion of the new chief executive, John Akers, who openly preferred centralization for IBM.

History does not record whether this was a hard-headed calculation by IBM's senior management that costs would be lower and revenues higher because the re-coordinated organization was optimal for their strategic goals or whether it was the outcome of a wasteful internal political fight, or both. The incident does at a minimum show how myriad costs with the firm-within-a-firm archetype can lead to its eventual demise.

III.4.b. Long-Run Issues of Realignment

For the next three years, from 1985 to 1987, the PC Division did, in fact, aspire to act like any other division of IBM—in the sense that it aimed to release new PC products—only after internal consultation and deliberation—that were technically reliable, priced with high margins, and introduced later than competitors. Unfortunately

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for IBM's commercial prospects, most potential buyers did not wait for the results of this coordination because they had access to alternative compatible products with similar functionality priced at low margins. The traditional IBM supply organization was stunningly misaligned to an open systems environment like the PC market.

Although IBM had entered the PC market as an open systems company, after 1985, the deliberate product introduction process of the PC Division moved it away from that approach (even more than prior decisions). This movement was inconsistent with the market environment of the mid-1980s (and thereafter). Clone hardware products began to innovate faster than IBM could (the first Intel 80386-based PC was a Compaq machine, not an IBM one.). Meanwhile, IBM launched a major long-term initiative: The leapfrog redesign of the PC. An important part of this was a joint venture with Microsoft for a new operating system. These initiatives failed dramatically.

The PC organization suffered under the concerns of the rest of IBM. Most critically, meeting demand elsewhere in the firm, the PC revision reverted to IBM's historical stress on proprietary products, a design decision that met with approval from senior management. The firm announced in 1988 a 386-based machine with a proprietary architecture—the IBM PS/2 with micro-channel architecture (MCA). In an effort to compel the transition, it simultaneously announced that the roll-out of the PS/2 would be accompanied by the discontinuance of IBM's best-selling product at the time, the PC/AT, which was based on the 80286.³⁶

The PS/2 might have sold well if it had had new or different features that users actually wanted. MCA was not such a feature. IBM might have kept its margins high if it had had features that could not be replicated. Yet, plenty of firms offered alternatives to an IBM-brand PC. Thus, the introduction was a disaster.

By 1988, IBM's actions had fostered the perception that IBM's managers just did not understand the situation. In the summer of 1988 the clones declared independence

³⁶ Carroll (1993) attributes the decision to remove the PC/AT from the U.S. market to Lowe alone. As evidence for this interpretation, he notes that just before this decision, Lowe's former boss received a promotion to head IBM-Europe, where he did not discontinue the PC/AT and it continued to sell well. Carroll's interpretation must be an overstatement. Keeping with standard practice at IBM at the time, this decision must have been reviewed by the CMC and the Distribution Division (and either party could have objected if they understood the ramifications).

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from IBM's designs by combining to form the EISA, a 32-bit architecture which respected backward compatibility with prior IBM designs but without the MCA.³⁷ The announcement openly rejected IBM's stewardship in planning upgrade cycles for the IBM-PC-and-compatibles industry.³⁸

The events of the summer of 1988 are a long story and one that has been told often in the press and many books. We do not disagree with the generally well known facts about the severity of the crisis at IBM after 1988. Contemporary observers understood its importance and newspapers commented on it.

We add an additional element that has largely escaped attention by all other observers, and, indeed, which makes more sense of the long arc: We stress the antecedents to the announcement by the clone makers, and examine why it was difficult for IBM to achieve economies of scope between two seemingly neighboring activities. Many of the issues at IBM, specifically with its PC Division, arose because of IBM's organizational limits and the conflicts and failures that ensued when the company tried to generate economies of scope within its organizational structure while maintaining its large systems and its presence in the burgeoning PC market.

III.5. The Costs of Managing Both the Old and New

As recounted above, IBM's top managers confidently imposed a planning process on the PC Division in 1985 that coordinated its decisions with other parts of the firm. As desired, it resulted in decisions screened by the CMC and fostered a consensus-building process aimed at sampling the opinions and judgments of the other parts of the company. The view of the established business was that this process involved some costs in terms of delay but had an (to contemporaries, it seemed, obvious) potential coordinating benefit to the PC Division. For example, MCA and related technologies could link PCs in

³⁷ It was sponsored by AST Research, Compaq, HP, NEC, Olivetti, Tandy, WYSE, and Zenith Data Systems.

³⁸ The principal difference between EISA and MCA was that EISA is backward compatible with the previous bus, while MCA was not. Computers with the EISA bus could use new EISA expansion cards as well as old expansion cards. Computers with an MCA bus could use only MCA expansion cards. Ironically, this fight was largely symbolic and short-lived. A few years later, a new technology called the PCI bus, sponsored by Intel, came into use in combination with the old EISA bus.

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organizations to larger computers. Although similar links are valuable today, in 1988 customers did not value them.

Our alternative view is that, after 1985, IBM imposed extra costs on the PC business by structuring it in a way that altered the new business to suit the established one. Managing the challenges of the market environment in PCs was already hard, as IBM's own experiences prior to 1985 illustrated. The changes after 1985 added an additional cost to the challenges at the new division—that of coordinating with the rest of IBM. This did not have to lead inevitably to failure, but it made failure more likely if the delays caused problems and if the marketplace did not value the benefits of increased coordination. Both happened in this case.

The arrangement also introduced an additional subtle bias into the selection of information shaping the judgment of key decision makers, which IBM's top managers seemed not to have anticipated. Sampling opinions from the rest of IBM produced a consensus among top managers from the Large Systems Division about what they would like IBM to do in PCs. This, however, was not necessarily what IBM *should* do in the PC market, because it elicited the opinions of those who experienced another market with very different supply and demand conditions. As we have stressed, those differences could not be learned quickly, and they were not appreciated at a prospering mainframe division in 1985–86.

We stress that commercial failure does not follow deterministically from the presence of organizational limits to discretion and the resulting conflict. To make the point a different way, it is possible to speculate about what might have been had historical events taken a different shape. This bias might have been corrected by immediate and frequent negative feedback from PC marketplace events.

In practice, however, negative feedback was not immediately visible in PC product revenues.³⁹ There were no IBM actions to generate strong marketplace reactions

³⁹ As it turned out, immediately after the changes in 1985 there were not many negative revenue events with clear association with the new strategy. The PC/AT did well in 1985 and 1986. The negotiations with Microsoft also went according to plan in 1985, and its problems later were thought to be a symptom of Bill Gate's savvy, not problems with IBM's strategy for coordination. There was one negative market event. It was the PC/XT rollout, which went badly, but it had been planned for some time, so the changes post-1985 were not held responsible.

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until the PS/2 rolled out in 1988. For a year prior to this, IBM only talked about its benefits, a marketing approach the CMC certainly approved. The baldly negative outcome in the marketplace made all the positive talk look disconnected from reality, as if nobody had anticipated any negative reaction. It was this latter event that received the most attention in contemporary reports, cementing it in popular imagination as the event that brought about the wave of entry. We have argued, in contrast, that this event resulted from myriad of decisions that preceded it, culminating with those in 1985.

We differ from common perceptions in another important way. The latter part of this epoch became cemented in the popular imagination, because, for their sheer drama, there is nothing equal to the events surrounding the divorce between IBM and Microsoft—embodied in meetings between Gates and Lowe, then Gates and Cannavino, Lowe’s successor. The latter meetings especially received enormous attention at the time. These last sets of meetings were the culmination of years of volatile start-and-stop negotiations, mutual misunderstandings, and frequent redirections of IBM’s goals.⁴⁰ They also coincided with the rollout of OS/2 and Windows 3.0, two products that would compete directly. The outcome reinforced the perception that IBM was caught between a rock and hard place.⁴¹ Many contemporary papers treated the divorce between Microsoft and IBM as if it were the downfall of IBM. Many focused on the question of bad-faith bargaining on Microsoft’s part.

In summary, popular reports date the beginning of the crisis to events after the clones declared their independence. We think that popular account is misleading. We see many antecedents in earlier events. Our framework offers an alternative interpretation of the likelihood, timing, and severity of these events. First, many issues had appeared far earlier than 1988.⁴² Second, over the late 1980s, IBM lacked an independent manager in

⁴⁰ For *all* the details, see the latter half of Carroll’s (1993) book, which is a full account of what he followed in detail as the Wall Street Journal’s reporter.

