The Right Remedy

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1) Introduction

Antitrust law respects economic logic by establishing two goals for remedy, restoration of competition harmed by the anticompetitive acts and prevention of further anticompetitive acts. Microsoft has a pattern of anticompetitive acts, interfering with the commercialization of competitive technologies brought by the Internet in the 1990s and committed to repeating the pattern by preventing valuable innovation in the new century. Microsoft is strategically quite predictable; it will always resort to anticompetitive means if – as has been so often the case since the mid 1990s – it cannot win a technology race on the merits. On the other hand, Microsoft is tactically quite resourceful; its violations of the antitrust law are wide-ranging and varied. Such a widespread, lawless and harmful ongoing pattern calls for a remedy that accomplishes both goals.

Standard antitrust analysis would lead to the obvious, traditional remedy: ending the Windows monopoly, either by breaking up the company into multiple sellers of Windows or by licensing Windows technology widely. Both goals for remedy can be accomplished in this case without that traditional step. First, divestiture of the company into an applications and an operating system company restores competitive conditions very like those destroyed by the anticompetitive acts. Absent the anticompetitive acts, Microsoft would have lost the browser war, and other firms would have commercialized useful technologies now controlled by Microsoft. Divided technical leadership, which could be accomplished by having an independent browser company in the late 1990s or an applications company now, lowers barriers to entry and competition in many markets. It was exactly this route to an increase in competition that Microsoft avoided by its anticompetitive acts. Second, ending Microsoft's unique position in the industry offers innovative new technologies the choice of two mass-market distribution partners, either AppsCo or OSCo. The divestiture will do much to reduce the motive to violate and also to reduce the effectiveness of future anticompetitive acts. It restores conditions for competitive innovation at a moment in technology history when having a single firm set the direction of innovation in PC and end-user oriented internet markets is most unwise.

2) The Economics of the Case

Microsoft, the longstanding monopolist in the personal computer operating systems market, saw the commercialization of the Internet in the mid-1990s as a potential threat to its position and its market power. Microsoft feared divided technical leadership.

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It thought that external control of such Internet-centric technologies as the browser and Java would lower barriers to entry into PC operating systems. It therefore acted to prevent widespread distribution of those innovative technologies under the control of other firms. Caught off guard by the sudden success of the Internet, and far behind in standards-setting races, Microsoft found itself unable to win by advancing its own versions of browser and Java technologies and giving them away for free, despite its considerable "strong second" skills in incremental technical progress and technology marketing. Having failed at competing, Microsoft turned to an impressively wide-ranging arsenal of anticompetitive tactics, exploiting the innovation-preventing clout of its existing monopoly position. Its ultimate success in establishing dominance for its own browser and client-side Java were the fruits of those anticompetitive acts. That dominance, in turn, means that the industry is more vertically integrated than it would have been had the market been permitted to choose and that entry barriers into the PC OS business have remained high as a result of the anticompetitive acts.

Since the motive for Microsoft's actions was preserving its monopoly, and since the specific methods it employed prevented market choice without efficiency justification, and since its opportunity to employ those methods arose from its existing monopoly power, it was found guilty of monopolization of the PC OS market under section 2 of the Sherman act. It was not the PC OS monopoly circa 1995 that was illegal, but instead the maintenance of that monopoly into the present by holding entry barriers high at a time they would have fallen except for the anticompetitive acts.[2] The protests from Microsoft's defenders (in this volume and elsewhere) notwithstanding, the section 2 theory of this case is quite boring and conservative. "Monopolist sees new technologies as good for its customers but bad for its market power, cannot preempt them by itself innovating, so prevents customer choice of them by a number of strategies lacking efficiency justification." Far from conflicting with the purposes of section 2, this case embodies their very core.

The most important harm to competition was holding high entry barriers into the PC OS business by preventing divided technical leadership. Much of this paper is concerned with the economics of that harm. To be worth remedying, the harm must pass two distinct logical tests. First, was there a real prospect of improvements in competition absent the anticompetitive acts? Second, is there an available remedy that restores a reasonable approximation of the lost competition? I answer these questions by examining the economics of the computer industry. When Microsoft sought to prevent divided technical leadership of the industry in the late 1990s, it was drawing on a large body of industry experience and industry self-assessment. In this industry, dominant firm positions in any particular product market tend to persist, protected by entry barriers. But those dominant positions can and do end when there is disruptive change in related, complementary product markets – as long as those markets are not also dominantly supplied by the same firm. Under divided technical leadership, the disruption permits new and innovative entrants to offer superior products and technologies. Microsoft applied this experience to the late-1990s situation quite explicitly, fearing that Windows

[2] Other counts included tying under section 1, exclusive dealing under section 1 (where the District Court found for Microsoft) and attempted monopolization of the browser market. The "attempted" is now a quaint historical artifact, as the Microsoft browser monopoly is an accomplished fact. None of these subsidiary counts is central to the liability trial nor to the remedy argument.

might be exposed to competition if the browser and java were successful and were outside its control.

Microsoft is a vertical foreclosure case in several senses. First, basic vertical foreclosure logic explains why Microsoft was so eager to avoid external control of Internet technologies, for these would lower entry barriers into their OS monopoly. That is why they made an offer to pay Netscape to reduce competition, and that is the motivation for their anticompetitive acts concerning the Navigator browser, cross-platform Java, and several multimedia technologies innovated by other firms. On the second level, many of the anticompetitive acts themselves also had vertical foreclosure logic. The computer and Internet industries involve a number of distinct complementary technologies typically separately supplied. Microsoft sought to bribe or bully many different kinds of suppliers of complements in order to block distribution and usage of competing browsers and cross-platform Java virtual machines.[3] On the third level, browsers and Java Virtual Machines are themselves complements, so that one mechanism of predatory attack on cross-platform Java was blocking widespread usage of the independent browser. Finally, Microsoft's vertically integrated structure was itself used as an anticompetitive tool.

The government's divestiture proposal has a restoring-competition remedy logic that is quite closely linked to the logic of the liability case. Microsoft sought to prevent external control of key technologies because it feared the competitive consequences for Windows. The remedy re-establishes divided technical leadership, enabling those consequences. Microsoft sought to deny new technologies the opportunity to collaborate with complementary industry participants. The remedy reduces the incentive and the ability to undertake those anticompetitive acts.

That is the logic. The remaining important economic question is whether the competitive consequences are now worth having and whether the remedy will accomplish them. I will take this question up at some length. A secondary practical question is whether there is some other remedy – divesting only a browser and java firm? – imposing only conduct restrictions? Breaking up the Windows monopoly directly? – that might better accomplish the same goal. I will take this up as well.

The second purpose of a remedy is preventing of future anticompetitive acts. The open questions here are whether the status quo would likely lead to repeat violations by Microsoft and whether the divestiture substantially reduces the motive, methods, and/or opportunity for those anticompetitive acts. The first question is easily answered by the long pattern of Microsoft anticompetitive acts so thoroughly documented in this case. The second is answered by examining the present circumstances of Microsoft and the industry, to see whether the triggers for new anticompetitive acts remain present. It is easy to see that they do.

I worked for the Antitrust Division as a consultant through much of 1998 and early 1999, gathering materials from a large number of experts on the question of remedies in the Microsoft case and assembling and interpreting them for the Division. I then served in the Division as Chief Economist at the end of the liability trial, during the mediation, and during the preparations for the remedies hearing. I continue to consult to

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[3] These included computer manufacturers (OEM's), Internet Service Providers and Online Services (collectively, IAPs), other software companies (ISVs), providers of Internet content, Intel, Apple, etc.

the Division at this writing. So this paper is not the view of a neutral. The remedies recommendation that the Division made to the District Court had and has my full support, and I believe it to be based on the best possible analysis of the economics of the industry and the case and very strongly in the interests of consumers. This paper explains, in nontechnical terms, the core economic ideas behind the most important part of the remedy proposal, the divestiture.

3) Divided Technical Leadership is More Competitive and More Innovative in Computing

The innovativeness and competitiveness of the personal computer industry are due to a number of factors, including ongoing technical and market opportunity. The most important element of supply is divided technical leadership and specialized supply. It is particularly important that distinct firms sell widely distributed complementary technologies with platform potential.[4] In the 1980s, technical leadership was divided, with platform level technologies sold by microprocessor, PC (OEM), operating system, networking OS, word processor, and spreadsheet firms. Fewer separate firms now are in that position, as operating system, word processor, and spreadsheet have been consolidated in a single firm, and OEMs have been rendered toothless. The introduction of the browser added a new "layer" with strong platform potential. This would have reversed the tendency toward vertical consolidation if the browser had remained in independent hands.

The competitive implications arise because layers with platform potential have a tendency to monopoly arising from network effects. Those monopolies can, for a time, prevent entry by "locking in" the network effects, but under divided technical leadership opportunities to end lock in arise more frequently. The corrective forces of competition are unleashed when disruptive change in another layer lowers entry barriers or lessens the costs of migration to a new, superior technology. The particular features of industries like computing make this kind of intermittent but powerful competition an important force; preventing it was Microsoft's goal, restoring it, the government's.

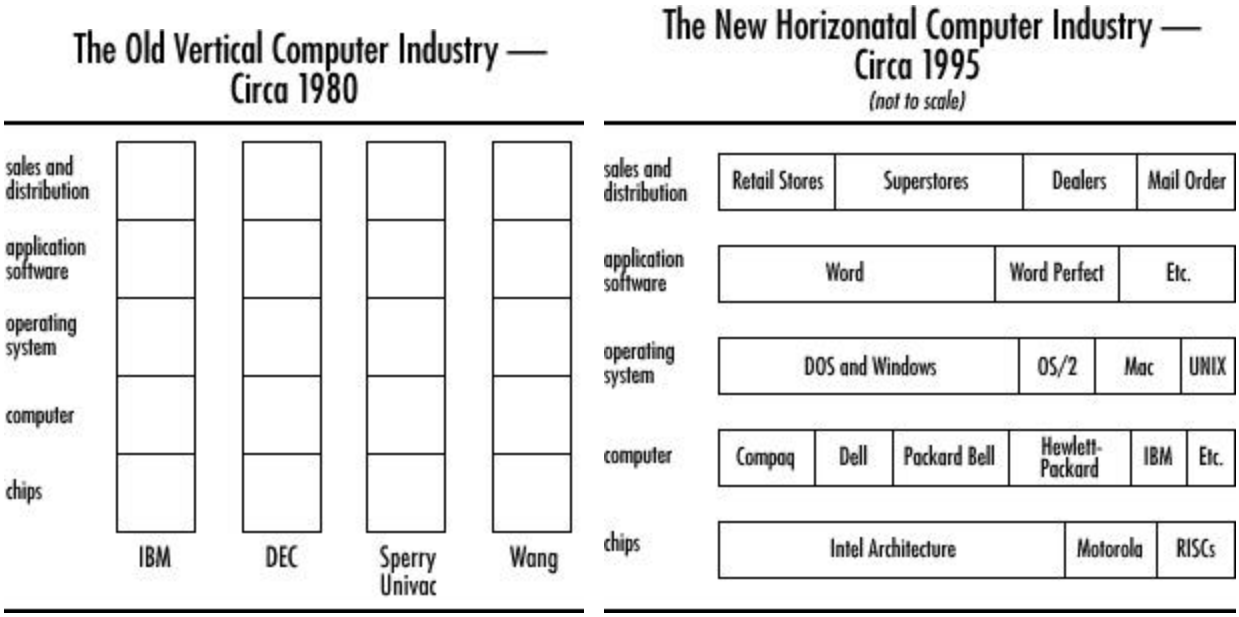
a) Industry Self-Assessment

The computer industry's self-assessment is that divided technical leadership is a more competitive and a more innovative way to organize the industry than vertical integration of all platform layers. The origins of this assessment are empirical and practical, based on leading business people's examination of the history of competition and innovation. The assessment, while analytical, is not distant and theoretical, but is

[4] Technologies with platform potential are, in economic language, those which might become the center of indirect network effects. See, e.g., David, P. A., and Greenstein, S. "The Economics of Compatibility Standards: An Introduction to Recent Research." *Economics of Innovation and New Technology*, 1990, Katz, M. and Shapiro, C. "Systems Competition and Network Effects." *Journal of Economic Perspectives*, Spring 1994, or Liebowitz, S.J., and Margolis, S. E., "Network Externality: An Uncommon Tragedy." *The Journal of Economic Perspectives*, Spring 1994, for defintions. The District Court reasoned correctly that widespread usage of a technology and the ability of the technology to provide services to a wide number of complements (through exposing programming interfaces) are the elements of a platform, and that the ability of platform-potential software to run both on Windows PCs and other clients was critical to its competitive importance. See the *Findings of Fact* (hereafter, FOF) at ¶ 53.

used by industry participants to explain important competitive events and to guide important strategic and investment decisions.

The locus classicus of this assessment is a book by Andrew S. Grove, then CEO of Intel[5]. Dr. Grove wrote of the differences between the "old" computer industry, characterized as "vertical" because firms were vertically integrated, and the "new" computer industry, characterized as "horizontal" because (in economics language) the general purpose (or platform) parts of the industry are vertically disintegrated and (in Dr. Grove's diagram) the industry is divided into horizontal layers defined by products. Dr. Grove does not mean merely to associate the industry structures he identifies – vertically integrated and vertically disintegrated with divided technical leadership – with different parts of the computer industry – mainframes and PCs – but instead puts the shift forward as a general valuable innovation in the organization of the industry.



The advantages of the "new" industry structure advanced by Dr. Grove begin with superior customer choice. They continue with his emphasis on the possibility of disruptive and valuable "paradigm shifts" under divided technical leadership. Dr. Grove's basic framework is that it is possible to build and maintain dominant positions in each layer in his diagram. However divided technical leadership supports disruptive technical change and divided supply supports buyer choice. Dr. Grove summarizes this: *"Not only has the basis of computing changed, the basis of competition has changed too."*

Dr. Grove is not merely offering a "new is better" businessperson's analysis, but instead takes a careful look at the competitive and innovative strengths and weaknesses of each model of organization before coming to the conclusion that one is better-performing in the computer business.[6] In particular, in thinking about innovation, he

[5] Grove, Andrew S. *Only the Paranoid Survive*, Doubleday, 1996.

[6] Economic theory and organization theory cannot determine that either vertical integration or vertical disintegration performs better in all environments for they have advantages and disadvantages which may be brought to the foreground by the empirical economic and technological circumstances of a particular industry. See M. Perry "Vertical Integration: Determinants and Effects" and M. Katz, "Vertical

notes that the vertically integrated model allows for superior coordination across layers, as each vertically integrated firm takes responsibility within its own "stack" for coordinating technical progress, while the model with specialized supply draws on the capabilities and ideas of a far greater number of firms, permitting multiple distinct initiatives by sellers and buyer choice of best of breed within each layer.[7] From a competition perspective, the vertical model is characterized by substantial competition *ex ante*, but customer lockin[8] removes many opportunities for competition for specific components of an overall solution *ex post*, valuable competition provided by the horizontal model. The reason that the horizontal model provides more competition *ex post* and more customer choices is that it does not use the proprietary architectures of the vertical model, but instead lets customers choose from among separate vendors in each layer. In looking at the pluses and minuses of each system, Dr. Grove uses a general framework familiar to economists. The net of these pluses and minuses is, as assessed by Dr. Grove, a huge benefit – ten times better for consumers: "A consumer . . . might have trouble making them work [together] but he put up with that trouble and worked a bit harder because for $2,000 he had just bought a computer system that the old way couldn't deliver for less than ten times the cost. This was such a compelling proposition that he put up with the weaknesses in order to avail himself of the power of this new way of doing business."

Bill Gates, in his books, agrees with Dr. Grove about the benefits of the new structure for competition and innovation, making the comparison between "the old vertically integrated computer industry" and the "PC approach" with divided technical leadership among the "infrastructure layers"[9]

> *In the old vertically integrated computer industry*, a customer would buy almost all of the elements of a solution from a single company-the chips, the computer systems built on the chips, the operating system, the network hardware and service. Every vendor had its own vertical solution. Sales volumes were low and prices were high. Integration between different vendors was difficult and expensive. *Switching costs for customers were very high* since every piece of the solution would have to change. These vertically integrated vendor solutions are being displaced by *the PC approach, in which specialized companies give customers a choice in each of the infrastructure layers*: chips, computer systems, *system software, business applications, networking*, systems integration and service. *[Emphasis added]*

Contractual Relations" both in *Handbook of Industrial Organization*, R. Schmalensee and R. Willig, eds., North-Holland, 1989. The industry consensus in favor of specialization in computing arises from participants' empirical assessments.

[7] A more formal framework for this can be found in Farrell, J., Monroe, H. K, and Saloner, G. "The Vertical Organization of Industry: Systems Competition Versus Component Competition." *Journal of Economics and Management Strategy*, Summer 1998.