⁴¹ That is, it either continued contracting for an operating system from Microsoft or it organized its own software project in-house. No option looked attractive or free from large risks. The firm’s managers had vacillated for years between these options before the divorce settled it, and when it competed with Microsoft directly the market’s reaction was decidedly negative.

⁴² Aside from those already mentioned, Lowe’s own accounts make it clear there were tensions before 1988. For example, Lowe and Sherburne (2007) highlight initiatives by the Mainframe Division to support an open Unix platform in an alliance with DEC, which were initiated for political appearances. These were

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the PC Division who could make deals with Microsoft in real time. It also lacked a focus on the immediate market needs of the PC market. These made the division a sitting duck for a more decisive firm that was better aligned to the market (i.e., a firm with a clear view of the needs of the market place and the capabilities to address those needs quickly), such as Microsoft, which ultimately took control of PC standards.

IBM retained its leadership in mainframes, and, for a time, its leadership in what was becoming server-based computing. That would wane later, and it was likely already visible to some at the time. As smaller systems began cutting into large-system demand in the early 1990s, this competition became apparent to the large-systems managers at IBM who had denied the possibility throughout the 1980s.⁴³

Leadership in the proprietary mainframe platform would not be lost, but it would be much less valuable. The firm would choose an open systems approach, becoming a leader in a profitable though inherently limited niche, providing very expensive servers, and becoming a leader in the growing and much more profitable activity of being a service firm.⁴⁴

The later decline of the IBM's traditional business takes the focus away from the deeper lesson. The IBM example illustrates the critical role of organizational scope diseconomies in fostering misalignment. It was ultimately impossible for the firm to manage both the PC business and its existing large-system business within the same organization. Conflicts arose over the deployment of a fundamental strategic asset, IBM's reputation as a firm and its relationship to its corporate customers. The conflicts were fundamental, entailing not only the marketing, distribution, and sales functions in a narrow sense, but the engineering and product design functions of the two businesses. Where the open systems PC business called for quick, "good enough" new products

understandably greeted by Microsoft as contrary to their interests, fomenting mistrust between Lowe and Gates in particular.

⁴³ Contemporary reports that emphasize technical advance have a tendency to observe the coming of an event before commercial markets actually act on it, dating the revolutions' arrival by a technology's arrival instead of a market's activity. The profitability of a company is much more sensitive to the latter. Our dating of the *actual* change in market demand is in keeping with our prior empirical studies of the competition between legacy large-system users and the emerging client-server technologies. See Bresnahan and Greenstein (1996).

⁴⁴ Gerstner, 2004.

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compatible with PC-market competition and innovation, the existing proprietary large-system business needed predictable product upgrades, compatibility in connection between large-systems and small-systems, and high reliability. There was no resolving this conflict.

In this case, a number of historical circumstances meant that internal political power shifted to the existing business. By the mid-1980s, thanks to the macroeconomy, the mainframe business was booming and the disaster of minicomputer entry was forgotten. The mainframe organization looked great; we further note that it would have looked far worse if the conflict with the PC company came in 1978 (i.e., if the macroeconomy of 1985 had looked like it did in 1978.) Meanwhile, the PC Division within IBM had a number of start-up problems, which made its engineering look sloppy.

There was a great irony to IBM's internal organizational resolution of this conflict. It was not that the PC business was crushed in a fight, but rather that a highly attractive companywide cooperative solution was found.⁴⁵ That internally cooperative view just happened to be entirely inconsistent with the external behavior required of an open systems PC company at this time. Hence, the IBM PC company died slowly in the stranglehold of cooperating with the rest of IBM.

IV. Second Illustration: Microsoft and the Internet

We now turn to Microsoft and the browser wars. Despite substantial differences in the details of this market and organization from IBM's, this case will display a surprising set of parallels. Once again, we see a dominant firm with substantial sunk costs facing rapid technological progress. Once again, the firm will employ centralized strategic decision making for regular operations, and move away from them during early phases of its entry into a new market, only to change course again after facing considerable issues arising from organizational limits on economies of scope.

⁴⁵ See Killen (1988), whose title "IBM: The Making of the Common View" gives away the punch line for a careful insider history of this cooperative solution.

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IV.1. Microsoft and the PC

The development of the Netscape browser launched the commercial Internet. It was an event that one of the dominant firms at the time, Microsoft, considered to be a threat to the existing hierarchy of the industry.⁴⁶ There is a considerable advantage in looking at this illustration because the antitrust case has left behind a deeper written record about organizational structure and decision making than the IBM example has. It allows us to provide a rich explanation of the timing of particular decisions and their causes. A corresponding disadvantage is that less time has passed, so there is only a short history.

As with IBM and the PC, we start with Microsoft's existing business. Microsoft's long-run strategic goal was to dominate or commoditize all pervasive general-purpose computer technologies, and its strategy was to enter and seek to dominate new component markets when they appeared likely to become pervasive. To achieve high revenue per employee, Microsoft sought to be a dominant supplier of components which could not be commoditized, and it actively prevented its proprietary code from becoming commonly known when it could. Finally, it attempted to keep proprietary standards for itself while forcing open standards on complementors.

Microsoft implemented this strategy by having an organization and capabilities that were aligned with it. The firm compensated for rarely innovating in component markets by being an excellent imitator and incremental improver. The firm was well-organized first to detect new technologies invented outside and then to decide how they fit into the firm's long-run strategic plans.

These strategic actions created considerable tension for senior management, which needed to be responsive both to a constant barrage of new information from outside and to the internal organization focused on implementing improvements in existing products. Much of this tension was resolved by a combination of decentralizing day-to-day authority for existing product lines and centralizing strategic direction and decision making about new initiatives, including remarkably small ones. Microsoft could be extremely patient and foresighted in the effort to expand the range of products that

⁴⁶ As with the prior case study, we present only essential highlights from a very long sequence of events.

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were its proprietary technology (though others groused that the important inventions came from outside).

Microsoft had been through a number of wrenching organizational changes within the PC business prior to this one. In each case, it had moved forward without losing its then-preexisting positions. For example, Microsoft had been the dominant firm in programming tools for PCs from the earliest days of the industry, and it survived entry by a firm with a far-superior product to continue as the dominant firm. Microsoft had also remade itself from a tools firm and had frequently acted as the entrant into markets previously dominated by others (OS, Spreadsheet, Word Processor, Presentations.) Like IBM, it was with some experiential justification that they thought of themselves as an extraordinary organization with extraordinary leadership.

Microsoft's organization took advantage of economies of scope across an array of opportunities in personal computing. Its managers aggregated information across a very wide range of user concerns *and* coordinated both large-scale product development for the entire product line and application development by many firms other than Microsoft. Over many years it had built a set of capabilities useful in dealing with consumers, assemblers, and other software application writers.

The collection of information and the development of a large-scale project often took time. So, too, did the production of large-scale software. But it yielded market-based strategic advantages that others could not match (e.g., the operating system could have a complex design with broad functionality). It also came at a potential strategic cost. No design feature could be considered market-ready until its functionality had encountered a wide range of circumstances. Hence, designs needed to be planned far in advance of their market use, which could restrict the final design (e.g., of an operating system) to functionality *identified* far prior to its commercialization—a potential strategic disadvantage in markets where new customer requirements emerged unexpectedly and frequently.

Aware of the value of large-scale projects and their potential strategic drawbacks, Microsoft developed a production process that innovated at the interface between testing and design. By the time the commercialized Internet began to emerge (after 1993), the

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company's executives had invested considerable resources, energy, and experiments in developing processes that did not rigidly follow what was colloquially termed a "waterfall" development process, which is, in brief, a predetermined sequence of steps between design, development, and testing.