[8] Grove: "The minuses were that, once you bought into this proprietary arrangement, you were stuck with it. If there was a problem, you couldn't throw out just one part of the vertical stack; you would have to abandon the entire stack, and that was a big deal. So customers of vertical computer companies tended to stay for a long time with the solution they chose in the first place." (Citation in note 5, supra.)

[9] Gates, Bill (with Collins Hemingway), *Business at the Speed of Thought: Succeeding in the Digital Economy*, Time-Warner Books 1999.

Note the scope of Mr. Gates' analysis. He does not, as Microsoft's lawyers now argue, that all software is the same, and that the boundaries between different layers are entirely up to Microsoft. Nor does he agree with Microsoft's lawyers that there is only one "infrastructure layer," which must be provided by a single firm. Instead, he recognizes explicitly that there are a variety of distinct "infrastructure layers" in which not only is hardware distinct from software, but systems software is distinct from business applications and from networking.

In The Road Ahead[10] he explains the advantages to IBM and to the computer industry from the open architecture of the PC and divided technical leadership in the supply of the IBM PC, and the subsequent increasingly competitive industry structure that resulted from it:

> It has become popular for certain revisionist historians to conclude that IBM made a mistake working with Intel and Microsoft to create its PC. They argue that IBM should have kept the PC architecture proprietary, and that Intel and Microsoft somehow got the better of IBM. But the revisionists are missing the point. IBM became the central force in the PC industry precisely because it was able to harness an incredible amount of innovative talent and entrepreneurial energy and use it to promote its open architecture. IBM set the standards. In the mainframe business IBM was king of the hill, and competitors found it hard to match the IBM sales force and high R&D. If a competitor tried climbing the hill, IBM could focus its assets to make the ascent nearly impossible. But in the volatile world of the personal computer, IBM's position was more like that of the leading runner in a marathon. As long as the leader keeps running as fast or faster than the others, he stays in the lead and competitors will have to keep trying to catch up. If, however, he slacks off or stops pushing himself, the rest will pass him by. There weren't many deterrents to the other racers, as would soon become clear.

Several aspects of Mr. Gates' assessment here are relevant. The most important for present purposes is the "incredible amount of innovative talent and entrepreneurial energy" which a multifirm structure puts to work, and the fact that IBM's position was rendered more competitive – like that of the leading runner in a marathon – only because the PC industry had divided technical leadership. Yet note also Mr. Gates' assessment of the very high return, in this case earned for a period by IBM, to the role of standard setter. Microsoft's defenders now argue that the same process that happened to IBM – temporary leadership in the enormously lucrative standard setting role later undermined by competition sponsored in part from other layers – would, if it happened to Microsoft, so dramatically undercut the rate of return to innovation as to bring the industry, if not capitalism, to its knees. Mr. Gates knows better.

Steve Ballmer, successor to Mr. Gates at the helm of Microsoft, agreed with much of this in the waning days of the antitrust trial, explaining why specialization was an important step forward: [11]

> . . . .in 1975 companies tended to be vertically integrated. A company did its chips, its hardware**, its system software, its applications**, its systems

[10] Gates, B., Myrhvold, N., and Rinearson, P. *The Road Ahead* Viking: New York, 1995.

[11] Ballmer, S. April, 2000 speech at George Washington University, http://www.microsoft.com/PressPass/exec/steve/04-19gwu.asp

> integration, that tended to come all from Digital or IBM or … . And the premise on which our company was built was that software and hardware were separate businesses. It sort of spoke to a whole different industry structure. A structure, which still is maintained today. A structure of **specialization**. You have chip companies, you have communication companies, **you have systems software companies, you have applications companies. People tend to specialize. Now, we've been called out because we participate in two sectors of those, but, heck, it's still a very specialized business**. [Emphasis added]

Like Grove, the two Microsoft CEOs point out the superior performance characteristics of divided technical leadership, and point quite explicitly to the absence of competition after a customer has made an initial technical choice as the dominant disadvantage to customers and society of the vertically integrated structure, despite its advantages to established dominant firms of raising switching costs which delay or defeat the impact of new competition. Part of the reason that these industry leaders think that the specialized system performs better is that the vertically integrated one has those barriers to new competition, and another part of the reason is their assessment that the computer industry depends on an enormous number of distinct technology layers within each of hardware, software, and networking, so that there are large gains to specialization. Given this central industry view of industry performance, it is no surprise that Microsoft decided that a browser layer outside of its strategic control would increase competition to the benefit of consumers but to the disadvantage of Microsoft's position as the incumbent operating system monopolist.

b) Mechanisms for Innovation, Competition in the PC model

To understand the mechanisms behind these high-level summaries of the relationship between industry structure and competition over time is to understand much of the theory of the government's case against Microsoft. In this section, I continue examining that from the perspective of the industry.[12]

Why do these industry leaders conclude that divided technical leadership is so important? Powerful forces tend to protect a dominant firm's position in any particular market or "layer" of the industry (cf. Grove's diagram.) These can be positive feedback and network effects, in some markets (like the operating system), and individual-customer switching costs, or both, in others.[13] In either case, there is a tendency toward stasis because of entry barriers protecting the incumbent's position. Disruptive technical change in another layer can, however, lead to opportunities for entry.

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[12] This section draws heavily on my work with Shane Greenstein, Bresnahan, Timothy F. and Shane Greenstein (1992) "Technological Competition and the Structure of the Computer Industry," Center for Economic Policy Research, Stanford University, Research Publication number 315. An abbreviated version is available in *Journal of Industrial Economics*, (1999).

[13] As part of a doomed effort to prove Microsoft does not have a monopoly, its attorneys and defenders argue that switching costs, network effects and the resulting lockin are a "theory" invented by academics. They should meet any manager at Microsoft – the firm uses network effects and first mover advantage analysis in its daily work. Dozens if not hundreds of the documents used in the trial, and the testimony of several Microsoft employees, attest to this. See Bresnahan, T. "Microsoft and Network Theory, 2001.

The opportunities for disruptive technical change in another layer to lower entry barriers were seen from both sides by W.A. "Pete" Peterson, whose WordPerfect Corporation was first the entrant and then the incumbent dominant firm in the word processing market.[14] Writing of the problem of entering against incumbent dominant product WordStar, Peterson notes "For most people, switching from one product to another was almost unthinkable." Later, with characteristic color, he notes that this has both individual-user switching cost elements and network elements: "The diehard WordStar users pushed their word processor on unsuspecting friends and co-workers, and this very vocal group represented our biggest obstacle to convincing new customers to buy our product." What is also characteristic of Peterson's mode of analysis is what he shares with participants in the personal computer business generally: individual-customer switching costs and network effects among users of applications are part of the basic toolkit they use to explain how their industry works. For Peterson the entrant, in the early 1980s, the bottom line was that incumbent dominant firm "WordStar seemed impassible." The switch from CP/M computers to the IBM PC – a major piece of disruptive change in another layer – forced WordStar's authors into an incompatible change in their product, causing them to lose the benefits of lockin and leveling the playing field in word processing software.[15] On the level playing field, WordPerfect had a chance to build up enough of its own network effects in order to compete.

Peterson found his own firm to be the beneficiary of the network effects in the era of the IBM PC running the DOS operating system. The most powerful network effects, he thought, would arise within an organization, but there were real reasons why a single word processing program – his – might be adopted by new customers because existing customers already used it.[16] Given that feature of his market, Peterson hoped that because they were the highest market share firm they "were in a good position to pull further ahead in the DOS word processing market, and if IBM and Microsoft kept fighting long enough over OS/2, perhaps we would have time to get ready to win in the GUI market as well." The key changes that would lead to failure in that effort would

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[14] Peterson, W.E. "Pete" (1993, 1999) *Almost Perfect*, Prima Publishing (original) and http://www.fitnesoft.com/AlmostPerfect/ (revision)

[15] Peterson, in Ch. 5: " . . . WordStar seemed impassable. WordStar from Micropro had no less than 60% of the market, and their dealers and customers were very loyal. All Micropro had to do was to keep offering improved versions of WordStar to maintain their number one position. . . . Sadly for Micropro, the one thing they could not do very easily was update their product. After their luck at getting the CP/M version of WordStar running on the PC, they could not seem to get an updated version out the door. They decided instead that they would produce an entirely new product . . . Luckily for us, the new WordStar, introduced at COMDEX as WordStar 2000, was entirely different from the old product. Micropro intentionally attempted to replace their market leader with a product that was bigger and slower and used a different interface. . . . . Micropro did more for us at that show than we could ever have done for ourselves. They convinced their customers that the old WordStar was not very good and that they needed to look for something better. Not only would these customers take a look at WordStar 2000, but they would also look at WordPerfect 4.0.

[16] "In addition to having the same word processor throughout an organization, it helped if the same word processor was used all over the place. If one law firm worked with another on a case, their documents needed to be compatible. If a businesswoman was away from the office, she wanted to find the word processor she used at work on her home computer, her laptop, and at her hotel's business center. If a business needed temporary help, it needed its agency to send someone who already knew how to use its word processor. The world did not need the incompatibilities which came with many different products. The world needed a standard."

arise, not in the market for word processing itself, but in the markets for complements, that is, in other "layers" of the Grove diagram. Peterson:

> "If the computing world would have [sic] stayed as it was in 1986, we would have had little trouble from our competition. There were, however, two big changes coming which would eventually give Microsoft a chance to catch us. The first was the laser printer and the second was the graphical user interface, or GUI (pronounced gooey). These two improvements were still small threats to our business, but support for both would require an enormous amount of work. At the time, it was a little discouraging to think that just as we were beginning to win the word processing game, the rules were changing."

Peterson chose to deal with the disruptive technical change associated with the laser printer. WordPerfect's unique market position was lost, and entrant Microsoft Word got enough of an installed base to get its own positive feedback effects started, during the change to GUI-based computing associated with the replacement of DOS by Windows.[17] This is the core of Peterson's account, and he points explicitly to the contingency of the possibility of ending dominant positions. Disruptive external change broke the positive-feedback loop supporting WordPerfect's position and gave Word its entry opportunity, just as he saw his own entry opportunity earlier at another time of external disruption (CP/M => IBM PC shift). Absent the disruption from another layer, no entry opportunity would have been there.

Mr. Peterson is, by the way, despite his having been fired and WordPerfect having never gone public as a result of the loss of its market position, in complete agreement with Gates and Grove that the "new" structure is far superior, from a consumer perspective, to the vertically integrated structure as a way to organize the computer industry.[18]

Mr. Gates, looking at the same incident from the winning side, is in agreement with Mr. Peterson about the forces at work in permitting the end of WordPerfect's dominance and permitting successful entry by Word. Indeed, Mr. Gates, tells the same

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[17] It is of no particular importance for present purposes to resolve the debate about whether Word won or lost on the merits in its competition with WordPerfect. Without the external impetus of change in the operating system market, Word would not have had much of a chance competing either fairly or unfairly. It is also important for the broad dynamics of the industry but not for present purposes that the key entrant products in the word processing market in different eras, WordPerfect and Word, had been able to prepare for entry away from competition from the dominant firm, WordPerfect on larger computers in the CP/M standard era and Word on Macintoshes in the DOS standard era.

[18] In the old system, the "proposals which the customer received rarely contained a mixture of products from more than one vendor. IBM sold only IBM products, DEC sold only DEC products, etc. Since the customer actually expected the system to work, vendors did not want the bother of mixing and matching a group of incompatible products."

"Once the bid was awarded, the customer and the computer vendor were bound to each other forever, or at least until the next RFP cycle."

"The customer paid a high price for the reliability and convenience of one-stop shopping."

"As the largest and richest company, IBM benefited the most from the old way of doing business. Ironically, IBM was probably most responsible for bringing down the old establishment. When they went outside the company for the operating system for their new PC, they opened the door for other vendors to sell to their customers."

story (with appropriate distinctions at a low level of detail) for spreadsheets, in Gates (1995b)[19]:

> The third example I give are some of the components that go into Microsoft Office. These are cases where, once again, embrace and extend was what it was all about. When we were developing a spreadsheet, we didn't sit down and say, "What's the world's best spreadsheet?" I mean, we had that conversation, but we understood that the market was a market for Lotus 123. People knew 123; they had 123 macros.
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> The only thing that people were interested in buying was a better 123, and so, with Excel, we embraced their macro language. We embraced all the extensions they did. And yet, we did extensions. And so this was a case where the company coming from behind actually moved at a speed, adopted things like graphical interface in a timely fashion, was able to pull ahead of the original product that was there. The same thing can be said for Microsoft Word, although the framework of competition was a little different.

This point about external disruption is made over and over. Charles Ferguson, first a scholar of the computer industry, then a successful software entrepreneur, now a scholar of the computer industry again, wrote a compelling history in "The Fall of IBM" chapters in his 1993 book.[20]

The CP/M standard for Microcomputers, the leading architecture before 1981, was an operating system that ran on a number of different computer manufacturers' hardware. CP/M unified and standardized the market, however, and, with modest exceptions, software that ran on any ran on all CP/M machines (or could be very easily ported.) Part of the reason was that CP/M machines had Intel microprocessors. This led to very substantial network effects and to considerable lock-in to the CP/M compatibility standard.[21] The second most popular architecture, and one that had a single OS vertically integrated with the computer (though not the microprocessor) was the Apple II. It too, had considerable network effects among users and applications developers linked together by a compatibility standard embedded in the computer and OS architecture. These network effects were broken, and a new standard emerged, by disruptive technical change in a very influential layer, the PC itself, taking advantage of fundamental and disruptive technical change in another layer, the microprocessor. The IBM PC was a 16-bit computer, where the earlier Apple and CP/M machines were 8-bit – not a trivial advance, this permitted larger and more complex applications, more speed, and such user interface improvements as color. And it was sold by IBM – a disruptive change in the market as well as the technical conditions of the OEM layer. The value of preserving the network effects associated with CP/M was not lost on IBM, in two senses. First, understanding the logic of network effects and lockin, IBM wanted to offer developers and users a migration path to the new computer, that is, wanted new applications to be at least partially backward compatible with CP/M. This was an important part of the

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[19] Internet strategy day keynote, December 7, 1995, *DX 341*.

[20] Ferguson, Charles H, and Morris, C.R. *Computer Wars: How the West can Win in a Post-IBM World*, New York Times Books, Random House, 1993. Dr. Ferguson sold his company, Vermeer, to Microsoft. The most important product, FrontPage, is a web page and web-site design tool. Dr. Ferguson has applied the same analysis to Microsoft again in his new book, Ferguson, C. "High St@kes, No Prisoners,: a winner's tale of greed and glory in the Internet wars." *Times Business*, New York (1999).

[21] These network effects were analytically the same as those called the Applications Barrier to Entry in the Microsoft case.

decision to use Intel architecture microprocessors.[22] Second, IBM wanted to get the PC off the ground quickly, so as to get a positive feedback loop started. This decision led IBM to divide technical leadership of the PC architecture, bringing in both Intel and Microsoft as major partners. This led to the replacement of CP/M with PC-DOS, the IBM PC operating system that IBM obtained from Microsoft. Without the disruptive change in microprocessors (16 bit) and computers themselves (PC), the switch to a new operating system would have been blocked by network effects. Mr. Gates praises IBM's decision, in a passage I quoted above, noting that the advantage was speed and the disadvantage was that it left IBM in much more competitive circumstances.

At the outset IBM – the leading manufacturer of the IBM PC and compatibles -- had a strong role as the coordinator of the decentralized technical progress in the PC platform. Later, this role slipped away to IBM's early partners, Intel and Microsoft. Such shifts are a competitive advantage of divided technical leadership.[23]

Disruptive change in the microprocessor layer quickly led to an increase in competition for IBM in the PC layer. An important new microprocessor, the Intel 80386, was first used by Compaq, not IBM, in a shipping PC. This event, which was encouraged by Intel, increased competition in the PC business by undercutting IBM's brand distinction. More importantly, it led to the rapid change in the way the PC layer worked competitively. Where it had consisted of IBM plus "clones," it now had multiple branded PC firms.[24] Quickly there came to be an "industry standard architecture" rather than an IBM architecture for PCs, an important step in commoditizing the PC (OEM) layer. Though IBM continued to enjoy a valuable brand name within PC layer, the disruptive change in a complement, Microprocessors, keyed an entry process that led to a more commodity-like PC with weaker brand differentiation.[25]

It was in this state of dramatically reduced control over standard setting in PCs that IBM came into conflict with Microsoft over the future direction of the platform. It was clear in the late 1980s that the graphical user interface (GUI) was an important new layer in the PC stack.[26] At first, the two firms had a collaboration on a new operating system-cum-GUI, to be called OS/2. This collaboration would have continued the relationship between Microsoft and IBM that had existed in the era of PC-DOS and MS-DOS. But the disruptive technical and market change associated with the commercialization of the GUI offered opportunities for changes in the conditions of competition. Microsoft and IBM went down different paths in the development of the GUI (Windows and OS/2, respectively.) Microsoft's offering abstracted and further commodified the PC, whereas IBM's would have had the impact of maintaining a special position for that firm in linking hardware and software technologies plus its brand name.