Rather, the firm employed development processes where many parts of the design were broken into sub-steps, each tested at incremental stages, before the largest and final assembly of code. While many facets of the "meta-design" remained constant over the entire development process, many facets of the specific look and feel of particular functions could change until shortly before first release for beta-testing by outsiders. In this way, large projects retained some flexibility to respond to unexpected market needs identified nearer to the time for final release. It was a cumbersome process to manage, and it imposed additional requirements on managers, designers, and programmers, but its strategic importance for the firm was widely appreciated across the organization.⁴⁷

Another of the important factors behind this success was Microsoft's extraordinarily centralized decision making, an aspect of the organization that was a direct reflection of its history. As of the launch of Windows 95, Bill Gates and Steve Ballmer had gained a great deal of personal authority inside the firm. Their status as successful rebels against IBM, the commercial success of Office and Windows 3.0 and 3.1, and the anticipated commercial success of Windows 95 had all given them wide discretion with both their board and their organization. Gates and Ballmer retained the rights to settle disputes about strategy and organizational design. They had also acquired and retained considerable personal authority to monitor activity, intervene when they deemed it necessary, and discontinue investments they deemed wasteful.

This distribution of authority amplified the importance of their views about strategic priorities and their assessments of a market opportunity. Major strategic decisions were not delegated—ever. Employees were instructed to bring their ideas for initiatives as well as their conflicts to the Strategy Team, which consisted of Gates, Ballmer and several other high level executives. Consequently, the top strategists never

⁴⁷ For more on the development of these processes in the late 1980s and early 1990s, see Cusumano and Selby (1995).

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lacked for technical information or for heterogeneous assessments of the market potential for new technical opportunities.

While this centralization gave the firm a unified strategic approach to a variety of issues, it also imposed a serious bottleneck on decision making. Historically, this had not been a critical issue since decision making occurred quickly, and the strategic benefits of centralization had out-weighed potential costs. Nevertheless, it played a role in the browser wars by delaying Microsoft's response to Netscape's entry into this market.

IV.2. Microsoft as the Internet Revolution Loomed

We can see both of Microsoft's traditional strengths in the period when the Internet loomed on the horizon. The firm was using its existing position to deepen its hold on PC standards and was aggressively seeking new opportunities in mass-market electronic commerce as a "strong second."

First, Microsoft was deploying its ability to undertake large projects by coordinating numerous developers inside the company, customer corporations, and complementor hardware and software firms to excellent effect. The product we now know as Windows 95 encapsulated years of learning at Microsoft about developing, supporting, and distributing operating systems for mass-market products like the PC.

Microsoft had been working on this new operating system for years, and had slipped several planned ship dates. Nonetheless, this was a major effort to move PC standards and functionality simultaneously forward. It had backward-looking elements: a series of compatible improvements in DOS and Windows had left some very old technologies in place, and one goal of Windows 95 was to put applications as well as the operating system on a modern foundation. It also had forward-looking elements, such as improving the programming interface for applications developers and the graphical user interface for users. Finally launched in August 1995, the product was an enormous success, cementing Microsoft's position as a leader in PC operating systems and cementing its position in such key applications as word processing and spreadsheets.

As the Internet revolution loomed, Microsoft anticipated widespread electronic commerce, electronic entertainment, and other online applications of a revolutionary

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nature, as did most other computer firms. Microsoft engaged in a strategy to develop and exploit the best technologies for mass-market online applications in electronic commerce and content. The best available outside versions to imitate and improve upon came from firms like AOL. Microsoft characteristically set out to improve upon those with a proprietary architecture. The idea was to have a proprietary Microsoft standard in place long before there was mass-market use of online services.

With regards to technology, Microsoft expected online services to be available after the widespread distribution of broadband access was. In terms of timing, Microsoft predicted it to be early in the new century. In other words, prior to the diffusion of the browser, Microsoft had committed itself to invest in anticipation of a slow user acceptance of its own and everyone else's services, believing this gave its developers enough time to experiment with a new service and position it appropriately by the time demand by mainstream users began to grow.

As it would turn out, Microsoft's online strategy was remarkably unsuccessful at meeting Microsoft's aspirations.⁴⁸ Yet, we do not want to let twenty-twenty hindsight get ahead of our analysis. Microsoft's managers were quite committed to this strategy in 1994.

Two organizational practices reinforced the steadfastness of Gates and Ballmer to this strategy in 1994. Microsoft's solution involved the introduction of proprietary online services, called MSN. MSN imitated AOL, the most mass market-oriented among the other proprietary online services, with one important difference: It attempted to exploit Microsoft's position as a distributor of mass-market software. Microsoft hoped widespread distribution of its electronic commerce and entertainment software with Windows 95 would lead to a new mass market of applications built around the MSN service.

⁴⁸ While MSN has remained a number 2 or 3 in the portal and online service markets, MSN has always been a distant second or third to whomever is the leading portal in a given year, whether it is Netscape, AOL, Yahoo or Google. It has done better than most niche business, but never has had a dominant position, nor have analysts ever forecast that it was imminent. MSN also has not achieved another Microsoft aspiration that is, any notable profitability, which is, once again, notable in comparison to leaders.

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Despite the focus on the commercial opportunity associated with online content and e-commerce, Microsoft's senior management decided not to pursue the content and commerce opportunity associated with the widespread use of the Internet following the invention of the browser. The reason for this involves an interesting interplay of potential economies of scope with several organizational limits on it.

IV.3. Rationally Passing on a New Market Opportunity

In reviewing Microsoft's response to Netscape, two features emerge as particularly relevant to understanding later events. First, Microsoft's response was slow. Microsoft's browser was not the first to obtain mass-market acceptance. This advantage went to Netscape. Second, there was no developed internal group with intimate knowledge about all aspects of the nascent Internet. These two outcomes were linked, and we address these in turn.

Why was Netscape earlier than Microsoft, the most successful software in the PC market? One logical possibility is that Microsoft was not prepared because the threat did not come from one of the many firms whose actions Microsoft monitored closely, such as Sun, IBM, Lotus, Compaq, HP, Oracle and so on.⁴⁹ The technological and noncommercial origins of the threat also were not standard.⁵⁰

Nevertheless, we can rule out this explanation. Microsoft's organization was very effective at competitive intelligence. Support for third-party software firms gave its employees regular insight into the plans of other firms in the personal computer industry. Microsoft employees were regular participants in the portions of the computer industry

⁴⁹ Though, to be sure, once the Internet began to diffuse, it did not take Oracle or Sun long to devise a strategy for "thin client and fat server" which served their interests in relation to Microsoft's. It did not commercially succeed. That is a longer story. See Bresnahan (1999).

⁵⁰ The building blocks of the technology—TCP/IP, HTML, and the parts endorsed by the World Wide Web Consortium—did not come from the places where prior technological revolutions in computing science originated. HTML came from an employee at a high-energy physics lab in Switzerland, Tim Berners-Lee, who later founded the World Wide Web Consortium. Browsers had evolved since that invention on Unix based systems, and then in 1993 a team at the National Center for Super Computing Applications, based at the University of Illinois, Urbana/Champaign, developed one for a windows-based system. The operations for the U.S. Internet backbone came from the recently privatized NSFNET. On these origins and their transition into commercial markets, see e.g., Abate (1999), Berners-Lee (2000), Greenstein (2001), and Mowery and Simcoe (2002).

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organized around open systems lines. Employees summarized support conversations and notified supervisors about important changes. Moreover, the process for triggering changes in the product set was well-known within the firm. Requests to alter designs climbed a (comparatively flat) hierarchy directly to the Strategy Team.

In fact, Microsoft's organization functioned excellently in bringing the widespread use of the Internet and the opportunity associated with the browser to the attention of senior management. A formal presentation of the suggestion that Microsoft should produce a browser and other mass market Internet technologies was made to the senior team in April of 1994. This was still early enough to gain strategic advantage from investing in Internet applications. At that stage, however, Microsoft decided to provide only Internet "plumbing" to connect a PC, leaving the browser and other applications to outsiders. Gates and Ballmer insisted that Microsoft keep to the status quo and not invest.

The decision reflected prior assessments that a proprietary online service model was the most profitable entry path for Microsoft. In autumn, 1994, Gates restated the then-familiar strategic analysis at another meeting. He expressed considerable skepticism about the profitability of any Internet application—for Microsoft or any another firm. Internet applications had previously been catalogued as the domain of third-party vendors and of little potential business or strategic value to Microsoft. The noncommercial origins of the Mosaic browser potentially reinforced the view that the application lacked profitability.⁵¹ Further, Gates expressed the view that any standards for PC-Internet connection would be decided by Microsoft with its (then) 100 million users. In brief, seeing neither opportunity nor threat, the firm did not change course.

Not everyone at Microsoft agreed with their senior management's decision. Two disobedient initiatives emerged inside the company. First, a small group inside Microsoft worked on a "skunkworks" browser in Autumn 1994. These employees were due to gain internal power and prestige later, but at this time they labored, as do most skunkworks

⁵¹ The first popular browser came from a team of undergraduate programmers at the University of Illinois, Urbana/Champaign, a leading research institution in many frontier sciences and engineering fields and in many aspects of computing. However, it was not a university with a long track record of commercializing new scientific inventions, such as at MIT, Stanford, or the University of California.

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that lack senior executive support. No one paid any attention to them, and, by the same token, they received few resources. This was an unintended drawback to the successful execution of a centralized strategic allocation of resources—Gates and his advisors saw no value in investing in employees understanding all the various aspects of Internet technology, so none was made deliberately. The skunkworks group was small and remained under the radar screen of top management. Thus, Microsoft's late development of the browser touches on the second aspect of organizational limits that we previously mentioned—namely, there was no developed internal group with intimate knowledge about all aspects of the existing capabilities for the Internet.

Second, another group—the marketing people in the very influential division preparing Windows 95 for launch—also sought to initiate a wider set of programs inside Microsoft. These programs were designed to make the firm's products compatible with the Internet and to cooperate with Internet-oriented firms. Here, once again, centralized strategic allocation of resources shaped management. Senior management, of course, encouraged them to add technologies to Windows 95 for Internet plumbing or basic connectivity.

The Windows Division, however, also saw a considerable profit opportunity in selling space on the Windows 95 desktop (or providing related distribution services) to Internet Service Providers (ISPs). This was imagined as a kind of “click here to sign up for the Internet” which would take the user to an advertisement. ISPs were even willing to pay for position, so such a program could become quite profitable. The problem though was that this initiative involved a conflict with the planned proprietary online service, MSN, which was still quite young at the time. To give MSN its best chance at scale economies would require exclusive distribution with Windows 95.

Centralized strategic decision making played a decisive role. All initiatives with ISPs were quashed by senior management. Though potentially extremely profitable, it was quashed in November, December (with alleged finality), and January of 1995. This behavior showed real organizational strength on Microsoft's part. The firm was protecting a future effort, its (soon-to-be doomed) proprietary online service, from a

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powerful internal group with a current near-term profit opportunity. It is the kind of action taken by a strong organization that is attempting to be forward-looking.

IV.4. The Costs of Aligning with the Old Market

Microsoft delayed having its own browser until a last-ditch effort put the unimpressive *Version 1* in the box with Windows 95. It was also available in a different box under the name, *Plus Pack*. This add-on was a hastily modified version of the Mosaic browser, originally developed at the University of Illinois earlier, which the university was now widely licensing out through a third party.⁵²

By August 1995, the add-on was not sufficient to execute a successful fast-follower strategy. In contrast, the team at Netscape had reprogrammed the entire browser from scratch, tested a beta version with many users, and made numerous improvements to the browser and other programs that worked with it. Netscape's browser had nearly a year's lead time over the Microsoft browser.

Microsoft's delay gave Netscape an extraordinary commercial opportunity, which others would later label an error by Microsoft. In retrospect, such an error would not—we might say, *could not*—last for very long. Microsoft was and is an organization with administrative processes designed to help it respond to market events, even when the CEO is steadfast in his views. In this sense, the interplay between market events and organizational practices at Microsoft had a key role in shaping the decision making.

The key change in strategy had come in the spring of 1995. By then, the entire question of the Internet had become increasingly urgent inside Microsoft for a number of reasons:

(a) Netscape had begun to make money from sales to businesses and employed a unique distribution mode involving “free” downloads by households and students, anticipating revenue from business licensees.⁵³

⁵² See an account from the viewpoint of the licensor in Sink (2007).

⁵³ The browser was free, technically only for evaluation and educational purposes. This was a variant on a well-known practice among shareware vendors to let out software for trial use and attempt to follow up with registration during service or upgrades. Here, a key difference was the attempt to establish usage share through households by making it free, while collecting significant revenue in a distinct market segment,

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(b) Netscape's products were getting attention from futurists as being necessary for all computers.

(c) Netscape had begun a program to invite third-party vendors to make applications compatible with the Netscape browser, mimicking Microsoft's practice of supporting APIs (application programming interface)—practices aimed at controlling the rate and direction of innovation.

(d) Not long after its founding, Netscape began to expand its product line into complements to browsers, such as products for servers and areas of related networking.⁵⁴

(e) The set of uses for the World Wide Web began to mimic the functionality affiliated with the proprietary online services.

The latter three arguments turned the browser into an activity more consistent with established modes of analyzing the PC market environment. By the spring of 1995, it was possible to use a commercial browser to surf the earliest attempts at developing applications on the commercial and noncommercial web. This rendered many of the most critical business and strategic issues very concrete.

In April, 1995, an evening of surfing was arranged for Bill Gates with instructions about where to go and what to look for. This was arranged by some employees who intended to change his mind about the strategic priorities of the firm. As it turned out, the demonstration succeeded. Gates spent the better part of the night surfing. A month later he issued the memo entitled "The Internet Tidal Wave," which effectively admitted the prior oversight and announced the realignment of priorities for strategy inside the firm.⁵⁵

By the spring of 1995, the browser technology obviously held the potential to generate a redesign in the software used by the typical PC, possibly redefining the value chain for PC purchases. Responding to it became a matter of competitive urgency at Microsoft—as a market-based perspective might suggest—but, our main point so far, the

among business licenses. In practice, that led to a difference in the scale of aspiration as well. We thank Tom Haigh for making us aware of the precedent.

⁵⁴ Cusumano and Yoffie (2000) have an extensive description of how Netscape explored the commercial potential of many complementary service markets through site visitation of lead users and interaction with many user and vendor experiments.

⁵⁵ A publicly available copy of Gates (1995) is at http://www.usdoj.gov/atr/cases/ms_exhibits.htm, government exhibit 20.

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timing of the response (and hence, the severity of the competitive events hereafter) was deeply shaped by Microsoft's activities in the prior technological generation, namely, the PC, and its interplay with its unique internal decision-making structure, which reduced any earlier investments that might have left the firm better prepared.

Now we turn to its response to the newly conceived competitive threat. Now that action was allowed, the *way* in which the firm responded was deeply shaped by organizational diseconomies of scope.

IV.5. Strategic Costs of an Changing an Assessment

"The Internet Tidal Wave" came out in May of 1995. The memo sketches several different scenarios. Gates explicitly outlined a few that lead to large losses in profits at Microsoft.⁵⁶ Defending against this was his primary motive for pursuing the Internet opportunity. At the same time, Gates recognized how attractive Netscape's and others open approach was to developing a new market, and, at least for a period of time, decided to abandon Microsoft's proprietary online approach. (This ended up costing little, as the proprietary product was headed for a very rocky launch—albeit that was less obvious at the time the memo was written.)

The company did not publicly announce its change in direction until early December, well after the release of Windows 95 and Netscape's IPO (both in August, 1995). As has been widely documented elsewhere, part of the long delay was understandable in simple marketing terms, a by-product of desiring not to distract from the launch of Windows 95. But a large part of the silence had a different origin; it could be attributed to the lack of any coherent strategy to announce. After briefly negotiating with Netscape for a cooperative arrangement in the spring/summer of 1995 (and failing to

⁵⁶ Gate's memo is eight pages, single spaced. It first emphasizes the long-run drivers of market value in computing and Microsoft's position therein. It then turns to specific broad initiatives the firm should undertake to develop a position over the next few years. Before doing that, it stresses several different ways in which an independent browser might ultimately lead to "commodification" of the operating system. First, Gates is concerned about a browser and its extensions accumulating the same functionality as the operating system, directly reducing the latter's market value. Second, an independent browser, combined with new technologies from Sun Microsystems called "Java," might lower entry barriers into the operating system business for Netscape or others. Third, Gates is concerned that the browser enabled something "far cheaper than a PC"—such as a network device—that might achieve sufficient capability to compete with Windows PCs.