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[22] See Ferguson and Morris (cited in note 20).

[23] See Ferguson and Morris (cited in note 20) for a detailed recounting of these events. IBM coordinated improvements in color monitors with the VGA standard IBM owned 13% of Intel for a period and helped coordinate the introduction of the Intel 80286 processor. IBM coordinated improvements in the DOS operating systems even though these were supplied by contractual collaborator Microsoft.

[24] For the degree to which this undercut IBM's market power quickly, see Bresnahan, Timothy, Scott Stern, and Manuel Trajtenberg "Market Segmentation, Transitory Market Power, and Rents from Innovation: Personal Computers in the late 1980's", *RAND Journal of Economics*, 1997.

[25] IBM attempted to re-proprietize the PC architecture with a cluster of breakthrough improvements but failed as the industry had locked in to the industry standard architecture.

[26] Already commercialized in the Mactinosh, the GUI was still new for the dominant PC platform.

Ultimately Microsoft's product triumphed in the marketplace. The impact was to complete the process of commodification of the PC layer itself, and to shift a large part of the standard setting role in the PC platform to Microsoft. Once again, the issue is not whether Microsoft won this struggle on the merits.[27] The point is, the struggle could not have arisen without the divided technical leadership of the PC platform, with both IBM and Microsoft (sellers of complements) in a position to vie for control of the emerging standards. Nor could it have emerged without disruptive change.

That form of competition has an important advantage that we should not forget. Microsoft could abstract and commoditize the OEM layer without forcing any incompatible change on the users of PCs. They could migrate from buying an IBM PC to buying a Wintel PC without having to abandon any of their sunk costs in the PC platform. This happens because the OS and the GUI lay on top of the PC – i.e., because of divided technical leadership, which offers an opportunity for competitive entry and important shifts in the strategic position of vendors, important routes for innovation and change, without always having to overcome the strategic and social-costs barriers associated with ending lock-in to a platform.

Looking at the history of PC software reviewed so briefly here, disruptive change in an influential layer permits several distinct kinds of entry where entry had been blocked before. The starting point is that disruption can make the existing lockin forces less powerful. This can happen in either of two very different ways. First, if the disruptive change is technical, existing software may need to be rewritten to take advantage of new capabilities, possibly losing backward compatibility or simply losing the rhythm of upgrades to meet customer needs. This has the effect of permitting the market to choose the best product paying less attention to old network effects. Alternatively, the change could bring a number of new users in to the market, users who are not individually locked in and who might be distinct enough from existing users that the flow of network effects does not automatically extend to them. This permits expansion of an entrant in the niche defined by the new users, from whence they might ultimately be a more immediate threat to the incumbent. Alternatively, the change could disrupt marketing relations in the industry, so that consumers now buy our product to get the complement – weakening any lock in or network effects associated with the old standard.

Disruption in turn permits several distinct kinds of entrant. The disruptive complementor may sponsor entrants, as Intel sponsored Compaq's challenge to IBM's leadership. Sponsoring competition in an adjacent layer may shift strategic leadership, as when Microsoft's efforts to commoditize the PC by abstracting the PC and writing a PC-neutral OS.[28] Another pattern is that the disruptive complementor may themselves enter. The latter is the strategy chosen by Microsoft in the word processing and spreadsheet markets, for example. This has the advantage of being an occasion of competition in the applications markets, and the disadvantage that further rounds of entry and competition become less likely because the industry becomes more vertically integrated. Another pattern is that the disruption permits entry on a broad front in a number of

[27] Microsoft's critics in the technology community have long averred that there was some dirty dealing in the OS/2-Windows split that led to their triumph.

[28] Commodification of the market in PC hardware would be an important background fact in the antitrust case, but it arose only because of the vertically disintegrated structure of the PC business

complementary markets. This was, for example, a centerpiece of the platform shift from CP/M and Apple II to the IBM PC. The PC was a better computer than its 8-bit predecessors, but the PC running Lotus 1-2-3 and WordPerfect with a color card from Hercules was a vastly better computer than a CP/M machine running VisiCalc and WordStar in black and white. These complete platform shifts are rare, and tend to arise when there is an alignment between disruptive technical change (the IBM PC was far better than predecessors technically) and market change (there were many new users of PCs and the original constituency of CP/M, hobbyists, was now very small.) However, even if disruptive change does not lead to new entry, it can lead to shifts in the distribution of influence over direction of the industry as some of the functionality that used to be in one layer is contested by another layer and moves to it.

Strategically important individual layers in the computer business are not likely to have much horizontal competition at any given time, because of network effects. They are not likely to have immediate entry threats at any given time, because of lock in. Any given entry threat is far more likely to be successful if there is divided technical leadership and if the entry threat is based on an important new technological and market opportunity. With divided technical leadership, the industry can be reasonably competitive in the intermediate run, for there is a balance between the degree to which current market positions are protected by entry barriers and the underlying technological progress which brings new entry opportunities. That is the fundamental intermediate run competitive dynamic of the industry. There is a longer term, grand dynamic, however. One of the mechanisms by which divided technical leadership leads to competition is entry by firms in adjacent layers (as when Microsoft entered WordPerfect's market). Successful entry of that form, however, leads to a vertical consolidation and then vertical integration. Given the substantial entry barriers under vertical integration, vertical consolidations are very hard to reverse. Accordingly, the addition of new strategic layers in the industry, such as those brought by the commercialization of the Internet, is an important restorative force for competition in the industry's grand dynamic. This is why Microsoft sought to avoid a browser and java under outside control.

Microsoft's defenders tend to point to the changes over time in software market leadership as showing that software markets "are" easily contested by new entrants, largely ignoring the role of disruptive change in other layers. They do admit the role played by external disruption in their histories. Here is Dean Schmalensee on the topic[29]:

> [Software] Competition centered on the development of innovative features. Software vendors released periodic improvements and occasionally made revolutionary changes. *Technological change in hardware and software platforms was at least partly associated with changes in category leadership.* Wang introduced its dedicated word processing system in 1976, and by 1978 it had become the leader in what was then a niche with 50,000 users. The rise of the microcomputer eventually displaced Wang and other dedicated word processors. *WordStar only briefly bridged the transition from CP/M to MS-DOS [sic!]. The switch to Windows helped displace WordPerfect because WordPerfect took too long to introduce a Windows-compatible version of its software.*

Similarly, Evans et al. analyze the ultimately successful entry of Excel as a competitor against Lotus 1-2-3 by pointing out that Excel was the superior product in

[29] Schmalensee Direct Testimony, paragraph 68 (emphasis added, references deleted.)

features and performance in the late stages of the DOS technical standard for PC competing but made miniscule gains; only with the migration to Windows did Excel get the opportunity to enter and compete on the merits[30].

Industry participants, Microsoft and I agree with Microsoft's defenders about the importance of revolutionary change in the software business. However, the defenders' claim that the existence of revolutions in industry history somehow proves they are right is nonsense. Where industry participants, Microsoft and I depart from the defenders is in emphasizing that the revolutionary changes are contingent on external disruption. Competitive revolutionary changes are especially contingent; absent external disruption, few existing dominant firms with dominant positions buttressed by network effects will suffer much competition from innovative entrants. This is the point of the antitrust case; the commercialization of the Internet was an external disruption that could have led to exactly the kind of valuable competition that the industry, Microsoft's defenders and I all praise. The point of Microsoft's anticompetitive acts was to deny consumers the benefits of that valuable competition.

4) Microsoft Prevented Divided Technical Leadership to Avoid Increases in Competition in Core Monopolies

Based on its knowledge of the history of the PC industry, Microsoft analyzed the threat to its position posed by the Internet according to exactly the framework just laid out. The obvious implication of the result that divided technical leadership increases competition is a strategic motive for vertical integration. This is how Microsoft thought of the browser and java incidents; by preventing external control of those technologies, competition could be avoided. Microsoft thought that this would be costly to its customers, not beneficial to them, but proceeded to impose those costs to maintain its monopoly position.

Microsoft thought that its monopoly in PC operating systems was unassailable from any direct assault on it. The network effects associated with Windows were enough to assure that.[31] Further, assaults based on disruptive technical change from the other main layers within the existing PC industry were foreseeable and under control. Computer manufacturers had been rendered toothless by making their product a commodity, though they remained a distant threat. Novell, while still annoyingly independent as a networking company, was in a weak strategic position. Intel was the most worrisome potential source of disruption, but a known and containable one. The most widely distributed business applications were now supplied by Microsoft, with the many ISVs writing for the Windows platform supplying to smaller markets than that dominated by Office. Office itself was a secure monopoly, especially with the most important other layer from the perspective of an application, the operating system, under Microsoft's control. Disruptive technical change in existing PC applications markets was unlikely to be the source of new competition, as the nearly universally distributed applications, "personal productivity applications" like word processing and spreadsheets, were dominantly sold by Microsoft. From this vantage point, Microsoft analyzed the

[30] Evans, David S., Albert Nichols, and Bernard Reddy (1999) "The Rise and Fall of Leaders in Personal Computer Software," Mimeo, NERA.

31 See evidence adduced in Plaintiffs' Revised Proposed Findings of Fact in section II.B.3.

competitive threat posed by the Internet as introducing divided technical leadership by adding new important layers. They viewed the World Wide Web in general and the browser and java in specific as dangerous developments precisely because they were complements with platform potential and were outside their strategic control.

Much can be learned from the time, in spring 1995, when Microsoft grew aware of the potential browser threat and turned to deal with it.[32] Mr. Gates' Internet Tidal Wave memorandum, after assessing the commercialization of the Internet as the most important piece of disruptive change in the industry since the introduction of the IBM PC, stated the nature of the threat in clear terms (emphasis added):[33]

A new competitor "born" on the Internet is Netscape. Their browser is dominant, with 70% usage share, allowing them to determine which network extensions will catch on. They are pursuing a multi-platform strategy where they move the key API into the client to commoditize the underlying operating system. They have attracted a number of public network operators to use their platform to offer information and directory services. We have to match and beat their offerings including working with MCI, newspapers, and other who are considering their products.

One scary possibility being discussed by Internet fans is whether they should get together and create something far less expensive than a PC which is powerful enough for Web browsing. This new platform would optimize for the datatypes on the Web. Gordon Bell and others approached Intel on this and decided Intel didn't care about a low cost device so they started suggesting that General Magic or another operating system with a non-Intel chip is the best solution.

Mr. Gates sees Netscape's innovation as bad for Microsoft through enabling operating system and hardware competition that would help his customers. His analysis is predicated on divided technical leadership: only the dominant position of the non-Microsoft browser will permit external control over "network extensions." His concern is that the browser is "multi-platform" i.e., runs on many operating systems, so that it might "commoditize the underlying operating system" – business-speak for turn an existing monopoly into a commodity product, such as those we find in perfectly competitive industries. The consequence for Mr. Gates' customers? "Internet fans" might "create something far less expensive than a PC which is powerful enough for Web browsing."

Mr. Gates is scared at the prospect of competition against arising from entrepreneurial innovation which will be good for customers but might end an incumbent firm's -- his -- monopoly. I note, for fans of the "no harm to consumers" defense, the substance of Mr. Gates' argument and for fans of the "snippets of emails" defense, that this arises in an eight page single spaced memo from the CEO changing the strategic direction of the company.

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[32] Some Microsoft employees had, of course, been aware of Internet technologies before this time, as the Internet had been in use, primarily in noncommercial contexts, for over two decades. It was, however, the commercialization of the Internet at the hands of entrepreneurs like the founders of Netscape that brought it to Microsoft's, and the world's, attention.

[33] Gates, Bill, "The Internet Tidal Wave" Memoradum to Direct Reports and Senior Staff, *GX 20*, May, 1995. I use the notation "GX" to refer to government exhibits at trial, which are available at the Antitrust Division's website.

Mr. Gates was basing his analysis upon the work of many Microsoft employees in the Internet area. Ben Slivka wrote a memo with "a lot of material":[34]

The Web is the Next Platform
5/27/95, bens (version 5)

Note: I've included a lot of material in this memo. If you don't have time to read it all, please be sure to read at least the first 4 chapters.

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My nightmare scenario is that the Web grows into a rich application platform in an operating system-neutral way, and then a company like Siemens or Matsushita comes out with a $500 "WebMachine" that attaches to a TV. This WebMachine will let the customer do all the cool Internet stuff, plus manage home finances (all the storage is at the server side), and play games. When faced with the choice between a $500 box (RISC CPU, 4-8Mb RAM, no hard disk, ...) and a $2KPentium P6 Windows machine, the 2/3rds of homes that don't have a PC may find the $500 machine pretty attractive!

The following attributes of the Web are paramount:
1. Server-side information and *interactive applications* are key (the viewer is just enabling technology)
2. Universal data formats and viewers enable the web to grow in richness and power -- the Web is a platform that no one controls and everyone can enhance.

1.2. Why do we need to start from the Web today?

If we don't quickly become the supplier of choice for Internet technology, the Internet will grow and change under someone else's influence, and we risk losing the standard setting role (with the attendant profit margins) we have come to enjoy with MS-DOS and Windows (and Office).

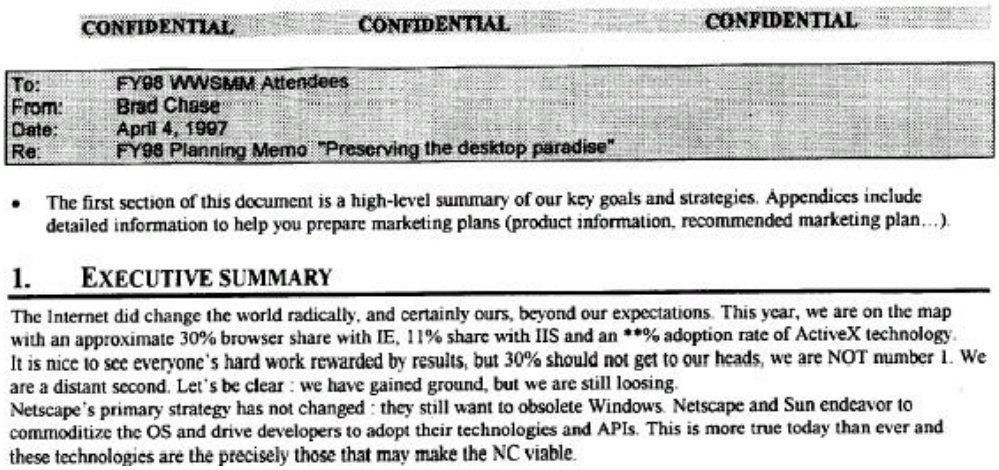
There was a time when we thought that we could just "build it and they will come" with MSN, hence all the non-Internet technologies we developed (Marvel RPC, incompatible Mail & News protocols, MOSView, etc.) for MSN. These technology choices are unfortunate, for (in hindsight) I think it is clear that MSN would have been much further along now if we had started from the existing Web and enhanced it.

There are several key messages in Mr. Slivka's memo. Note that he underlines Mr. Gates' analysis of the mechanisms by which competition from the WWW might be problematic. He has a "nightmare scenario" related to the possibility of "operating system-neutral" developments – loss of market power. The nightmare is only a nightmare for Microsoft, however, as customers – he is obviously thinking about customers using their computer at home -- gain tremendously from new competition ushered in by operating system neutrality, getting the computer they want for one quarter of the current price. It is quite clear that the WWW is a threat to Microsoft's unilateral ability to set standards, which Mr. Slivka sees as a source of profitability, and that part of

[34] Slivka, Ben "The Web is the Next Platform", *GX 21*, May 1995.

the problem is that the Web is open. Mr. Slivka is concerned that, since "no one controls and everyone can enhance" the Web, an era of Microsoft control of standards setting could come to an end. Note that he believes that Microsoft must become "the supplier of choice for Internet technology." Failing that, the key to the profitability of the company will be lost, for they will risk losing the standard setting role they have in operating systems and in Office.

It was not only the possibility of a newer, cheaper, home computing device that had Microsoft officials concerned. In a planning memo titled "Preserving the Desktop Paradise," (oddly titled if the industry were perfectly competitive, don't you think?) Brad Chase agreed with others that the strategic goal of Netscape was to "obsolete Windows" and to "commoditize the OS."[35] At this somewhat later date, however, Chase is concerned about customers at work as much as home, for he is concerned that the developments in Java and the browser are "precisely those that make the NC viable." By the "NC" he means the network computer, another initiative to replace Windows PCs in workplaces (main locus of the "desktop paradise" for Microsoft) with a far cheaper alternative. Entry and success of the NC are, as Chase makes clear, contingent on the success of some kind of cross-platform middleware such as the browser or Java. "Our competitors are still hard at work trying to obsolete Windows. More people than ever now believe they will. Netscape and Sun endeavor to commoditize the OS and drive developers to adopt their technologies and APIs. This is more true today than ever and these technologies are precisely those that may make the NC viable."[36]



CONFIDENTIAL CONFIDENTIAL CONFIDENTIAL

To: FY98 WWSMM Attendees
From: Brad Chase
Date: April 4, 1997
Re: FY98 Planning Memo "Preserving the desktop paradise"

- The first section of this document is a high-level summary of our key goals and strategies. Appendices include detailed information to help you prepare marketing plans (product information, recommended marketing plan...).