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elicit a cooperative response), Microsoft began internal development of Internet-based technologies over a wide range of products.⁵⁷

The firm's earlier underassessment of the value to developing Internet applications was extremely costly in the short run. To begin, Microsoft had done little Internet-related development up to this point. Its legions of programmers had not explored the possibility of redesigning any applications, tools, or operating systems to emphasize the World Wide Web and its standards. The absence of advanced development work was a symptom of how unanticipated this threat was and how late top managers were (in comparison to entrants) in recognizing the potential.

More critical for understanding subsequent competitive events, perhaps, were the organizational capabilities developed by the firm during its experience prior to 1995, which made it difficult to respond to the Internet threat with any speed. The firm had a long history of taking several years to commercialize software: It was demonstrably good at commercializing software that required coordinating large teams of designers, programmers, and distributors, inside and outside the firm. It was also successful at reviewing the market experience, generating lessons, and incorporating them into later actions. For short commercial episodes, Microsoft was good at responding to incremental innovations invented elsewhere with fast-second capabilities, particularly when these could be integrated into preexisting Microsoft products and distribution channels.

Those organizational capabilities were magnificently aligned to being the dominant firm in the PC operating system and the major applications (e.g., Word and Excel) markets. As the commercial browser began to sell, however, these capabilities had limited value.

The firm lagged far behind in development and design in comparison to Netscape's Navigator. Merely adding a browser to Windows 95 and pushing it down existing channels did not induce new adoption. The first version of Internet Explorer (IE) was not as good as Netscape's, and there were also problems in the support network. Merely announcing support for Internet applications was not sufficient to motivate third-

⁵⁷ The negotiations with Netscape ultimately acquired a controversial flavor, as they were prime evidence used in the antitrust case. For an account of these early negotiations, see Cusumano and Yoffie (2000).

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party developers to write software compatible with Microsoft's, particularly when superior technologies existed elsewhere.

Moreover, Microsoft's recent history of controlling Windows motivated many third-party software firms to seek less-constraining alternatives for their software development projects. This was particularly so for those that could afford to hire a large team of programmers and develop broad arrays of products. A similar dynamic emerged among the PC assemblers, since by 1994, Microsoft's managers were going to great lengths to enhance the firm's bargaining power with assemblers, and were introducing a wide range of nonmonetary terms into contracts with assemblers, such as those preventing assemblers from adding things to the "first screen" that came up after a boot-up sequence.

In summary, at the outset of the browser wars, there was a misalignment between Microsoft's competitive strengths and the needs of the new market environment. That is, there were no links between the existing organization and the browser market. The organization's design was inappropriate for exploiting economics of scope in the operating system market. As one might expect with diseconomies of scope between one market and another, the factors that shaped the success in the established market also made it more costly to address when the strategic direction at Microsoft changed.

IV.6. Realignment Costs

The Internet wave brought many challenges to Microsoft, even with its abundance of resources, deliberately flexible organization, and history of competitive success. Some of these challenges came immediately, others in the near short run, and still others in the long term. We use a few selective examples to illustrate the main theme—that managing two businesses, an operating system business and a browser business, increased the costs of operating either one and, hence, shaped the choices the incumbent made.

In contrast with many other observers, however, our interpretation traces many of Microsoft's successes in blocking the competitive threat from the browser to the ways in which its top managers handled issues regarding scope diseconomies. We, therefore, interpret these decisions in terms of the costs of coordinating the activities of two

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divisions in two distinct market environments, where one division is well suited to the established market while the other serves the new. We also stress the costs of adjusting the alignment of the existing organization. Forcing the new division to coordinate with the existing imposed costs on both.

IV.6.a. Realizing No Scope Economies in the Short Run

Achieving Microsoft's competitive goals created a number of organizational problems. First among them was the complexity of organizing a response to this competitor *while* supporting Windows 95. Windows 95 had taken years of preparation and had involved large numbers of personnel assignments that could not easily change. The firm had been organized to support products and services affiliated with a market in which users bought a PC operating system, some applications, and, if the buyer was a business, a network operating system and related applications (e.g., SQL Server). Even in a firm stacked with talent and loaded with resources, these were demanding activities to operate and execute, requiring the attention of the top managers.

Managers wanted to redeploy employees, but it was not possible until Windows 95 was successfully launched. Even after the launch, such plans for redeployment would generate resistance. Many sunk assets had been developed for that launch. Many employees had accepted responsibilities and had significant investments in them, with anticipations about the long-term responsibilities their jobs engendered. Altering the priorities of the firm around the Internet necessarily altered the anticipated costs and benefits that employees foresaw, as well as potentially sacrificed success with Windows 95.

More subtly, altering the priorities for the company required bringing employees into agreement with management's analysis of the anticipated competitive threat. Despite Gates's and Ballmer's credibility with employees, this common agreement was not necessarily easy to generate in the summer of 1995. The firm's launch of Windows 95 went spectacularly well, showing all the signs of reaching profitability as anticipated. Such commercial success had demanded years of sacrifice and hard effort.

This prior and contemporary commercial success was incongruous with top management calling, in tones laced with panic, for a dramatic change in firm direction in

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response to an anticipated but (largely) unseen future. Prior to Netscape's IPO, which occurred in August, the contemporaneous success of Microsoft understandably generated complacency in its employees. Complacency's role in slowing Microsoft's response illustrates the power of common belief systems in organizations. Microsoft's managers eventually got a bit lucky, though. Netscape's spectacular success (especially the publicity that followed that autumn) eventually broke through this complacency—and Netscape's own noisiness also helped.⁵⁸

Netscape was both lucky in the timing of its launch (with Microsoft tied up in the Windows 95 rollout) and skillful in the way it took advantage of the situation. Netscape sought to introduce a browser that was “cross platform,” meaning it ran on all kinds of PCs. Since almost all PCs were Windows PCs running Microsoft operating systems, this might seem like a small point. After all, neither Apple Macintosh nor desktop Linux was likely to grow very rapidly, so in the short run, the PC was a Microsoft-dominated PC.

There is, however, one very important distinction here. Microsoft was attempting to move the Windows standard from the obsolete Windows 3.x (3.0, 3.1) to the modern Windows 95. As Netscape launched its browser, almost all PCs were the older standard Windows 3.x. Thus, as Microsoft sought to introduce its own browser to blunt the outside threat, there were numerous goal conflicts between success with the browser and success with the operating system. For example, the Windows group did not want its IE browser to be compatible with old versions of Windows (3.0, 3.1 and the like) so as to preserve users' and application developers' incentives to upgrade to Windows 95.

Those supporting IE's battle with Netscape Navigator, however, wanted to foster adoption by more users by making IE compatible with as many PCs as possible, including old versions of Windows. Left alone, Microsoft had no incentive to support older versions of Windows, because doing so reduced user incentives to upgrade to Windows95. Netscape, on the other hand, had incentives to sell browsers to users of Windows 3.0 because it helped build the installed base. A similar fight arose over compatibility with the Apple Macintosh systems.

⁵⁸ As was widely remarked, Netscape's CTO, Marc Andreessen, could not resist making provocative remarks in the press. Cusumano and Yoffie (2000) label this behavior “mooning the giant” and characterize it as a strategic error.

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This is a conflict we have seen in different clothing (the PC market) and with a different dominant firm (IBM). With Microsoft, the conflict was between a new product whose strategic imperative is connected to open systems (a browser), and an existing product whose fundamental strategic imperative is proprietary (Windows 95). In this case, as in our prior example at IBM, entry changes the behavior of the large firm. In the absence of entry, a dominant firm acts one way, but the actions of entrants alter the assessments made by managers and, in time, their actions.

In the short run, these conflicts were resolved in favor of the new product group's competitive needs (i.e., the browser group's needs). Matching Netscape's compatibility, versions of IE initially were available for most PCs, including old versions of Windows and Macintoshes, though IE was never available for Unix.⁵⁹

Microsoft's strategy team also tried to exploit its indispensable position in the PC value chain for the benefit of its browser. At first, they sought to delay some of the terrible threatening effects of not having a competitive browser. For example, Microsoft requested (or demanded) specific actions out of its distributors and assemblers, such as carrying its Web browser and displaying it, even if users did not ask for it.

This strategy had immediate costs. Those who were handling the negotiations with PC assemblers over Windows 95 did not like compelling the use of IE because it was resisted by customers, and hence by many assemblers. In the absence of full cooperation from willing partners, Microsoft's position eventually evolved, leading it to retaliate against partners that cooperated with Netscape, such as Compaq, HP and IBM. Yet, even Microsoft's own managers believed that such actions would meet with resistance.⁶⁰

The resistance would not fade soon, so these short-run issues in distribution became attached to long-run strategic issues as well. We turn to those next, which also illustrate why this crisis became so costly.

⁵⁹ IE never was made available for DOS, and never achieved the promised availability on Unix systems. Eventually Apple agreed to make IE the default browser as part of a much larger deal involving patent disputes and financial remuneration.

⁶⁰ For more detail see Bresnahan (2002) or Bresnahan and Yin (2006).

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IV.6.b. Long-Run Realignment Issues

In his first book, Bill Gates summarized that “Both timing and marketing are key to acceptance with technology markets.”⁶¹ The relative strength of distribution and first-mover advantages vary over time, as the mass market develops, leaving a finite window of time when a second-mover can act strategically to interrupt the activities of a first-mover.

It is no surprise then that Microsoft’s own analyses of the browser wars assumed they had a short window of time to move both users and developers over to their browser.⁶² They hoped to (1) move into the market early enough to precede most user and developer decisions and (2) make a browser attractive enough to be adopted by later adopters. In this sense, Microsoft’s long-run actions during the browser wars *followed* from their analysis of anticipated demand and distribution conditions, leading to additional unanticipated internal conflict.

Long-time participants in the PC industry, such as Gates and many others, believed that individual users choose systems that have the most or best applications provided by developers. That choice is also based, in part, on their expectations of future applications availability. Yet, this behavior is not set in stone: Any particular user will trade off the number and variety of developer applications on a system against other considerations, such as the price of that system or the difficulty of connecting to it.

Gates, once again like others in the industry, also believed that developers tend to provide for systems that have the most users (or the most profitable users for their particular application). If developers sink costs into a system (for example, by learning how it works or how to make their application work well on it), then they will base their choice at least in part on expectations about similar demand. If the *porting costs*, namely, the incremental costs of developing for a second system, are positive, then there is an incentive to supply first (or only) to the system with the most or the most profitable users. Once again, this is not set in stone: Developers trade off the number and variety of users

⁶¹ Gates, Myhrvold, Rinearson (1995), p. 135.

⁶² For a fully developed analysis of many market-oriented factors and their role in setting *de facto* standards in this case and more generally, see Bresnahan and Yin (2006).

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against other system features, such as its technical quality of a development environment, and, therefore, sometimes act on expectations.

Microsoft's long-run strategy, then, followed from this belief about how the market operated and its sober assessment of Microsoft's position in it. Microsoft had entered a market where the users and developers had so far chosen Netscape's browser. Nevertheless, Microsoft also believed there was inertia—not irreversibility—behind those choices. Microsoft's intermediate goals for contributing to its core strategy emerged quite plainly as two tactical goals: (1) Find ways to compel a sufficiently large number of users and developers to adopt IE. (2) Find ways to compel a sufficiently large number of users and developers to abandon Netscape altogether. Of course, the first goal supported the second one, so most of the energy in the short run focused on the first.

Ultimately, the strategy team decided that the mass market was just developing in 1995 and was nowhere near cresting in 1996. Hence, Microsoft's long-run strategy was to take advantage of this growing demand over the next several years and undercut Netscape's initial advantage. How does a leading firm take advantage of changes in the market over time? In one way, the composition of adopters changes: For example, an installed base of adopters finds it costly to switch between browsers, but the rapid growth in demand presents an opportunity for an alternative browser to capture the newest adopters in numbers that swamp the size of the previously installed base.

Another way in which markets for new technologies change over time is in the composition of demand. The early adopters of a technology tend to be different from the mass-market adopters, who tend to be more responsive to convenience of adoption than to the capabilities of the technology. Many later adopters are waiting for complete, ready-to-go systems. Once again, that presents an opportunity to capture the later adopters in large numbers if an alternative plays to their distinct needs.

These demand factors enhanced the strategic importance of Microsoft's control over distribution channels for new browsers. While supply-side factors, such as taking control of distribution, were not sufficient to compel users to stop adopting Netscape's browser, they could contribute to increasing the number of users and developers dedicated to IE. Specifically, distributing only one browser to some mass-market

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adopters could (1) generate some adoption among users who prefer the browser they initially use; and (2) generate some adoption by developers who wanted to serve the users of IE.

Intending to build a large organization that played to its strategic advantage as a large software developer, Microsoft began investing simultaneously in browser technologies and the services related to supporting developers. It also let developers know about its investments and intention to support a mass-market browser technology. These actions let developers plan for more complex applications as well as for applications that suited later users who value ease-of-use over frontier features.

Microsoft's managers initially attempted another familiar strategy—proprietary standards. For example, they attempted to advance their own proprietary version of HTML.⁶³ This met with such developer and market resistance that the IE group managed to get top management to change this practice, eventually employing preexisting nonproprietary Internet standards. This was a symptom of the extent to which the firm's development efforts began with familiar operating practices, which slowed its ability to shift towards the requirements for fast catch-up.

The development of browsers did not stand still, nor did the attempts to foster its diffusion. Other parts of the organization sought to compel a switch to an improved (closer-to-competitive) browser. Microsoft's managers continually let every assembler and distributor hear about Microsoft's desire not to see alternative browsers displayed. These actions generated the allegations that led to the antitrust case.⁶⁴

This competition did not end quickly. As it continued, a large organizational problem arose that had not been anticipated in 1995 when the long-run strategy for the browser wars was first sketched. Microsoft's IE began as an application and was originally situated outside the operating system group. Indeed, Microsoft set up a new division, the Internet Platform and Tools Division (IPTD), to press forward with its mandate. This appeared to be the classic firm-within-a-firm strategy. Note, however, that the parallel with IBM's PC Division falls short. Microsoft's division never had discretion

⁶³ Microsoft's effort, as well as Netscape's, collapsed after opposition from W3C and the IETF.

⁶⁴ For longer discussion, see Rubinfeld (2004), Bresnahan (2002), and Fisher and Rubinfeld (2001).

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to vary from organizational norms to achieve its goal. It never had autonomy from the rest of the organization: Gates and the strategy team retained rights to monitor and intervene in decisions, and, from the outset, they used it frequently.⁶⁵

Impressively, Microsoft eventually built the IPTD up to 4500 people (there are considerable strategic advantages affiliated with eventually being able to deploy resources on a vast scale, as a dominant firm can do). Equally impressively, the IPTD rapidly chased Netscape in browser quality and features, and, using a variety of distributional advantages, effectively pushed its browser out to all kinds of PCs, not just new versions of Windows. Indeed, after a while contemporaries began to forecast the strategy affiliated with starting this division would succeed.

From the perspective of the Windows group, there were two benefits from building up the new division. First, it brought the browser in-house, where Microsoft could manage the competitive threat directly. Second, it gave the IPTD the benefit of Microsoft's control of the distribution channel. Though beneficial in a number of respects, this also led to enormous internal conflict, precisely the type that limits the exploitation of economies of scope.

The internal conflict reflected the interplay between Microsoft's position as a leading operating system company and the competitive threat that resided in the market place as an application. The browser has elements of an application and elements of being a platform for the development of other, network-oriented, applications. It has its own APIs for the purposes of permitting such applications. It did not much matter to the internal conflict that the Microsoft browser's APIs were a direct response to competition with Netscape's support network. Until the browser wars, the development of API's had been the domain of Microsoft's Operating System Division. Conflict over the design, function, purpose, and support of many APIs was inevitable, since almost every API on the browser served a strategic purpose on the dominant operating system, Windows, and the multi-OS applications support browser—and these purposes were not necessarily congruent with one another.

⁶⁵ Indeed, that monitoring and intervention activity left an impressive trail of email communications between various managers of this division and top management at Microsoft. For a lengthy review of much of it, see e.g., Bank (2001).