1. EXECUTIVE SUMMARY

The Internet did change the world radically, and certainly ours, beyond our expectations. This year, we are on the map with an approximate 30% browser share with IE, 11% share with IIS and an **% adoption rate of ActiveX technology. It is nice to see everyone's hard work rewarded by results, but 30% should not get to our heads, we are NOT number 1. We are a distant second. Let's be clear : we have gained ground, but we are still loosing.
Netscape's primary strategy has not changed : they still want to obsolete Windows. Netscape and Sun endeavor to commoditize the OS and drive developers to adopt their technologies and APIs. This is more true today than ever and these technologies are the precisely those that may make the NC viable.

Thus we see that one of the mechanisms I identified above was on the mind of Microsoft employees. Windows has a valuable monopoly, and entry barriers into that monopoly are high. If, however, there is disruptive change in a complement such as the browser or Java, that may open up opportunities for entry of substitutes for a Windows PC. The documents we have just examined suggest both entry suitable for home customers (Mr. Gates and Mr. Slivka) and for work customers (Mr. Chase (and many others, elsewhere.) All of these documents raise a call to arms to prevent development of

[35] Chase, Brad "FY 1998 Planning Memo 'Preserving the desktop paradise'" Microsoft Memorandum, April 1997, *GX 510*.

[36] Cited in note 35, supra.

an independent browser (and/or Java) precisely to prevent this increase in competition to the benefit of customers.

The importance of divided technical leadership for entry and long run competition is illustrated by other kinds of internal Microsoft analyses as well, such as those related to pricing Windows. Joachim Kempin (1997) asks, in memo to Gates about a Windows 98 pricing plan "Who can derail this plan and MSFT counter tactics."[37] Among the "who" are no current vendors of other operating systems for PCs or other horizontal substitutes – no mention of the Macintosh, of Be, or of Linux. Sun (only) is mentioned under the "OS competitor" heading, but as one that would have to enter by way of Java, so that "for the next 2-3 years the barriers are huge for them."

The threats Kempin considers, but discards, as not actually constraining Microsoft, are all threats of potential entry into the OS business sponsored by or undertaken by firms in other layers. One is from an "OEM coalition" – current complementors/customers who might "fund a competing effort (say in India)." Other potential sponsors include an ISV, Netscape, and Intel, the microprocessor manufacturer, or a Netscape-Intel-Compaq coalition. Kempin thinks that all of these are unlikely threats, however, because they would have to get over the great "inertia" created by customer investments in "training, infrastructure and applications in windows [sic] computing." But they are the closest threats he can adduce to the Windows monopoly.[38] Kempin's pricing analysis assumes (with some foundation, as anyone who has met firms in the other layers will attest) that firms in the layers around Microsoft are adequately annoyed with the way Microsoft has been handling the Windows monopoly that they might sponsor a potential entrant or become potential entrants themselves. Divided technical leadership is critical to Kempin's argument that there is a -- small -- threat of entry from the existing complementors; his assessment of the small size of the threat turns on the inertia associated with lockin to Windows network effects, that is, on the applications barrier to entry.

Mr. Maritz, Group Vice President, Platforms and Applications, and third in command at Microsoft, spoke in court to the issue of how a complement in the present could become, with suitable developments, a substitute in the future. He pointed quite explicitly to potential future competition from the next layer over. "Even if it [the browser] is running on top of your own platform, over time the value of the platform [Windows] can become diminished. He was drawing on a wide consensus within Microsoft that browser was a potential future threat, though not a current substitute for Windows.[39] Relatedly, Mr. Maritz testified that Navigator is a threat to Windows "if

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[37] Kempin, Joachim "As Promised OEM Pricing Thoughts" Morandum to Gates, Ballmer, and Maritz, December 1997, *GX 365*.

[38] This pricing analysis shows some of the absurdity of the idea that the browser and java should be counted in the same "platform" market along with Windows simply because they had platform characteristics and were potential entrants into the OS business. Is the producer of an important complement, Intel, an operating systems seller? Should the main customers for Windows, OEMs, be counted as sellers in the market in which they are buyers?

[39] Trial Transcript 1/25/99 pm. See, also, Mr. Slivka's deposition 1/13/99 "So the point is not that the little tiny Web browser, you know, whether it was Navigator or Navigator 2 or Navigator 3, the point was not that that thing as it stood then would immediately kill Windows. . . . The point was that that thing could grow and blossom and provide an application development platform which was more popular than Windows," or Mr. Rashid's assessment of the future technological change that would make the browser an immediate threat in *GX 521*.

more and more application programs get their services from Navigator and not from Windows, the perceived value of Windows is going to decline, and the ability to have those applications moved to other platforms will also be increased" pointing explicitly to future threats both from entry by Navigator itself and by Navigator as a force increasing competition in the OS business.

The mechanism was spanning and abstraction of Windows, exactly as the history taught them. Mr. Wright wrote that the "core threat for Microsoft is the potential for this platform to abstract the Win32 API."[40] Mr. Slivka took the "slightly extreme view of the ability of the Web to make Windows irrelevant, but it [is sic] worthwhile to ponder this possible future" in explaining why a Web outside Microsoft's control was good for consumers, for content developers, and for competitors to Microsoft.[41] Mr. Gates characteristically positioned Netscape as a potential future entrant into the operating system business because of the disruptive change ("sea-change") implied by the widespread adoption of the Internet[42]:

> Netscape's strategy is to make Windows and the Apple Macintosh operating system all but irrelevant by building the browser into a full-featured operating system with information browsing. Over time Netscape will add memory management, file systems, security, scheduling, graphics and everything else in Windows that applications require.
>
> The company hopes that its browser will become a de facto platform for software development, ultimately replacing Windows as the mainstream set of software standards. In Netscape's plan, people will get rid of their existing PC and Mac applications in favor of new software that will evolve around the Netscape browser.
>
> Under ordinary circumstances, it would seem unattractive to build an incompatible operating system on top of an existing operating system. But because the widespread adoption of the Internet is a sea-change, Netscape's strategy could conceivably work if Microsoft wasn't bringing fast-paced innovation to Windows.

a) Java

The analysis of divided technical leadership between the desktop operating system and the Java technologies spearheaded by Sun followed a similar path. Mr. Maritz showed quite graphically how a *present* externally controlled Java could become a *future* entry opportunity into the operating system. Mr.: Maritz:[43]

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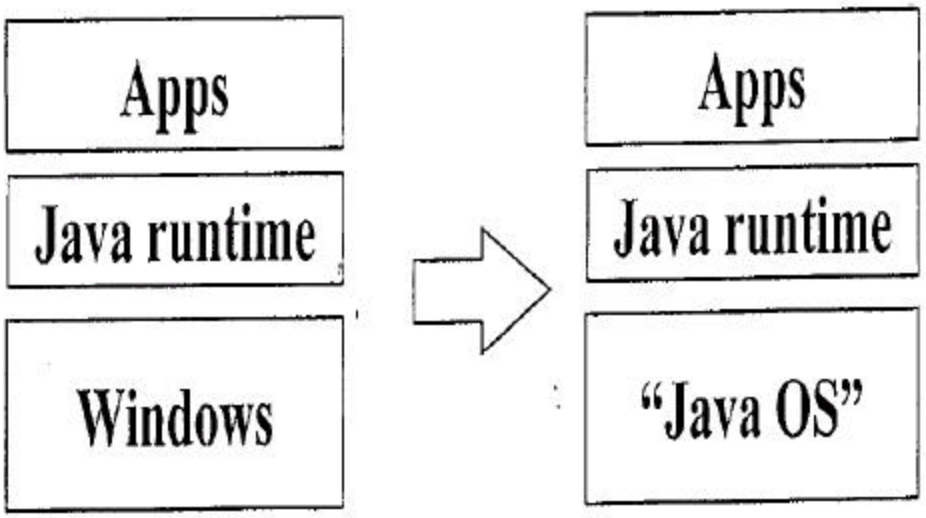
[40] Wright, Andrew, "Winning @ Internet Content Marketing Plan" 1996, *GX 407*.

[41] In *GX 21*.

[42] Gates, Bill, "Internet Strategy Workshop Keynote," December 7, 1995, *DX 341*. I use the notation "DX" to refer to defense exhibits at trial, which are available at Microsoft's website.

[43] *GX 490*, 1997 Platform Plan.



In the same document, Mr. Maritz talked about the possibility of corporations substituting out of too-expensive PCs and into cheaper Network Computers if Java succeeds, talking about the prospect of this shift to "end world hunger" among his customers. Relatedly, Mr. Maritz wrote of the importance of having Microsoft technologies control in the layers that contain Java, i.e., technologies for web/client divided applications and development tools for applications authors. Only if Microsoft controls such technologies will Windows be safe:[44]

> The need here is to fundamentally blunt Java/AWT momentum and to re-establish ActiveX and non-Java approaches as a viable strategy for structuring software, in doing protect our core asset Windows - the thing that we get paid $'s for. While Java per se is not the problem, if everything & everybody moves to Java as a language, then it will be so much more easy for AWT to become the API, and Windows is damaged.

Chris Jones summarizes very well the points that I have been making here[45]. First off, he points to Dr. Grove's book, as do I, for the points that (a) direct horizontal competition against Microsoft will fail, even if Windows were to lose "feature parity" with other operating systems. Second (b) complements for Windows have the opportunity to embody a "paradigm shift" and lower entry barriers, so that (c) technologies like the network computer and Java, which are "our customers' best hope for a correction of the sins of the Windows PC", may succeed in entering.

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[44] "windows and internet issues" June 1996, *GX 42.*

[45] Email to David Cole "RE: ie5 planning", May 1997, *GX 494*

continue to deliver on this proposition.

Competition

The watchwords for dealing with the current competitive situation can be taken from Andy Grove's recent best seller-Only the Paranoid Survive. It is a fact that our traditional operating system competitors (Apple, OS/2, and UNIX) have been left in the dust by Windows 95 and Windows NT on the client. There is simply no chance that we will lose sales because of lack of feature parity with those traditional products. Of course these companies, and all the new competitors, know that and are rapidly devising strategies that might lead to victory through an end-run or changing the rules of the game, mostly through an effort to build "middle-ware" solutions that render Windows and Windows services irrelevant. Thus our competitive focus for IE 5 will be on a new breed of communication and collaboration products that do not compete with Windows head-on, but offer customers an alternative platform environment that might accomplish the more relevant tasks (communication and collaboration) either more efficiently or more cost-effectively.

Network Computer (NC) and Java both represent our customers' best hope for a correction of the sins of the Windows PC. The NC platform with Java applications represents a world where new technologies and paradigms solve the management, deployment, and training issues negatively associated with Windows. For IE 5 by radically simplifying these aspects of Windows, and at the same time delivering a much richer user-experience, we will bridge the existing users to this new paradigm.

Netscape Communicator defines a new platform, taking advantage of the lessons learned from Visual Basic, Visual C++, Java, and Web content. They are completely focused on turning their applications framework (HTML, object model, scripting, and JFC) into the primary way developers deliver Internet-centric applications. As part of this strategy, they are leading the way in integrating browsing with electronic mail and discussions. They are also working to deliver a new user model and paradigm for navigating the local computer in an effort ot make the Windows shell obsolete. We must deliver on a broad set of features that address the platform threat of HTML and scripting, plus integrate communication seamlessly with the browser. In addition, we have to work together with the Windows team to promote the Windows shell as the premiere desktop environment.

HTML authoring tools such as Visual JavaScript, Netscape Composer, and others that uniquely target the Netscape/Sun platform are what enables developers to deliver solutions. While these are not directly features of our product, enabling the best tools and applications is the most critical part of our success. IT is critical that we make it easy for Visual Studio, Office, FrontPage, and 3rd party tools to target the Internet Explorer 5 platform.

b) Other Technologies

Microsoft's anticompetitive campaign did not stop with the browser and Java, but extended to an attempt to prevent development and distribution of a number of technologies or products. Many of these were multimedia technologies. Microsoft managers have long recognized the importance of the formats in which information is stored as standards, and multimedia standards might well be particularly important in the age of the commercialization of the Internet. Accordingly, they discouraged multimedia developments at Intel, RealNetworks and Apple. Similarly, Microsoft bullied the IBM PC company in the hopes of discouraging IBM from competing with Microsoft in other arenas. The point of this is twofold. It shows an extensive pattern, and it shows that Microsoft is consistent in its desire to control technologies that might become the friends of its enemies. Just as an independent browser or Java might become the friend of a direct competitor to Microsoft, independent multimedia technologies might become the friend of Java or the browser. In a parallel logic, yet another reason for the assault on the browser was that the browser might be an ally for Java. Thus, Microsoft undertakes

vertical foreclosure not only by seeking to make sure it itself does not need to deal with strong, platform-level partners, but by attempting to deny the benefits of specialization and divided technical leadership to other firms.

c) Outcomes absent the anticompetitive acts

Microsoft officials decided, at every stage, that they could not win the browser war on the merits. Up to and including Internet Explorer 4, the version that was close to Netscape versions in quality, they analyzed the situation as one that they could not win because of the first-mover advantages of the Netscape browser. They used, by the way, a theory of first mover advantages right out of the theory of indirect network effects literature in economics.[46]

Mr. Allchin wrote of the advantages to Netscape of being the leader in usage volume: "in near/medium term, Navigator provides the volume platform for ISVs and Corps [corporations] to target."[47] Mr. Gates summarized being behind in the momentum race surrounding the browser as a problem of needing to find some: "**Gravity** . . . Given the positive spiral that Netscape is experiencing what could possibly slow them down?"[48] Marketer Kumar Mehta, summarizing a great deal of browser market research thought "80% of those who do not use IE say that they have no plans to switch to it."[49] He, like his colleague Christian Wildfeuer, was writing about Microsoft's supposedly (according to their attorneys and defenders) superior new version, Internet Explorer 4: "if we rely on IE 4 alone to achieve this, we will fail."[50] Mr. Allchin, reporting on that market research and arguing in favor of an anticompetitive tie: "Even if we get IE to be totally competitive with Nav/Communicator, why would [it] be chosen? They have 80% marketshare." Another marketer, Cameron Myhrvold, testifying in court about an earlier time period and about market choice: "we were very concerned . .. Netscape having all of the mind share and usage share . . .lose all those side-by-side user choices"[51]. Finally, John Roberts (not the economist, the Microsoft employee) "In a browser battle, victory will go to the incumbent."[52]

Only the anticompetitive campaign, with all its choice-preventing fervor, kept Microsoft from facing a real threat to its position.

d) Market Implications

The late 1990s were a time of tremendous technological and market opportunity in the PC business, a boon that was brought to society, and to the PC business, from outside, from the Internet. This disruptive technical and market change had the possibility, if it not been brought under Microsoft's strategic control, to end the Windows monopoly by offering developers and users the opportunity to choose alternatives other than the Windows standard for part or all of their computing needs. Microsoft feared this prospect acutely, for a variety of reasons. A tough minded company, it knew that its

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[46] For the analogy, see "Microsoft and Network Theory" on my website.
[47] Microsoft Presentation, "Key Near/Medium Challenges," *GX 489*.
[48] Gates email, "Some Thoughts on Netscape," May, 1996, *GX 41*.
[49] Mehta reporting on survey research, March, 1997, *GX 204*.
[50] Wildfeuer report on end user focus groups held in Februarry 1997. *GX 202*.
[51] Trial Transcript, February 10th 1999 am.
[52] *GX 355*

products, especially Windows, had important failings from the perspective of existing customers ("end world hunger")[53] and that its product had limits to its appeal, when compared to the best technical alternatives, to the new bodies of customers brought into the market by the commercialization of the Internet. I do not bring these arguments forward to show that the PC market was locked in to a bad standard in 1995. Instead, I bring them forward to show that it was not just entrepreneurs with stars in their eyes who thought that there might be real opportunities to compete against Windows for new bodies of customers (home) and new classes of applications (communications applications more than "individual productivity applications".)