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This is an example where market needs necessitated two inconsistent organizational responses, with the organization's managers bearing a high cost. Those costs do not make managerial action inevitable, but they do make management consider reassigning formal authority and other related actions. As a matter of fact, management would act rather quickly, changing its formal assignment of authority.

The evolving strategic response of the firm under competition eventually necessitated placing the browser in one division—in this case, in the Operating Systems Division. This change generated considerable acrimony and rivalry inside Microsoft. The Operating Systems Division complained about having to take in such a browser developed in a competitive race, which, out of competitive necessity, was far from elegantly designed, difficult to modify, and fraught with the potential for intentionally coding “bugs,” which are unanticipated inconsistencies between different parts of the code. The Browser- and Internet-Oriented Divisions felt that the firm was slighting their priorities and broadly abandoning the needs for the firm in the future. Much of these costs played out *during* and *after* Microsoft ostensibly won the browser wars.⁶⁶

This is another place where the comparison with IBM's PC falls short. One might ask why placing the Internet Division under the domain of the Operating System Division—much like asking the PC Division to coordinate with the Large Systems Division—did not doom the Internet Division. The answer is two-pronged. First, unlike the IBM PC case, the competitive threat here collapsed from the multi-layered assault to distribution channels—Netscape and the community of developers built around the browser ceased to be much of threat.

Second, and in complete parallel to the IBM case, this internal conflict eventually led to the end of the independent IPTD, especially after the browser wars ended. Once the prospect of a Netscape browser standard began to recede, there was little justification for the firm-within-a-firm. As its independence was reduced, these organizational changes left many employees feeling as if management was reneging on its commitment

⁶⁶ After Netscape lost viability as a competitor, the firm moved Windows to the center of its business. Eventually Silverberg and Slivka and others affiliated with promoting the Internet quit. See the discussion in Banks (2001).

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to the Internet. So it eventually induced several employee exits, largely among the pro-Internet forces who lost out.

IV.6.c. Scope economies and strategic priorities

The competition that Microsoft encountered with its online efforts highlights the firm's innate long-run problems exploiting economies of scope within a new environment. The tension between adjusting strategic priorities and keeping existing businesses in tow is yet another example we offer of the conflict between organizational limitations and achieving economies of scope. As did all proprietary and nonproprietary information services at this time, Microsoft needed to reconsider its operations, as well as its business value to users. We now discuss two of the major competitors and Microsoft's response to their actions.

First, Netscape understood the importance of distributing its product to make adoption as easy as possible for new users. Specifically, it signed contracts to distribute its browser both through ISPs and along with new PCs. This service and hardware provided a strong complement to the browser, as, in addition to a browser, a user had to have both to access Internet content. Netscape employed these distribution channels to overcome the adoption costs for its browser. As was previously noted, Microsoft had been slow to initiate a similar program with ISPs at the end of 1994, when the competitive necessity for it was less urgent. Now that the top management had altered priorities, it set about initiating deals with ISPs as a competitive response to Netscape's initiatives.

Second, by early 1996, a wave of new ISPs offered Internet service throughout the United States. Online leader AOL (America On-Line) publicly switched strategies to embrace the Internet; and with Web-friendly software, acquisitions, and a new pricing strategy, AOL was becoming the largest ISP in the country. As with other ISPs, AOL was introducing new Internet users to many facets of the Internet. As an entrant into home-based electronic commerce, it was becoming a real threat to Microsoft's online content and e-commerce strategy.

Microsoft Network had been founded by Microsoft employees, many working there as early as 1992, and they had had the commitment of top management that their

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effort was the future of pervasive e-commerce and online content. For many years, Microsoft's strategic team had made good on its commitments: It had nurtured MSN with favored status in the distribution of their operating system. Microsoft protected this position with contracting restrictions requiring PC assemblers not to alter the prominent placement of MSN's symbol on the first screen of a PC. These restrictions angered assemblers, who could not tailor the PC to user requests, and those such as AOL, who also wanted a prominent place on the operating system, but Microsoft was unwavering.

The competition with Netscape over browser standards put MSN's special status under pressure. Microsoft failed to generate adoption of its browser, IE 1.0 and 2.0. With the resources devoted to development, IE 3.0 was anticipated to be much better and equal to the Navigator in some basic features, giving Microsoft the "realistic" option to push hard for its adoption without getting as much push-back.

In other words, AOL's interests highlighted that the protection of MSN came into conflict with a strategic action aimed at aiding the adoption of Microsoft's browser. Microsoft wanted to strike a deal with AOL to make IE the default browser of AOL. In exchange for making IE the default browser, AOL requested lifting the first-screen restriction on AOL's symbol.

As with other organizational limitations on economies of scope, the presence of this tension does not necessitate any action to resolve it. Indeed, Microsoft initially refused AOL's request and attempted to bargain for other things, such as money. Microsoft's initial refusal was understandable, since capitulating to AOL's request would be reneging on the promise to MSN employees, and their reaction might hurt Microsoft's standing online effort.

The refusal did not have to hold forever, however, and competitive events forced finality. Specifically, after considerable negotiation, AOL negotiated a deal with Netscape to support Navigator for several years, but left open questions about the default browser. The contract with Netscape placed pressure on Microsoft to fish or cut bait, pressure to which Bill Gates and Steve Ballmer relented. AOL made IE the default browser, and, in exchange, AOL received the right not to be subject to first-screen

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restrictions. Further deals over time supported AOL's marketing interest on the desktop and promoted Microsoft's interest in generating the use of IE by AOL's users.⁶⁷

As anticipated, this deal's benefits came with considerable cost for Microsoft. Over the next year, many MSN employees quit as MSN lost ground to AOL, setting back MSN's development for some time.⁶⁸ Yet the benefits to Microsoft were also considerable. The AOL deal moved a large fraction of Internet users—over one-third by some estimates—to IE as their default browser. Among other deals affiliated with increasing default use, this one especially was the beginning of the end of the browser wars. The deal contributed to the general thrust of Microsoft's distribution strategy at this time, which was to make other deals that altered the distribution of Netscape's products, limiting its availability on many ISPs and PCs.⁶⁹

The specifics of this particular set of events are engaging, but we do not want them to distract from the more general points they illustrate: Internal conflicts between the open systems browser and both the proprietary MSN and the proprietary Windows group were deep and difficult to resolve. They involved conflicts over one of the firm's most important shared assets, control of the PC distribution channel. These conflicts were closely linked to fundamental differences in strategic necessity between the browser and the proprietary businesses.

Furthermore, they involved deep disagreements over what the firms' reputation for steadfastness and decisiveness, one of its most important intangible assets in negotiations, meant for new decisions. Repeated attention from senior management could keep these deep conflicts under control for a period of time, but ultimately they had to be resolved as the costs in senior management time and attention grew.

⁶⁷ A copy of AOL's contract with Netscape, dated March 11, 1996, is at http://www.usdoj.gov/atr/cases/ms_exhibits.htm, government exhibit 824. AOL's deal with Microsoft, dated March 12, is exhibit 804. Further cross-promotional deals were made over the next year and a half. See, e.g., exhibit 1019 for a deal in October, 1996, and exhibit 1022 for a deal in December, 1996, and exhibit 1175 for one in September, 1997. According to exhibit 1480, IE's percentage of hits from AOL and CompuServe went from 22% in January, 1997 to 76% in October, 1997.

⁶⁸ Banks (2001).

⁶⁹ For a list of these deals, and a discussion of their controversy, see Rubinfeld, 2004, Bresnahan, 2002, Fisher and Rubinfeld (2001).

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IV.7. The Costs of Managing Both Old and New

Many contemporary accounts falsely discussed decisions at Microsoft as if Bill Gates had had a grand plan. Instead, once the competitive threat was upon Microsoft, it faced a series of anticipated and largely unanticipated costs associated with the new business. As our analysis suggests, management worked through the costs of operating both businesses as the unanticipated costs became apparent. Senior management initially tried to coordinate the new opportunity with the established business without paying much cost. After it was apparent there would be substantial costs, management tried to minimize them with a firm-within-a-firm organization. Perceiving a possibility of losing the existing business to new competition, Microsoft bore the costs of managing two internal businesses, each aligned to an entirely distinct market reality, for a brief period of time. As it turned out, the competition eventually collapsed under the assault, with the result perhaps better than Microsoft had expected.⁷⁰

What did the managers at Microsoft do then? A final anecdote from this large epoch is perhaps the most telling. After the immediate competitive threat fell aside, Microsoft's managers faced questions about what to do with all they had built for this competitive situation. The firm's management considered two distinctly different options: (1) expanding Internet tools and applications into all aspects of the firm's business, as had been planned under competitive pressure; and (2) returning to the strategies devised for Windows, a plan that Netscape's entry disrupted considerably.

Management's choices depended on its assessments of the reason for the Browser Division's market success. Microsoft's top managers could have concluded that the division's success arose from many of its unique features. In that case, the lessons learned in the new division needed to be transported to the rest of Microsoft. Alternatively, Microsoft's managers could have concluded that many of the successes at the Browser Division arose in spite of its unique features. In that case, many of the features of the old needed to be transported to the new.

We already have hinted at what happened next, but we are wary of giving a false impression. Microsoft's managers did not choose all at once. First, they reorganized

⁷⁰ See, e.g., Cusumano and Yoffie (2000).

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development of Internet technologies, giving Windows centrality in its strategic priorities. After the removal of competitive pressures, however, most organizational decisions became disconnected from outside pressures. Gradually, actions began to follow internal power struggles, motivated by a variety of rent-seeking, career-oriented, and personally-guided motives without competitive checks.⁷¹

Over time the Windows Division continued to win virtually every internal fight for supremacy over strategic direction. Top management reduced the organizational independence of the Internet platform and tools division. General internal commitments to make IE eventually compatible with other PCs or other software on other platforms and so on also were allowed to lose momentum and disappear. These actions induced a large number of exits by employees who had been committed to developing new Internet businesses. The decisions held firm in spite of the exits. In this sense, once competitive pressures lifted, the firm's top managers could not resist returning to the organizational practices and strategic priorities they had favored many years earlier and which had proven profitable prior to the diffusion of the Internet.

How should we understand this embrace of the future and the subsequent reversal? A central explanation concerns organizational diseconomies of scope between two businesses. With the dual value of exploring a new growth opportunity and preserving the profits of Windows and Office, Microsoft's management was willing to bear the organizational costs for a transitory period. Certainly the benefits were highest at the height of the competitive wave. The coordination costs may have been lowest during the height of a competitive crisis also. In addition, the authority to coordinate was easily transferred to senior management. Once the crisis was past, however, the persistence of those costs forced a choice, which, in this case, went in favor of the old business and the older practices aligned to it.

To be fair, this internal triumph engendered other costs. It left the firm with serious long-run market challenges. Numerous talented programmers and managers left the firm to pursue projects and commercial opportunities more closely oriented with their interest in Internet technologies. Dominating Internet clients (browser, email, etc.) for

⁷¹ Banks (2001) provides an exhaustive chronicling of these events.

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individual users without focusing on communications applications brought serious headaches, many of them in the security area. The existing strategy of extending Windows into low-end servers (file, print, email, etc.) while reinforcing outsiders' views that Microsoft sought excessive control over complementors created a market opportunity for Open Source projects, such as Linux, Apache, MySQL and others. Focus on the OS platform (and on defensive strategies such as game boxes) rather than on the Internet left vacant opportunities on the server side with mass-market appeal, including search, directory services, hosting of retail stores, social-network sharing of user-generated content, and virtually every other notable lucrative on-line opportunity after the recovery from the dot-com bust.

As these pervasive computing opportunities appeared, Microsoft, committed to its old sources of income, passed up new opportunities. Only time will tell whether these were profitable strategic moves or actions that invited another round of entrants.

V. Organizational Economics and Scope Diseconomies

Organizations face many limits to the exploitation of economies of scope. Collectively these limits can add up to more than just a series of managerial inconveniences. "Over use" or "under use" of assets interferes with the pursuit of new opportunities and raises their costs. Those costs can undermine many attempts to realize economies of scope through optimal sharing of organization-wide assets.

When were these limitations costliest? One general set of issues concerned managerial choice among mutually inconsistent organizational designs aligned to different market circumstances. For example, managers had to choose between the incentive systems needed for employees who operate in one market and not another, where, for example, one is salaried and the other is paid on commission. It also arose, for example, when employees in one activity were explicitly rewarded for sales volumes and the other employees were rewarded for accomplishing intermediate milestones that do not affect sales in the short run.

Mutual inconsistency also was at issue when the information requirements of the new opportunity differed from the information requirement of the established market.

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For example, a new opportunity might require a distinct set of scientific knowledge or marketing investments by employees who then need to cooperate with one another—although they have disparate assessments about the necessity of such investments in learning.

Conflict between strategic priorities was, generally speaking, the source of another set of issues that made two markets mutually inconsistent. These arose, for example, when one product market required reliable products that resided a step back from the frontier, while the strategic priority of the new market required products that, though less reliable, nonetheless come closer to the frontier. As another example, strategic goals also shaped the incentives to have distinct business partners for existing and new markets, particularly in situations where information had to be shared or services had to be delivered cooperatively.

We are not saying that it is impossible that entirely separate (or even conflicting) businesses could be owned by the same organization. We are saying, instead, that a firm with common active management of multiple businesses and shared strategic assets will experience high costs of managing conflicting claims on those shared assets when the strategic imperatives of the different businesses are mutually inconsistent. Deploying the shared strategic assets is not merely a resource allocation problem; it involves resolving the conflicting strategic imperatives of the distinct businesses.

We go one step further. The presence of organizational diseconomies of scope shaped managerial decision making, even in settings where successful firms address new markets closely related to ones they already serve. That is, organizational limits are so costly in some circumstances that they give rise to higher costs for an incumbent firm than to a separate organizational entity, even in settings where the incumbent has enjoyed prior success. This outcome is not a sign of any weakness on the part of the incumbent organization, but, rather, a sign that it cannot allocate its considerable strengths to mutually inconsistent activities, and its managers choose between them.

Our argument for this proposition is inferential, based on deep analysis of the details behind two important cases. In both cases it would be impossible to explain IBM's or Microsoft's actions without understanding the role such diseconomies played. It also

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would be impossible to explain both cases without understanding each company's interest in continuing in one market while pursuing another. The essence of competitive events in both cases—timing of entry, pricing of products, distribution of market share, or even realized changes of market leadership—would be misinterpreted if viewed as solely determined by technology or solely by the incentives of market circumstances. Rather, the managerial actions affiliated with organizational diseconomies of scope shaped incumbent firm behavior and the salient features of outcomes.

That being said, we mark one cautionary note. Many would draw their conclusions from the case of Microsoft—the newer firm that, in seeming contrast with IBM, so far has successfully survived its competitive threat. It would be an error to focus too much on this specific difference in outcomes. It is a misreading of both the process leading up to the outcomes and the salient features of them.

There are too many parallels between IBM and Microsoft in the process leading up to facing competitive threats. Before the competitive threat was realized, each firm aggressively pursued new technological advances. Coincidentally, each had just undertaken a major electronic commerce initiative: IBM's had great success for enterprise customers in the late 1970s, while Microsoft's had little impact on the online world of the mid-1990s. In other words, even prior to these observed events, both firms attempted to anticipate future technological opportunities and adjust their capabilities.

In each case, there was a substantial internal conflict between management of the old (Mainframes, Windows) and management of the new (PC, Internet.) Each firm solved this in the short run by creating a separate internal organization (a firm-within-a-firm), and protecting it from internal attacks by the application of senior management time and attention. As the amount of senior management effort needed to control those conflicts grew out of control, each firm resolved the internal conflict—with both favoring the old over the new.

Each firm enjoyed considerable interim success by taking advantage of assets it had built up in the old market: IBM for a time dominating PC standards-setting and Microsoft winning the browser wars and setting other key standards such as email.

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Neither, however, turned this into lasting advantage in a range of applications tailored to new market opportunities.

Enough historical time has passed to see IBM's loss of PC market standards and eventual exit; Microsoft's future in the Internet age is unclear at this juncture, even though it staved off this first threat. Both firms avoided any short-run threat to their existing position. Again, with IBM, sufficient time has passed to see long-run threats come to fruition, whereas Microsoft today continues to dominate its historical markets, but few of the new Internet ones. Nevertheless, the salient features of the long run remain unresolved.

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