Microsoft made a series of assessments of the situation at a high level of strategy. Owner of the *de facto* standard of the past, it could best continue in that position by a measured, continuous, controlled (by it) shift to a new Internet-enabled world, a shift that preserved its position. Disruptive technical and market change were to be avoided. The strongest asset for Microsoft was the inertia in the existing user body and the existing applications developer body for end user oriented applications. These would, in the Internet world as well as the PC one, prevent a direct assault on its man monopolies, if only they could be gently migrated from a Windows standard to a Windows+Internet standard – still proprietary to Microsoft.

Given, however, that the new world had a flagship product, the browser, Microsoft faced indirect entry. The browser quickly got widespread distribution on Windows and other (far less popular) platforms. For some classes of customers, a computer purchase had as its main motivation getting a browser. For other classes of customers, new applications categories (communications one) somewhat weakened the applications barrier to entry. An independent browser company could sponsor OS entry, could distribute platform software, or could itself enter the OS business. Microsoft feared all these, because they might take advantage of the momentum of the browser as an application to start the momentum needed to get a new platform going, thereby offering customers and developers the opportunity to rethink the wisdom of our being collectively locked in to Windows[54]. The combination of an independent browser and considerable opportunity for technical and market disruption raised in them the very real fear – sensibly so – that their customers might choose something else.

Microsoft could not find a way to win the browser war by improving its product and giving it away, for Netscape's lead was too great. And Microsoft viewed winning the browser war as strategically essential, not because it thought of browsers as a potentially profitable business, but because an independent browser would be a key step in entry that might lead to competition against Windows on the merits. In an era like the late 1990s, with new applications and new bodies of demand very important, Microsoft wanted more than ever to avoid competition on the merits against Windows. Several features of the independent browser made it dangerous to Microsoft. Of these, the most important was the vertical disintegration, of course. But Microsoft does not fear vertical disintegration of all software, just of software that has some of the key features of the browser. The browser is near-ubiquitous, the browser has obvious platform potential,

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[53] See discussion and cite at note 43, supra.

[54] Mr. Maritz wrote in the 97 Platform Plan: "Netscape: The first "middleware" layer to have end-user momentum." *GX 490*

and the browser is a complement to Windows.[55] Those add up to divided technical leadership. But the independent browser did not get a market test, because of Microsoft's anticompetitive acts.

Much the same was true of Java. Java had momentum with developers, the other core constituency for building indirect network effects. Many developers believed that new classes of applications should be built, more network-centric ones, in a divided-logic framework like that offered by Java. Java has succeeded on the server side, to an extraordinary degree, and plays a substantial role in new enterprise and e-commerce applications. But cross-platform Java on the client is a dead letter, without having gotten a market test. Microsoft undertook a number of anticompetitive acts directed at cross-platform Java *per se*, but most deadly for Java was the attack on an independent browser, which would have been the distribution vehicle for cross-platform Java.

5) Economic Implications

The same important analytical lesson arises from the industry history as seen through the eyes of business people in section 3), above, and Microsoft's key strategic decisionmaking, reviewed in section 4), above. While dominant positions in any particular layer in this industry are hard to end by competition, even from a new and superior alternative, such competition can and does end them at times. The opportunity for that competition to break out is contingent on disruptive change in other layers. Disruptive change can only lead to competition when the other layer is important, widely distributed, under external control. Vertical integration means no external control, so that disruptive technical change will be managed along the length of the whole stack to prevent competition and entry.

There are two main conclusions here about the benefits of divided technical leadership. One is about competition, the other about innovation and dynamic efficiency. Industry participants firmly believe that divided technical leadership brings both benefits, and that it is very beneficial to their customers net of its costs. Microsoft's senior managers based very substantial strategic decisionmaking, when the threats from the Internet were realized, on the conclusion that divided technical leadership brings competition. They frequently thought of the competition they prevented from emerging as innovation competition that would benefit their customers. In contrast, Microsoft's lawyers and defenders attempt to position vertical integration as efficient.[56] As with so many issues in this case, one must ask: who is right, Microsoft's and the other industry executives, or Microsoft's lawyers and consultants.

On competition, the industry history and the Microsoft actions bear out the story told by the industry executives in a detailed way. All the important competitive shifts in the strategically important, large dollar volume markets have come when disruptive change in another layer has permitted it. It is telling that the Microsoft executives

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[55] In somewhat different language, the District Court's Findings of Fact use the same analytical framework. Cf. FOF Section IV.A, Paragraph 69F. (hereafter, I shall refer to this document by FOF).

[56] They hide behind a theoretical indeterminacy. The question of the superiority of vertical integration or vertical disintegration cannot be answered theoretically – there is no presumption, either in the theory of industrial organization and competition or in the theory of the firm, that either vertical integration or vertical disintegration is the superior form. Competitive industries contain both forms, for the appropriate model varies with circumstances.

interpret the history exactly the way that I am interpreting it here, and put their analysis to use to guide strategy. They viewed the commercialization of the Internet as a major disruption (the most important since the IBM PC, according to Mr. Gates) and thus saw divided technical leadership as likely to provide a source of ending or reducing their monopoly.

The executives' assessment of superior performance of divided technical leadership comes, in part, from their reading of the same history. The mechanism by which important innovations have been introduced has been competitive, and the mechanism by which new substantial technological possibilities have been exploited has involved widely dispersed innovation by many companies with different capabilities, incentives, and expectations. Achieving both sets of benefits is explicitly conditional on divided technical leadership. Of course, the industry executives' opinion and the history cannot tell us everything that would have happened in the counterfactual world of vertical integration. What if IBM had maintained control over the OS and microprocessor layers in the IBM PC over the last 20 years? Isn't there some chance that the superior control and direction for the PC platform would have been better than what we actually got? Isn't there some chance that Microsoft's forced vertical integration of the industry in the present brings advantages of centralized control more valuable than the lost entrepreneurial innovation and competition, even though they explicitly said they were blocking competition from new technologies that were cheaper or technologically superior?

As with any counterfactual, the answer must lie in the implicit theory being used to value control vs. innovation and competition. The industry theory builds on two distinct analytical foundations. First, while there is some advantage (there must be!) to centralized control and coordination of supply, the importance of this advantage is lessened by the strong positive feedback effects in network industries. Market forces, rather than managerial ones, get much of the job of coordination done. Second, at those times when integrated and divided technical leadership differ the most, times of disruptive and unpredictable market or technological change, the strengths of the disintegrated and less centralized model come to the fore. For it is at those times when the intermediate run supply behavior of a decentralized and entrepreneurial system, bringing forth a number of distinct offerings among which the market may choose, is at its most valuable socially. When, as at the time of the invention of the PC or the commercialization of the Internet, there is considerable uncertainty about market direction, multiple entrepreneurial initiatives and market choice take on their greatest value.

a) Antitrust Analysis in Light of This Industry and These Actions

The government showed that entry into the OS market was difficult but that it would become substantially less difficult with an independent browser or Java. The commercialization of the Internet was a substantial enough shock to the personal computer business that it promised a dramatic decrease in OS entry barriers. Microsoft's anticompetitive actions had as their primary motivation ensuring that the entry barrier did not fall, and, as their primary effect, preventing the divided technical leadership that would have lowered the entry barrier.

As a matter of economics, this is as logically complete an argument as can be possibly shown in a monopoly maintenance case. Microsoft's and Microsoft's defenders' arguments that there is something wrong with the logic are very dangerous. These arguments would mean that there can be no antitrust case in which an established monopolist blocks distribution of technologies that threaten its position before the threat is realized. That would sweep away the core purpose of section 2.

The economic point is simple and direct. A monopolist who blocks entry or maintains entry barriers harms future competition. The extent or effects of the entry that has been so barred must necessarily remain counterfactual. The effect of the anticompetitive acts is to prevent the market experiment that might have revealed the extent and effects of the entry.

The first relevance of this simple piece of economics is to the claim that the government's case was incomplete because there was supposedly no showing of harm to consumers. This mantra is repeated by Microsoft and its defenders ad nauseum. But it is silly. The government showed all that can, in principle, be shown, a case of successful monopoly maintenance. The evidence, including direct testimony from Microsoft's economics expert, not some admission pulled out on cross examination, showed that both Microsoft and others in the industry thought that the success of an independent browser or cross platform Java would lead to a far more competitive environment for Microsoft.[57] Microsoft's executives, up to its CEO, repeatedly wrote that the more competitive environment would be good for their customers but bad for their own monopoly position (some of these writings I reviewed above in section 4).) Consumers would have had the opportunity, but for the anticompetitive acts, to choose alternatives to Windows – alternatives that Mr. Gates, among others inside Microsoft, feared they might find very attractive. Little more could ever be shown about harm to consumers in a case of successful monopoly maintenance.

In a monopoly maintenance case, the economically most difficult to prove standard calls for the plaintiff is to prove a middle course: Entry barriers are high, but not so high that they cannot fall to a level permitting real entry. The government reached this standard in *Microsoft* by showing that entry barriers are high but that they would fall with divided technical leadership. The middle course is a high standard of proof, for the plaintiff's burden is like needing to fill an inside straight. A defendant might take advantage of this by attacking from either side, i.e., either by showing that entry barriers are low or by showing that entry is so difficult that the anticompetitive acts could not have had an effect. Microsoft chose to attempt to prove both of these, taking advantage of considerable legal writing skill, perhaps at the expense of other lawyerly virtues.

On one side, Microsoft tried mischaracterizations, i.e., the government must be proving that entry is completely impossible, so the past history of successful entry into some software markets shows the government is wrong. This argument is one of the favorites among Microsoft's defenders outside the courtroom as well. As I have said above, this simply misses the point, which is that lowering entry barriers is contingent on divided technical leadership. Also, the mischaracterization attributes bad antitrust logic

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[57] The widely repeated assertion, that Frank Fisher also testified that there was no harm to consumers, is no more than a mischaracterization. Fisher testified – perfectly in concert with the government's monopoly maintenance case—that there had not yet been any price harm to consumers – as there could not logically from blocking future entry. Cf. Trial Transcript, January 12, 1999.

to the government where the actual logic is sound. If the government had predicated its case on the impossibility of entry, the monopoly would maintain itself without help of anticompetitive acts. In fact, the history of the industry shows that entry is possible but contingent on divided technical leadership.

Microsoft also argued that, since the browser and java were long run threats to the Windows monopoly, the government must have been proving that the threats to Microsoft have already been realized, so that the government should define the OS market to include browsers and Java. This so called "platform market definition" argument makes two mistakes, neither of which is in the government's original argument. The web (including the browser) and the PC OS are complements, not substitutes, in the relevant short run[58]. One cannot compute on the web without an operating system on the connecting (client) device. So, looking at the period of the anticompetitive acts as well as the present, the Microsoft argument confuses complements and substitutes. Microsoft is completely correct that the web and various web technologies like the browser and java might, sometime in the future, become a competitor for Windows or might sponsor competitors for Windows. Yet the realization of that competition is as far from true today as it was at the time of the anticompetitive acts. That there is future competition from the Web, or enabled by the web, does not mean that there is (or was, at the time of the anticompetitive acts) competition in the present.

There is a current monopoly, and a threat of entry. That is exactly the circumstance in which a section 2 monopolization case is most warranted. These two defenses are simply mischaracterizations, and the correct argument (entry is blockaded but might become possible with divided technical leadership) is well supported in the facts of the case.

Microsoft's formalistic arguments in this area are particularly dangerous because they attempt to procedurally repeal Section 2. What we had in fact was new technology that did not, at the time of the anticompetitive acts, offer customers a replacement for Windows. (The record is full of Microsoft being able to make take-it-or-leave it offers to computer manufacturers, software applications authors, internet access providers, and so on compelling them to use its technology rather than the competitive alternatives they had decided were best for their customers.) The new technology did offer the prospect of future competition, either through itself changing over time to become a competitor, or through making it easier for other competitors to enter. That is the point of the quotations from Microsoft employees I have brought forth in section 4), above, and of many, many, many other similar quotations in the record. Microsoft and their defenders argue that any such potential threat should be either put as part of the relevant market (so that there is no monopoly) or viewed as distant and speculative (so that there is no harm to competition) or both at once.

Microsoft insists that – as a matter of pure logic -- all potential threats to a monopoly be viewed either as speculative or as in the relevant market. Under that logical structure it is not possible for section 2 to be violated. Since the two elements of a section 2 violation are monopoly power and anticompetitive acts, under Microsoft's logical argument one would always argue that since there was a "competitor" who was

[58] Mr Connor, Microsoft's chief financial officer, pointed out in a speech that improvements in the web (including the browser) sold a lot of Windows PCs – the definition of a complement. http://www.microsoft.com/msft/speech/connorspiperjaffray2000.htm

the target of the anticompetitive acts, there cannot be a monopoly. There is nothing in economic theory or empirical economics that supports such a silly argument. It is, as any sensible person would think, perfectly possible for there to be a nascent or potential threat to a monopoly that is not yet an alternative for customers. Microsoft's choosing to argue that the particular threats at issue should be viewed as both too speculative for a finding of harm to consumers and so immediate that they belong in the relevant market shows clearly the quality of their overall defense.

It is worth thinking through the logic of the two-part test (monopoly power and anticompetitive acts) for a section 2 violation that we have. There are many cases in which one could say that this logic does not correspond to sound economics. None of those cases are related to *Microsoft.* When, as here, an existing monopolist seeks to block the widespread distribution of new technologies that might unseat it, using mechanisms that reduce rather than enhance customer choice, and when managers in the monopoly firm conclude that Windows is an extremely valuable product because of its unique position, and the new competition that might arise from the commercialization of the Internet is good for consumers and bad for Microsoft by the mechanism of reducing its market power, there is no conflict between section 2 and economics. If there is a case that permits one to think intelligently about the boundaries of the monopolization standard, this isn't it. Section 2 is designed to ensure that competition against an established monopolist from new technologies receive a market test, when, as here, the incumbent monopolist seeks to thwart the corrective forces of competition.

Let me turn now to another antitrust logic point, which has less to do with market power and more to do with anticompetitive acts. The goal of Microsoft's anticompetitive acts was to forestall the restorative forces of competition in two timescales. First, in the intermediate run, competition against Windows is blocked if it takes the form of a direct frontal assault. The applications barrier to entry is simply too high, and the tendency of standards to persist just too severe, for an entrant. (In the short run, existing niche operating systems are barred from becoming a serious threat by the same forces.) The mechanism for intermediate-run entry would need to be collaboration with a non-OS complement with a strong market position with end users, such as the Netscape browser. Microsoft sought to prevent Netscape's success to, in the first instance, prevent that intermediate-run possibility. At a longer time scale, the industry has an important grand dynamic. Sometimes, the entrants into a particular layer in the Grove diagram are firms one layer over. This form of entry, while highly effective at offering competition to set a new standard in the entered layer, leads to an increase in vertical integration when it is successful. It is a one-time event; while the dominant OS firm entered the word processing market a decade ago, right now Microsoft is both the dominant OS and the dominant word processing firm. Thus, to renew the stock of potential entrants, in the long run innovators must invent whole new layers in the stack. The commercialization of the Internet offered the opportunity for that restorative grand dynamic. But that process, too, was cut off by Microsoft's anticompetitive acts, with the effect that future entry opportunities into operating system, browser, or personal productivity applications markets are rendered far more difficult than they would have been if competition had been allowed to go forward.

In its monopoly power argument, Microsoft twisted the truth of the industry to argue that it <u>is</u> the case that there <u>always</u> is an immediate threat entry to the operating

system monopoly. This is inaccurate, as the workings of the entry process are contingent on divided technical leadership, as we have seen in this section. What the government proved is that it should be the case that threats from other layers are a threat that Microsoft must respond to by competing. In fact, it is precisely the process that would make Microsoft's legal theory of market power in the industry be true that their anticompetitive actions sought to prevent. By preventing emergence of a vertically disintegrated browser they were attempting to prevent competition, as we shall see in the next section.

I loved Microsoft's monopoly power defense; I just want it to come true.

6) The Divestiture Remedy Restores Lost Competition

Microsoft's anticompetitive acts prevented a substantial fall in barriers to entry into their core monopoly market, the PC operating system. Absent the anticompetitive acts, the commercialization of the Internet would have meant success of an independent browser company and new divided technical leadership. That would have led to considerable opportunities for entry whenever there was disruptive technical or market change outside the PC but connected to it – now as then, the likely source of such disruption is the Internet. While the lost opportunities for competitive entry in the late 1990s cannot be recovered, the current situation is one with the potential sparks of new entry and new competition.

a) The Current Situation

Mr. Ballmer, on taking over as Microsoft CEO last year, analogized the early 2000s to the late 1990s, and I agree.[59] While the independent browser threat and the threat from client-side cross-platform Java have been destroyed by Microsoft, there is a new wave of technological and market opportunity, which has, once again, the potential to permit customers and developers new choices. Microsoft retains all of the motive and has more methods to defeat these new threats, and will use illegal methods to defeat them if it decides that is necessary.

While the disruptive potential of the new technological opportunity are one of the great clichés of our time, understanding them from the perspective of Microsoft requires some precision about the role of the Windows PC in the present. The new technological opportunity contains both potential substitutes – but early-stage, weak ones – for a Windows PC and potentially strategically important complements for it. Among the potential substitutes are a number of sub-PC devices, including PDAs, smart cell phones, game boxes, television set top boxes, and so on. None are, at this moment, a realistic alternative to a PC in most uses. But each has the potential to be an alternative in some kinds of applications for some kinds of users, and could become the basis for developments that, in the long run, lead to entry and competition against Windows. A second set of potential entrants is alternatives to Windows on the PC itself. These include Linux on the client, of course. They also include applications-dividing technologies that would put more applications logic on a server while letting a cheaper and lighter client access it. None of these technologies is an immediate and direct threat to Windows, though all are real technological opportunities. The one which looked most

[59] See, e.g., PC week of Jan. 14, 2000, "I look at it as a little bit like where we were in 1995."

imminent in the late 1990s, migration of applications to the server side, has been slowed down by an important technological development, the growing importance of wireless communications technologies (with their low bandwidth.)

Among all these potential alternatives to the existing Windows monopoly, it is the market's job to choose which are the best alternatives, and for which kinds of uses they are the best alternatives. That market test is not being run in the present, because there is no independent, strong complement to Windows, such as the independent browser, which might act as the sponsor of one of those technologies as an entrant.

There are, of course, important complements to Windows PCs in the present, but they are more distant and offer weaker strategic bases for sponsoring entry and competition. Ongoing technological and commercial opportunity on the Web, important complements to the PC, is another cliché of our time. Many observers, including Microsoft's senior management, talk about a "second phase" of the (commercialized) Internet. They mean the transition to an Internet in which divided applications are far more important, for example in enterprise applications or electronic commerce. This technical change takes place out on the Internet, however, and its impact on Microsoft's strategic position is limited by (1) the strength of the OS monopoly (2) the new strength of the browser monopoly inherent in Internet Explorer's dominance and (3) the absence of a client-side development environment outside Microsoft's strategic control.

Microsoft is quite aware of the problem posed for it by the cluster of distant threats from sub-PC devices and complements to the PC running on servers. Microsoft once again has an embrace and extend strategy, an extension of Windows to embrace the Internet called .NET. Microsoft's technological plan has been made quite clear at a broad strategic level, even though the specifics by which it will deliver are still obscure.[60] The technological initiative that began as Next Generation Windows Services and is now marketed as .NET is a uniform platform across a wide range of devices, including PCs, sub-PC clients, and servers. Important parts of the platform will be proprietary to Microsoft when the dust settles.[61] Thus, just as now there is no independent browser, there will be, in Microsoft's preferred future, no independent platform-level software running on devices other than PCs that participate in end-user oriented applications.

It is important to understand exactly what Microsoft is proposing. There is, they argue, far too much competition and fragmentation in servers, and far too much fragmentation and competition between different kinds of technologies for linking client devices to servers appears imminent. All of this should be unified in a single platform, they suggest, which extends from the cell phone and the PDA up through the PC to the server. This platform should be backward-compatible to the extent feasible, they argue, with the existing end-user platform, Windows, and Microsoft should manage the migration to the new platform for us.

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[60] Entrants need to come up with technological specifics to get market credibility, whereas incumbent Microsoft can often slow down technological developments while it gets its act together.

[61] Microsoft is undertaking a PR program of convincing potential complementors that .NET is, and will remain, open. Yet Microsoft is Microsoft and, as Mr. Gates said in an interview with Jason Pontin, Red Herring, September 2000, .NET is a Microsoft platform and its exploitation will be a "capitalist act." Pontin (2000). "Q: . . . is Dot.net [sic] a platform-independent strategy? Gates: No. No. Dot.net is a Microsoft platform. Just like the Windows platform. Windows was built on common standards . . . but it was a Microsoft platform. The Dot.net is a Microsoft platform."

At this stage, I argue neither that .NET is a bad idea technically nor that it is certain that there will be future anticompetitive acts to prevent the success of independent alternatives to .NET. I argue merely that (1) Microsoft seeks once again in the present to avoid divided technical leadership as a major strategic goal and (2) that the strategic situation has some of the elements which led to anticompetitive actions in the past, in the precise and limited sense that some of the precursors to competitive entry are present.

Specifically, two of the three ingredients of the situation in 1995 are repeated: there are real, but distant and barred potential substitutes for the Windows PC, and there is the potential for disruptive market and technical change in complements. What is missing in the present is a widely distributed client-side application outside Microsoft's control that would serve the role the independent browser might have played in the late 1990s.

Indeed, the past anticompetitive acts themselves and later developments have put Microsoft in a stronger position on the client side than it was in the late 1990s. First, the campaign against Netscape succeeded in removing that non-Microsoft browser with sufficient distribution on the client so as to collaborate effectively in server-based threats to the Windows standard. Microsoft now controls the dominant browser on PC clients, a powerful second "layer" closely complementary to the operating system. In a remarkable move for a firm about to be convicted of "attempted monopolization of the browser market" and of monopolization by preventing the emergence of an independent cross-platform browser, Microsoft in summer of 1999 acquired a company designing a leading browser for sub-PC platforms.[62] Second, looking now at developers and not end users, Microsoft's campaign against cross-platform Java has succeeded in preventing the emergence of an end-user-oriented applications development environment independent of Windows but running on all client devices.[63] Putting an end to the client-side middleware technologies outside its own control that emerged in the late 1990s strengthens Microsoft's strategic position in the present, first by denying new entrant technologies a widely distributed client-side potential collaborator (as Netscape would have been) and second by putting Microsoft firmly in charge of the main technologies of PC-webserver communication.[64]

What is missing from the picture, to make the current situation have a strong possibility of leading to entry and competition against the Windows monopoly, is a widely distributed application on the client with platform potential. There is no immediate mechanism for disruptive technical change to impact the "desktop paradise," though there is clearly the opportunity for such change.

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[62] I am referring to the acquisition of STNC, which thought of itself as a "microbrowser" company (though Microsoft, at the time of the acquisition still suffering from its temporary allergy to the word "browser" called it a "cellphone software company." The merger was not Hart-Scott-Rodino reportable.

[63] Java is a successful cross platform development environment with a commercially adequate body of developers using it –- on the server side. On the client side, cross-platform Java is no longer a threat to Windows.

[64] This is addressed this in FOF ¶ 384. "Although the suspicion lingers, the evidence is insufficient to find that Microsoft's ambition is a future in which most or all of the content available on the Web would be accessible only through its own browsing software. The evidence does, however, reveal an intent to ensure that if and when full-featured, server-based applications begin appearing in large numbers on the Web, the number of them relying solely on middleware APIs (such as those exposed by Navigator) will be too few to attenuate the applications barrier to entry."

The divestiture remedy fills this lack, by dividing technical leadership on the client. It is restorative of competition, allowing for differences in the times. In the late 1990s, the strategic or competitive force behind independent Java and the browser would have been accomplished by surprising and innovative entrepreneurial action. That has been extinguished. In the early 2000s, the force arises from the strong market position of Office and IE on the client, and their relationship to server-side applications and technologies (most in BackOffice) within the Microsoft product line.

Very considerable competitive value can arise from the applications – operating systems split. The split only lowers entry barriers, and does not force entry or competition in the operating system market. Thus many observers talk about "risk" (left wing) and "speculation" (right wing) of the effects of the divestiture on entry. They are wrong. Let me begin with the "speculation." The line of "speculation" that says AppsCo will sponsor entrants into the Windows monopoly follows very closely the line of "speculation" that Microsoft undertook to understand the strategic implications of the independent browser and Java. As I showed above, Microsoft thought that an independent browser firm or an independent Java firm might sponsor entry from sub-PC devices of the late-1990s type, might itself enter the operating business or participate in a coalition that would do so, or might sponsor a "thin client" like the NC. The motivation for all of those entry initiatives stem from two things: user dissatisfaction with Windows which, though far from universal, is widespread enough to suggest entry might be efficient, and strong motivation for complementors to help users find alternatives.

Those forces haven't gone away in the present. An independent applications firm would have every reason to worry about OSCo's seeking to replace it with a vertically integrated structure, just as Microsoft once got rid of the peskily independent WordPerfect and Lotus. An independent applications firm would have no anticompetitive incentive to favor Windows-based PDAs and cell phones, as Microsoft applications now have.[65] AppsCo would support such devices in, for example, how Outlook synchronizes with them and how Word and Excel data display on them (whether stored in fancy document formats as now or by the "server extensions" soon coming.) Similarly, AppsCo would have every incentive to look closely at alternatives to Windows on the PC itself. Turning Linux into "our AMD" would improve the strategic and bargaining position of AppsCo against OSCo, just as the real threat to Intel from AMD is quite helpful in Microsoft's bargaining. AppsCo and a coalition of partners drawn from those who already support Linux could make a good deal of progress on that front if they reached the judgment that a substantial number of users would like an operating system that is cheaper, more secure, and with less hardware requirements than Windows – though one that did not support the Windows applications base (beyond Office) and which offered fewer features than Windows. That could easily jump start positive feedback on a new platform, for smaller software developers look to the behavior of large strategic players – of which AppsCo would clearly be one. And an independent AppsCo would reach the decision about supporting another client platform, like Linux, without regard to any desire to keep the Windows platform in its monopoly position forever. Closely relatedly, an independent AppsCo, with applications running on both client and server, would have no incentive to embrace only Windows-based technologies for applications service provision, for running applications on servers and accessing them

[65] See discussion in section 7), infra.

from clients, or for dividing complex applications between client and server. Instead, the firm would embrace best-of-breed ASP technologies, divided applications technologies, and so on, or would support multiple experiments with alternative technologies in order to have the best menu of platforms available to its customers. It is the standard logic of intermediate-run competition in the computer business. Under divided technical leadership, the great volume of disruptive change we see in the present would be translated into entry and consumer choice opportunities.

It is also important to keep in mind the tendency for standards to persist. The Windows standard will, under the divestiture plan, stay in place on the client in the early going. OSCo will be able to continue to evolve and advance it. Of all the possible future platforms for full-featured, end-user-oriented applications I have just suggested, only one starts with the huge advantage of installed base, applications base, and incumbency.

The important past potential threats to the Windows PC – the direct, horizontal threats that did not get a real chance to be considered by demanders in the late 1990s – all offered a really distinct technological and market proposition from the Windows standard. I tend to agree with Mr. Maritz's assessment that the important ones had an "end world hunger" value proposition for Windows users.[66] That is, by differing radically from Windows they offered some very real benefits to users that are not now available. So do the new alternatives in the present. These include requiring less, and less expensive, hardware on the client side, offering fewer, and therefore less expensive, features in the software itself, a more open and componentized architecture so that developers and users can take some but not all of the features as *they* choose, differences in the model for where functionality lives (client device vs. server, etc.) somewhat different architectural choices on the convenience / security spectrum, distinct visions for the appropriate technical capabilities of sub-PC devices, and so on.

Permitting competition from such technologically different alternatives has a number of advantages for users and developers. Those advantages are present in the early 2000s just as they were in the late 1990s.

The first clear advantage is that permitting competition from very different technologies opens up the possibility of <u>leapfrog competition</u> against the Windows standard. At the moment, such leapfrog competition is blocked by Microsoft's anticompetitive acts and the applications barrier to entry, but there is a chance that, absent the entry barrier observed in the present and with tools for maintaining the entry barrier high, OSCo would face a real run at its monopoly from an entrant (one of the many described above) whose goal was to completely replace it. Such a run would be highly valuable for society whether it succeeded or not, for it would force OSCo to deal with many of the gripes customers have with Windows in the present.[67] An actual leapfrog and replacement of Windows would be a highly valuable step, should the market choose it.

A second mechanism by which permitting competition from very different technologies offers advantages is that it allows the possibility of <u>using distinct technologies</u> to serve distinct bodies of demand. Microsoft treated these kind of

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[66] See discussion and cite at note 43, supra.

[67] This is one of the places where Microsoft's defenders and I are close together. We both agree that the real prospect of leapfrog competition would be a good thing. They argue, incorrectly, that the prospect is real in the present situation.

scenarios quite seriously in the late 1990s, for example, the possibility that home computing might be served by a distinct standard based on cheaper, less hardware-requiring, and more network aware alternatives to the PC. In the present, such an opportunity would take on any of a variety of paths. There might be a Linux-based PC, for environments in which security and a small hardware footprint are useful. There might be game-box or set-top-box based PCs for homes. There might be increasing competition from cell phones or PDAs for mobile workers or for those with very simple computing needs. Of course, OSCo would have every incentive to compete to keep the extent of the Windows standard very wide, for there are huge advantages to a large installed base for a platform sponsor. These improved competitive incentives would leave us better served even if, ultimately, a new body of demand was hotly contested and ended up being served by only Windows or only by an alternative. Or the market might choose any or all of these alternative technologies for important subsets of demand.

Many of Microsoft's defenders offer the argument that the case is now moot, and the appropriate remedy is – no remedy, while there once might have been a problem, market forces have solved it.[68] They point to the same potential future entrants as I do, the sub-PC devices (cell phones, handheld computers and personal digital assistants) and the alternative operating systems for the PC, such as Linux. This merely repeats an error in market definition made in the liability case. These products and technologies are not now effective competitors for a Windows PC, instead, they might someday become one if entry barriers were to fall.[69] An excellent way to have entry barriers fall is to have AppsCo, which has a very widely distributed client product, choose to collaborate with or sponsor a potential entrant. AppsCo could, if it chose, port Office to a client alternative such as Linux. Or it could, if it chose, have Office available in a non-Windows ASP (applications service provider) technology. Relatedly, it could make Office file formats, server extensions, and synchronizing technologies work well with very popular sub-PC devices, the ones its customers own, even if those are not the strategic choices of OSCo.

In short, AppsCo could avoid what Brad Silverberg called, after a highly sarcastic review of how complements to Windows managed within Microsoft are deployed, "doing unnatural and losing things to 'protect' Windows."[70]

A very important overarching point here is that all of this competition is enabled, but not compelled, by the divestiture remedy. The judicial system does not have to decide that it is time for a leapfrog – that is something the judicial system is not very well equipped to do. The judicial system does not have to decide that it would be technically better to have distinct demands served by distinct technologies – another bad task for the judicial system. All of these outcomes will be permitted by the divestiture remedy; none will be compelled by it. Far from picking winners, the divestiture merely lets all the horses into the starting gate.

The market will choose, from the menu I laid out above, which kinds of alternatives to Windows prosper. It is not the job of the antitrust prosecutors not the courts to forecast that, nor, God forbid, to guide it technically. It is also not the job of

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[68] See, e.g., Robert Hahn "Microsoft, A Monopoly No More" *New York Times* 4/07/00.

[69] How many people in your office have scrapped their Windows PC for one of these alternatives?

[70] For example, Mr. Silverberg complains about "getting [epithet suppressed] mail from billg [Mr. Gates] saying the portal should be windows online so I can check my available bug fixes 10x a day." *RX 40.*, 1999 email exchange with Ben Slivka.

any single vendor, not even Microsoft, to compel consumers and developers to adopt a migrated version of Windows as the sole platform in the Internet era. Instead of any central authority making these choices, public or private, it is the job of the market to choose. Divided technical leadership permits the market to choose but does not compel any particular choice. It is the antithesis of picking winners.

7) The Divestiture Remedy Lessens Recurrences

There is a real prospect of recurrences of violations of the antitrust laws. In the last section, I showed that Microsoft's strategic situation in the early part of the new century includes distant but real potential threats to their monopoly position. The historical lessons of Microsoft's behavior strongly suggest that they will engage in anticompetitive acts to preserve their monopoly position if they reach the judgment that any of the new technologies outside their control are becoming an immediate threat or moving into position to collaborate with or sponsor an immediate threat. It is not possible to prove a violation of section 2 in the future tense, of course. Neither is it possible to predict with certainty which of the long run threats to its position Microsoft will be able to defeat on the merits, which not. A legal doctrine that required proving such things with certainty would, of course, lead to no prophylactic sanctions being imposed, ever, for such predictions cannot in principle be made with certainty. In the present instance, we have the considerable advantage that Microsoft is a very predictable company strategically.

In 1997, Bill Gates told a reporter "we are a very predictable company" and once again, I agree.[71] At least at a strategic level, Microsoft is very predictable. The District Court found that Microsoft's corporate practice[72] to attempt to block software developments by other firms that might compete with it or might weaken entry barriers, and in his finding that it will stifle innovation by other firms in order to protect its own market power.[73] It is especially important to note the Court's explication of the anti-innovative and anticonsumer nature of Microsoft's actions "The ultimate result is that some innovations that would truly benefit consumers never occur for the sole reason that they do not coincide with Microsoft's self-interest."[74]

At a high level of abstraction, the key Findings are that Microsoft is a recidivist, making a "corporate practice" of violating the antitrust laws; that Microsoft has opened up an assault on innovation outside the company that will deter (FF ¶ 412) innovative technologies that might threaten its position or prevent their distribution; and that Microsoft is prepared to engage in anti-choice and anti-consumer activities to prevent widespread distribution of innovative technologies that might benefit consumers if they

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[71] Quoted in Fortune, 5/26/97.

[72] FOF § 93. "Other firms in the computer industry have had encounters with Microsoft similar to the experiences of Netscape described above. These interactions demonstrate that it is Microsoft's corporate practice to pressure other firms to halt software development that either shows the potential to weaken the applications barrier to entry or competes directly with Microsoft's most cherished software products."

[73] FOF § 412 "Through its conduct toward Netscape, IBM, Compaq, Intel, and others, Microsoft has demonstrated that it will use its prodigious market power and immense profits to harm any firm that insists on pursuing initiatives that could intensify competition against one of Microsoft's core products. Microsoft's past success in hurting such companies and stifling innovation deters investment in technologies and businesses that exhibit the potential to threaten Microsoft."

[74] FOF § 412 – immediately following note 73 text.

threaten its position. These Findings are well supported in the trial record and in the Microsoft documents; perfectly consistent with core strategic management doctrines at Microsoft.

Complements to Windows with three key features (cf. FOF ¶ 53) will be viewed by Microsoft as threats in the long run – but will be vulnerable to Microsoft's attacks in the short run. These technologies (1) have the opportunity to gain widespread distribution to consumers because they are complements to Windows in the short run, and thus do not need to compete with Windows head to head, an impossible task given the substantial entry barriers. They also (2) expose applications programming interfaces, or offer general-purpose services so that they might usefully expose applications programming interfaces, so that they could form the core of an applications development platform or at least be part of one. The technologies are (3) "cross platform" in the sense that they might run on Windows or they might run on another client device – "OS neutral" in the language of the Microsoft documents.

More precisely, the Findings of Fact offer a detailed and substantive model of for predicting when Microsoft will undertake anticompetitive acts. The first thing that the Findings of Fact identify is that it is the widespread distribution to consumers of complements to Windows that might sponsor entrants that moves Microsoft from "worry" to "alarm" about nascent threats. For example, referring to the browser FOF ¶ 72 talks about how the "dramatic acceptance" by the "public" "alarmed" Microsoft. On the other hand, Microsoft merely had "considerable concern" about Lotus Notes (FOF ¶ 78) for that technology was limited in its distribution. Similarly, the FOF talk about how Microsoft "reacted with alarm to Intel's Native Signal Processing software" (FOF ¶ 78) whereas it merely "noted the dangers" of multimedia technologies from Apple and Real Networks (FOF ¶ 75.) The difference is, of course, that the Intel technologies would be guaranteed widespread distribution to Microsoft's customers – and near-universal distribution of highly valuable technologies to its customers outside its own strategic control is just what Microsoft does not like. These findings are based on a thoughtful reading of Microsoft executives' writings and actions and offer a sound basis for predicting recurrences of the anticompetitive acts.

There is every reason to predict that the pattern of conduct described in the Findings of Fact will persist into the future unless it is checked. While the strategic situation I laid out in the preceding section is not immediately and closely threatening to Microsoft, it contains the potential for future entry. Accordingly, Microsoft will seek, by competition on the merits when that will work but by anticompetitive acts when it will not, to ensure that none of those other technologies will grow in the direction of providing immediate threats to their position, and that no other firm provides an influential and close complement which might be the locus of disruptive technical change. The background of Microsoft's offering in this area will be a universal, all encompassing descendant of Windows, now called .NET. Since Microsoft is certain not to get universal acceptance from the entire computer, telecommunications, and internet world that a proprietary Microsoft technology is the appropriate platform for end user oriented applications involving any devices from sub-cell-phones up to gigaflops servers, there will be attempts to bring forward other platform technologies or strong

complements. Some of these will be more attractive to the marketplace than the Microsoft offerings, and the anticompetitive acts will follow.[75]

There is also a good deal of forward-looking evidence that Microsoft plans to maintain its standard operating procedure of anticompetitive acts when they are strategically convenient.

Here is an email from Mr. Gates, who had talked with the head of Nokia, the cell phone company in 1999[76]. Mr. Gates talks about how Microsoft should use Outlook, an application and a component of Office, to disadvantage a class of potential entrant into Windows' market, PDAs.

I was amazed at the number of Palm Pilots I saw at this conference.

We really need to follow up with them on GPRS rapidly and get their best thinking given our goals.

We really need to demonstrate to people like Nokia why our PDA will connect to Office in a better way than other PDAs even if that means changing how we do flexible schema in Outlook and how we tie some of our audio and video advanced work to only run on our PDAs.

The strategy suggested by Mr. Gates, of using Microsoft's position in applications (here Outlook) to disadvantage a potential future competitor to Windows, PDAs and cell phones, would of course be prevented by the divestiture. That is a strategy that Microsoft has used before, for example in its bludgeoning of Apple computer to compel distribution of IE for the Macintosh and to compel making IE the default browser on the Macintosh. Relatedly, Mr. Gates explained internally in 1998 how Microsoft will have to punish Nokia if Nokia decides to cooperate with either an old competitive initiative (Java) or a new one (Symbian) showing the planned continuation of Microsoft's vertical foreclosure behavior into the future.[77] These specific threats of future anticompetitive acts serve only to confirm what analysis of the strategic situation makes obvious. There are a number of outside technologies that Microsoft feels compelled to control. If any of these become a close enough threat to alarm the firm, it will once again engage in as many anticompetitive acts as are needed to defeat the new threat. The likelihood of future antitrust violations by this firm is very high.

a) Dog Catches Firetruck

Before the trial, I questioned whether there would be an effective remedy that was proportional to the anticompetitive acts.[78] The basic logic of my argument was that, with

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[75] Of course, there is some chance that Microsoft will turn out to write the best technology for each of these disparate areas. The market, however, is already beginning to assess many of the Microsoft offerings, for example, in the settop-box OS area, and find them wanting. The probability of Microsoft being able to win as many of the nascent standards setting struggles without bribing or bullying other firms to harm their customers is very near zero.

[76] RX 1, Email Concerning Meeting in July, 1999 with CEO of Nokia.

[77] *RX 2*, Email Concerning Meeting in June, 1998 with CEO of Nokia.

[78] Bresnahan, T. speech at The Independent Institute, Oakland, California, April 1998, http://www.independent.org/tii/content/events/tech_innovat_rt_transcript.html and Bresnahan, T. "New Modes of Competition: Implications for the Future Structure of the Computer Industry," in Jeffrey A.

network effects and tipping, it takes a fairly substantial remedy to have any effect on industry equilibrium. I asked whether the government's case was strong enough to support one of the remedy options that might have an effect, such as an OS/Applications split or information revelation about interfaces. In particular, I said that it would be arrogant for the government to force structural change on the industry even if the government was convinced, as I was and am, that divided technical leadership is more competitive. After all, there must be some chance that vertical integration is more efficient and competitive (despite the widespread opinion in the industry to the contrary) and, without very serious evidence to the contrary proved it court, it would be better to let the market choose between Microsoft's preferred vertically integrated structure and the industry's preferred specialized structure. My argument was, of course, a familiar one in antitrust analysis. We believe in general that horizontal consolidation is anticompetitive, but the government does not split up companies into horizontal competitors or block the merger of existing horizontal competitors based solely on that argument. It takes more.

I used a metaphor I had used several times earlier, comparing the government to a dog, and Microsoft to a firetruck. The metaphor reflected my view of the problem of liability, which seemed to me to be trivial based on my knowledge of the computer business. I would have been amazed to discover Microsoft was not routinely violating section 2 of the Sherman act, like most people who follow computing. But the metaphor also leads to the difficult question about remedies. The dog must ask itself "what am I going to do with it if I catch it?" I publicly opposed bringing a lawsuit if there were only enough violations to lead to a conduct remedy. I expanded on this theme in my remarks on this subject at the Independent Institute, concluding that talk as follows:

> "you have to look it right in the eye and say, 'I am pretty sure we are going to be right to break them up; that that is going to get us the better industry structure.' And I would be much more comfortable with the current antitrust case if the feds had said that that's what they are trying to do -- if they had established a goal."

It turns out the government did have enough of a case, with room to spare. There is the repeated and serious blocking, by Microsoft, of exactly the technical and market developments which would have let the market choose what kind of outcome it wanted. The pattern of anticompetitive acts against a number of valuable innovations satisfies any proportionality query. Absent the anticompetitive acts, we would now have a substantially more divided technical leadership. In section 4)c), I showed that Microsoft could not find a way to win the browser war on the merits, but only by anticompetitive acts. Had Microsoft lost the browser war, we would now have an independent browser company with all the advantages for competition. There is a substantial likelihood that cross-platform Java on the client would live on. The divestiture remedy does not force structural change on the industry, but restores a competitive situation that would have emerged absent the anticompetitive acts.

The decision to recommend divestiture of a company like Microsoft – successful, full of very smart and effective people, and well managed if lawless – is one of the utmost gravity. After I became a "fed," and became, in my own metaphor, a dog with a mouthful of firetruck, I was compelled to consider the decision very seriously. Two

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Eisenach and Thomas M. Lenard, eds. *Competition, Innovation, and the Microsoft Monopoly: Antitrust in the Digital Marketplace* Kluwer Academic Publishers for the Progress and Freedom Foundation, 1999.

considerations were, and are dominant. First, the divestiture will lead to a more competitive industry structure in the intermediate run by dividing technical leadership. That is something I argued before, during, and after the trial. Second, the divestiture does not impose a market structure the government thinks is more competitive, but restores one blocked by anticompetitive acts. That I learned from the trial.

8) Supposed costs and problems of the divestiture remedy[79]

The debate over the supposed costs of the divestiture should start off in the context of the case and the industry rather than in some abstract theory or baseless spreadsheet calculation. In the context of the case, the key point is that the remedy restores the divided technical leadership that unfettered competition would have brought us. In the context of the industry, the key point is that division of supply of operating systems from applications is a familiar and effective market structure universally praised by market participants.

In this section, I attempt to respond to the major categories of theory of supposed costs and problems.[80] These can be usefully grouped into several major categories: theories that assume that the defendant's view of the case triumphed at trial, theories that assume that vertical disintegration is bad, theories that assume that competition is bad, and theories that turn on other false assumptions about the industry and the firm.

a) Assuming the (lost) defendant's theory of the case

The argument that competitors are the main beneficiaries of the government's remedies rests on the premise that the defendant won the case. If Microsoft had been, counter to reality, convicted of "competing too hard" and the government sought to charge its behavior, the change would be to the benefit of competitors and harm of consumers. In reality, however, Microsoft was not convicted of "competing too hard". Microsoft's defenders, in court and out, simply mischaracterize the government's case and especially the district court's findings with this canard. Their argument arises, characteristically of the defense and the defenders, from a simple imprecision. While Microsoft repeatedly undertook anticompetitive acts in the late 1990s, those were not the only things the firm did. It also engaged in my acts of lawful competition. The District Court carefully distinguished between the acts of competing and the anticompetitive acts, finding only the latter unlawful. Microsoft's mischaracterizers then leap into action, saying that the Court admits that Microsoft competed on the merits. This is a weak argument as applied to liability.

Versions of the same argument reappears in various guises to "prove" that the remedy is anticompetitive. Stan Liebowitz, for example, brings forward an analysis that shows price fell after Microsoft entered selected markets.[81] Since Liebowitz assumes,

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[79] There are many other criticisms of the government's remedy that are more focused on the conduct parts. As this paper is about the divestiture, I shall leave them alone.

[80] Given, however, that Microsoft's attorneys and other defenders invent new lines of argument unconstrained by any connection to reality, there will likely be many I miss.

[81] Liebowitz, S.J. "An Expensive Pig in a Poke: Estimating the Cost of the District Court's Proposed Breakup of Microsoft" 2000, http://www.actonline.org/pubs/remedies3.pdf

incorrectly, that the government's goal in preventing Microsoft from "acting as it did in the past," means that the government would like Microsoft to compete less fiercely, he assumes that they will stop entering markets post remedy. He offers no foundation for this amazing assumption other than his - clearly incorrect- assumption that the case was brought to stop "competing too hard."

What Liebowitz' tables actually show is the unremarkable proposition that successful entry by a large, well funded technically capable firm lowers prices in software markets. His tables focus our attention on one such entrant in particular, Microsoft, but the general proposition that such an entrant will lower prices in unremarkable in light of well established economics. Unremarkable that is, except that it contradicts a key tenet of Microsoft's defense in the case. They argued that the mere threat of entry, not actual entry, constrains pricing in software markets. This is not some unimportant side argument, but the core of their "no market power" story. Liebowitz' tables, just like Microsoft's internal documents, show that this argument is nonsense. On the remedy side, showing that entry lowers prices doesn't show the remedy is bad, but the reverse. The point of the remedy is to improve entry conditions so as to get more competition the operating system market. [82]

Here, as elsewhere, the fundamental logic of Microsoft's defenders is "Microsoft does good things, and the remedy will stop that." The logic is deeply sloppy. First off, Microsoft does both competitive and anticompetitive things, and the remedy is designed to stop the latter. But the defenders sloppily ignore the distinction, and assume they won the case because everything the firm does is good. This kind of unanalytic thinking was also the centerpiece Microsoft's defense at the liability phase.

This same error of logic extends to a number of related criticisms of the remedy. Some argue that the remedy will undercut incentives to innovate, falsely assuming that the point of the liability case was that Microsoft "innovated too fast" and oddly assuming, despite the industry's and Microsoft's statements to the contrary, that rivalry is a worse spur to innovation than comfortable monopoly.

b) "Vertical Disintegration is Bad" Theories

A number of the criticisms of the divestiture offer supposed reasons why vertical disintegration is bad for consumers. This includes the "double marginalization" theory and many of the various "unitary organization" theories, which cover a number of different technical and managerial issues. None of the theories makes any effort to explain why it isn't contradicted by the universally held view among computer industry participants that vertical disintegration's divided technical leadership is more competitive in their industry. Instead, what these criticisms do is make selective use of the available theories of vertical integration in economics, taking those that have the conclusion that vertical integration is good and asserting that they must be true in this industry. Since there is no general theory in economics that says that vertical integration is good, the

[82] Of course, Liebowitz' focus on entry by Microsoft into markets with a number of different structures does not offer a quantitative estimate of the impact of the entry of other firms into Microsoft's monopoly markets. Microsoft might react more aggressively to entry or be a more aggressive entrant them other firms, which tend to push the effect in opposite directions. But it does buttress a major point of the government's case, the value of competitive entry.

question of whether it is good or bad can only be addressed in context (for which, see sections 3) and 4) above).

The theory of "double marginalization" assumes a situation of static monopoly in each of two complements. The two monopolists set prices independently, and end up setting a higher price than a unified, vertically integrated monopolist would set. Many critics say that this will be a problem with the divestiture remedy. They must assume that both the operating system and the applications are static monopolies, and that they would stay static monopolies under the divestiture.[83] This ignores the assumptions of the theory, which are not satisfied either under the government's case (which is correct) or under Microsoft's defense.

The government's case, amply supported in industry history and the Microsoft documents (cf. Sections 3) and 4) above) is that an independent, widely distributed applications firm will lower entry barriers into the operating systems business. That directly contradicts one of the core assumptions of the double marginalization theory, static monopoly in the OS business, unaffected by divided technical leadership. It is simply not reasonable to assume that the Windows business will be the same well-defended monopoly after the divestiture that it is now. The same logic applies symmetrically to the applications business, though this was not a part of the liability case. Entry into personal productivity suites, now dominated by Office, or into particular products, such as word processors or spreadsheets, will be easier post divestiture. Indeed, the history directly shows that an operating system firm, Microsoft, was able to enter and compete in the personal productivity applications against entrenched dominant firms like WordPerfect and Lotus, after disruptive change. Thus, the pricing decisions of AppsCo, just like those of OSCo, will be made in a more competitive environment than the current pricing decisions for Office and Windows.

The double marginalization point has a special piquancy, for Microsoft's defense at trial also contradicts key assumptions of this theory – that Microsoft has monopoly power in Office and Windows. Microsoft's defenders are now forced to argue in quotation marks, saying that those of us who believe Office and Windows have market power in the present should conclude that double marginalization will be an issue[84]. Attributing arguments to other people is always dangerous, of course, especially if you leave out critical elements of their theory, in this case, the fall in entry barriers. I, alone among participants in this debate in actually having studied double marginalization empirically,[85] do not believe that there is a problem with it. The theory of double marginalization, like all economic theories, has assumptions, and in this instance all of the necessary assumptions are not believed by anyone in the debate.

A related argument says that vertical integration has been the key to technical advance in Windows itself. Technology transfer (from applications engineers to the Systems guys) within the firm has been an important source of technical progress, for it is the only way that valuable inventions made by the applications engineers can obtain

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[83] The theory is not materially altered if, instead of being static monopolists, the firms would be parts of static oligopolies in applications and in operating systems. It is materially altered if vertical disintegration changes the nature of horizontal strategic interaction in either layer.

[84] Liebowitz (cf. note 81 supra) appears to have left the in quotes camp, and now argues that double marginalization will occur – necessarily assuming market power for both AppsCo and OSco.

[85] Bresnahan, T. and P. Reiss "Dealer and Manufacturer Margins," *RAND Journal of Economics*, Summer 1985, examines automobile dealers and manufacturers

widespread distribution. The argument concludes that consumers will be denied the benefits of this kind of technical progress in the future, a disadvantage of the divestiture.

There is much wrong with this argument. It starts from the true observation that some technologies originally developed for Office or the browser were later distributed with Windows. It then leaps to the false conclusion that divided technical leadership will deny future technologies so invented to consumers. The first error lies (as usual) in assuming part of the defense's theory of the industry that was shown to be wrong at trial. In this case, the argument assumes that it is not possible to have two distinct firms - such as Microsoft and Netscape or OSCo and AppsCo -- separately distributing platform level software. This is belied by the history of the industry, in which it has frequently been true that platform elements have been supplied by distinct firms. The argument arises, not out of any analysis, but out of the wish on Microsoft and Microsoft's defenders' part that divided leadership of a platform be impossible.

The second error lies in ignoring the origin of many of the technologies distributed as part of Windows now. Many, many important technologies now in Windows were originally invented outside of Microsoft by entrepreneurs. Microsoft then bought or imitated these technologies.[86] Indeed, it is a cliché of the computer business that outside invention followed by imitation or purchase is the standard mechanism for important improvements to Microsoft technologies. There is nothing trivial about the platform technologies which have crossed the boundary of Microsoft the firm. Merely the most obvious ones are the original operating system (bought) and the graphical user interface (imitated). Post divestiture, entrepreneurs will continue to invent valuable technologies and OSCo will continue to buy or imitate them. Vertical disintegration has not historically blocked this process nor will it now. Nathan Myhrvold explained the historic examples: "I was a development manager of Windows 2.0. Without input from three application groups both inside and outside Microsoft, we couldn't have made Windows. It was absolutely critical." [87] Divestiture does not block things that can come either from inside or outside.

The current industrial organization, in which nearly all applications that run on Windows are sold by other firms, shows that the vertically disintegrated structure works excellently. Microsoft has sought control of all very widely distributed applications not because of any efficiencies that result but for strategic entry deterrence reasons. Monopoly applications areas with smaller market sizes they tend to leave alone.

As a group, these arguments prove far too much, for they show that the existing vertical disintegration in the industry, and the far greater vertical disintegration of the PC industry in the 1980s, was a disaster. Search the literature, either in economics or in studies of the industry, for evidence of this problem and you won't find it. "Wintel: the problem of Double Marginalization," and "The PC Industry Model: Bad at Innovating Compared to IBM." These papers haven't appeared, and there is a very good reason for this: they are silly. The PC industry structure has been a model of low prices, innovation, and technology coordination, not the reverse.

Almost all of the industry is organized the way the government has suggested here. No one has suggested that any efficiencies would be achieved by merging all of the

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[86] Let me point out that for present purposes, this is not a criticism of Microsoft but merely a fact.

[87] Myhrvold interview, 5/4/00, Seattle Post Intelligencer at http://www.seattle-pi.com/business/msft043.shtml; emphasis added.

other applications categories into an operating systems firm. Only in those categories of applications where the extent of the applications market is nearly as wide as the extent of the PC or operating systems market itself, such as browsers or personal productivity suites, do we see Microsoft's anticompetitive drive to vertical integration to preserve barriers to entry. Microsoft the firm is perfectly happy to tolerate an enormous amount of vertical disintegration in the industry and to laud it (Cf. Mr. Ballmer's remarks above.) It is only when there is divided technical leadership that Microsoft finds vertical disintegration uncomfortable, because it increases competition.

c) Comparing This Divestiture to Alternatives

The first alternative to a divestiture is a permanent set of "conduct remedies." As this was a vertical foreclosure case, the obvious conduct remedies are restrictions on Microsoft's behavior toward its complementors. As a long-run approach to preventing further effective anticompetitive acts, this has several serious disadvantages.[88] While Microsoft is a strategically very predictable company, it is also a tactically very inventive one. At some level, one can only admire the energy, inventiveness and enthusiasm of Microsoft's anticompetitive acts. Microsoft enlisted a very large number of complementors in its anticompetitive schemes in the late 1990s, using a variety of bribes and threats to get firms to undertake actions they knew were not in the best interest of their customers. Further, Microsoft is in a position of complete dominance of the distribution channel for PCs, a key if there are to be rich, end-user-oriented applications technologies with wide distribution, and is in a commercial relationship with a wide variety of distinct kinds of firm in the computer and Internet industries. Accordingly, Microsoft is well posed to take off on a campaign against new technologies that threaten it, especially if they involve innovation on the client side. More importantly for the analysis of conduct remedies, Microsoft would be able to invent around any specific restrictions on its conduct, finding new ways to inhibit the distribution of innovative technologies that lie just outside the letter of a conduct decree.

Relatedly, Microsoft has a highly self-centered and only limitedly ethical approach to contracts generally, but especially to contracts with the government. If there were an opportunity to violate a conduct remedy to materially slow the advance of a threatening technology, they would take it and then drag out the resulting consent decree violation hearing for a long period of time. The harm to competition would be irreversible in many cases, for high tech markets decide and move on, while proving bad faith would take time. The incentive to engage in this behavior is overwhelming. The cost in lost profits to Microsoft of a successful outside technology that would lower entry barriers into their core markets is in the tens of billions of dollars. The cost of dragging out a consent hearing and being, once again, accused by the Justice Department and a federal judge of behaving in bad faith consists of (1) tiny fines and (2) a psychic cost of being perceived as lawless. The economic doctrine of revealed preference plus Microsoft's historical behavior tells us how small (2) is.

Finally, of course, a conduct remedy would not act to restore the lost improvements to the competitive environment as a result of the late 1990s

[88] As a short-run complement to divestiture, as in the remedies proposed by the government and (largely) adopted by the District Court, they have some value. They force Microsoft away from its well-honed anticompetitive tools and push it toward inventing new ones, which will take time.

anticompetitive acts. Consumers are entitled to a far more competitive industry structure for full-featured end-user oriented applications than they have now.

d) Alternatives II: Horizontal Divestitures or Licenses

Given that the motivation and effect of Microsoft's anticompetitive acts was to maintain the Windows monopoly into the present, standard antitrust analysis would lead to the obvious, traditional remedy: ending the Windows monopoly, either by breaking up the company into multiple sellers of Windows or by licensing Windows technology widely on unrestricted terms. Given that conduct remedies aren't going to get the job done, and given the pattern of anticompetitive acts and the clear harm to society stemming from them, there is no problem establishing that such a remedy is proportionate. But that is not where the analysis should end.

I have argued throughout this paper that creating multiple operating systems companies directly is not necessary to restore competition. There is a reasoned position that it is necessary, though I disagree with it.[89] That position is that the client operating system is a very powerful layer; the anticompetitive acts we have seen stem from Microsoft's desire to preserve that monopoly. While correct as far as it goes, this argument underestimates the value of divided technical leadership as a force for competition in the computer business.

It is also important to keep in mind the strong tendency for standards in the PC business to persist. Creating competition within the Windows standard will likely lead to persistence of that standard without a market comparison to serious alternatives. I would argue that this offsets the advantages of competition within the standard. It is not possible to know whether the commercialization of the Internet – viewed by Mr. Gates as the most important piece of disruptive market change since the introduction of the IBM PC – should lead to an alteration, a continuation, a migration away from, or a leapfrog replacement of, the Windows standards. Imposing a remedy which creates competition within the Windows standard would be right if we were sure that one of the more backward-looking of these alternatives is better. Permitting competition from such technologically different alternatives rather than mandating competition from alternative versions of Windows has a number of advantages, most of which have to do with letting the market choose what form of route forward it wants. Those advantages are present in the early 2000s just as they were in the late 1990s.

A related problem is that equilibrium in markets with strong indirect network effects – like the market for operating systems – does not leave much room for long run competition between very close substitutes. The fundamental "tipping" logic of such markets makes it quite difficult for approximately work-alike operating systems to prosper. Advocates of a horizontal divestiture say that this would give a powerful incentive to the resulting competitors to differentiate their products, which is clearly right, and that such differentiation within the Windows standard would lead to real choice along the important dimensions before the tipping process moved too far along,

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[89] See, e.g., Litan, Robert E., Roger G. Noll, William D. Nordhaus, and Frederic Scherer (2000), Remedies Brief Of Amici Curiae, and Lenard T.M., "Creating Competition in the Market for Operating Systems: a Structural Remedy for Microsoft," *Progress and Freedom Foundation*, January 2000, ., Romaine, R. Craig and Steven C. Salop (1999) "Slap Their Wrists? Tie Their Hands? Slice Them into Pieces? Alternative Remedies for Monopolization in the Microsoft Case" *Antitrust* Summer 1999.

especially if all the various versions were backward compatible with the Windows of today. The second part of this argument is far less clearly right. The historical example of Windows vs. OS/2 comes immediately to mind. Both of these were capable operating systems, and they grew out of a collaboration that split. They differed somewhat in capabilities, and they differed a good deal in the degree and the manner in which they offered backward compatibility to DOS, the standard of the day. The market tipped to Windows, and there is no more real competition from OS/2. A similar fate would be problematic if there were to be a new competition among Windows variants. Competition among less close substitutes – Windows vs. any of the potential entrants described above, sponsored by, say, AppsCo plus Intel plus a big Internet player (AOL?) plus a substantial OEM (Gateway?) would be far less subject to tipping.

A related proposal would be the compulsory publication of Windows source code or licensure of Windows code for resale by other firms. This, too, represents a tilt in the direction of Windows forever, which involves more picking technological futures than I would like to see courts doing, for the same reasons as a horizontal divestiture. It also brings a large number of other firms – the licensees – into the position of attempting to enforce a contract Microsoft finds not in its interest to obey. Since delay is highly valuable, and since Microsoft is committed to a rule of power rather than of law in dealing with its contracting partners, enforcement of good faith compliance of licenses would be an ongoing problem of oversight.

e) Alternatives III: Divest IE and the JVM

The basic logic of my argument suggests a vertical divestiture remedy, as (1) divided technical leadership would be more competitive and (2) that structure was what Microsoft prevented. One obvious candidate would be to force divestiture of the IE browser and of the Microsoft JVM, thereby restoring independence to what was controlled. Indeed, such a remedy, could it have been fully implemented to be in place throughout the late 1990s, would likely have done a great deal for competition. Unfortunately, at this writing the late 1990s are over, and the market opportunity to build a strong strategic position as a browser-based firm has passed. Adding a JVM would not give a firm enough strategic assets to be a player at this point.

Spin-off remedies in antitrust cases should, at a minimum, create a live competitor. A standalone browser company, or a standalone browser plus Windows-specific JVM company, would have no revenue sources. Had the market developed without anticompetitive acts, Netscape browser technologies would have had several years to develop tight links to server-side applications which would have brought revenue to Netscape, as both Microsoft and Netscape forecast. Those opportunities are now long lost. Similarly, had cross-platform Java been available on all clients, including Windows, Java programmers would have had several years to write not only the server-side applications that they now write (in their hundreds of thousands) but also truly portable client-side corresponding applications. But that opportunity, too, is past. The right way to have an independent browser company is to have an independent applications company, which is what the government's proposed remedy does.

9) Economic Importance of This Matter and This Remedy

Computer platforms are among the most important technologies in the economy. For some time, software and networking have been the core platform technologies for the development of both end-user oriented applications and larger, organizational or interorganizational applications. Computer platforms are general purpose technologies linked to important technical progress in every industry that uses them, that is, in every industry. Interference with innovation in computer platforms is interference with the future economic growth of the United States and of the world.

We do not know, in precise technical detail, what the future direction of computer platforms should be. There is widespread consensus among vendors, including Microsoft, that the commercialization of the Internet is the most important disruptive change in the industry since the introduction of the IBM PC.[90] This important technical change has the prospect of being a "paradigm shift" in Dr. Grove's language, which permits markets to break out of longstanding relationships. Yet, as the falling dotcommers show us, there is considerable uncertainty about the exact form of the value to society associated with this new opportunity.

What Microsoft has done so far is to prevent the widespread distribution of innovative technologies that would have enabled competition against the Windows monopoly on the merits. They have demonstrated a pattern of being unable to defeat new technologies that might weaken their position by their own technological and (lawful) marketing efforts. To preserve their existing position into the future, they have been forced to anticompetitive acts, ones that directly harmed their customers or denied them choices in the small, in order to bar the market from making the critical technology choices in the large. There are no elements of competing too hard or of innovating too fast in their anticompetitive acts. Instead, they were unable to win by innovating, and needed to block the market opportunities of other firms.

What Microsoft now offers us is a vision in which their technologies continue to dominate in end-user oriented applications as those migrate to the Internet and merge, partly, with organizational and interorganizational applications. They offer us a vision in which there is one, universal platform, theirs, running on all devices. They offer a migration path to that platform which will be smooth and slow, avoiding disruptive change, and preserving their position. There is only one thing wrong with this offer. It is an offer we cannot refuse. Should market forces attempt to go down another path, Microsoft will use the tremendous advantages that come from its present position to compel a single vision, its own.

Is there any serious chance that what is best for society in a time of tremendous technological and market uncertainty is central planning by an incumbent monopolist, one that has already shown that it cannot outrun the fleet new entrepreneurs in a fair race? Of course, it is possible that the market will someday choose a single platform sold by a single vendor, perhaps even Microsoft. But what public policy argument could suggest leaping to that conclusion without a market experiment? Surely technological times like the present are exactly the ones in which a large number of distinct offerings from

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[90] In "The Internet Tidal Wave," *GX 20*, quoted above at note 33.

vendors with different vendors are what we want.[91] Surely it is at times like this that having a number of different vendors propose, and letting the market dispose, dominates central planning by Microsoft.

It is not only I who think this. My argument here about the optimal organization of innovation in the present, was made by Mr. Gates in The Road Ahead about the "information superhighway."[92] I quote him again at some length:

> This is a hallmark of an evolving entrepreneurial market; rapid innovation occurs on many fronts. Most of it will be unsuccessful, regardless of whether it's attempted by a large or a small company. Large companies tend to take fewer risks, but when they crash and burn, the combination of their sheer ego and the scale of their resources means they wind up digging a bigger crater in the ground. By comparison, a start-up usually fails without much notice. The good news is that people learn from both the successes and the failures, and the net result is rapid progress.
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> By letting the marketplace decide which companies and approaches win and which lose, many paths are explored simultaneously. Nowhere is the benefit of a market-driven decision more apparent than in an unproven market. When hundreds of companies try different risk-taking approaches to discover the level of demand, society gets to the right solution a lot faster than it would with any form of central planning. The range of uncertainties about the information highway is very large, but the marketplace will design an appropriate system.
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> Governments can help assure a strong competitive framework and should be willing, though not overeager, to intercede if the marketplace fails in some particular area. After the trials have yielded sufficient information, they can determine the "rules of the road" the basic framework guidelines within which companies can compete. But they should not attempt to design or dictate the nature of the information highway, because governments cannot outsmart or outmanage the competitive marketplace, particularly while there are still questions about customer preference and technological development.
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> A wide range of skills, from a wide range of companies, will be necessary to put the information highway together sufficiently for a mass market to begin. It will be tempting for a company strong in one or more of the necessary disciplines to try to find a way to do every piece and ignite the market all by itself, but I think this would be a mistake.

I think it would be a mistake, too, Mr. Gates. The government's proposed remedy in *Microsoft* seeks no more than to restore the competitive circumstances in which Microsoft grew up, and to prevent imposition of a solution by your company now that it

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[91] I have made this argument at some length in my valued collaboration with Franco Malerba (1999). "Industrial Dynamics and the Evolution of Firms' and Nations' Competitive Capabilities in the World Computer Industry", Forthcoming in Nelson et al. (Eds.)New version available at http://timb.stanford.edu/research/ccc7.pdf/

[92] Cf. note 10, supra.

is large enough to leave a "bigger crater." Those circumstances, of multiple innovative companies, each with its own ideas and specialties, have served consumers very well through innovation and competition. We agree absolutely that "any form" of central planning, including the form that comes from an incumbent monopolist, is a terrible idea. And we agree on the principles that should guide government intervention, and that did guide it in this case. *Microsoft* was government intervention to permit market choice in very important and highly levered markets. The divestiture enables that choice going forward.