IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

STATE OF NEW YORK *ex rel.* Attorney General ANDREW M. CUOMO, *et al.*, Plaintiffs, v. MICROSOFT CORPORATION, Defendant.	Civil Action No. 98-1233 (CKK)

MICROSOFT CORPORATION

EXHIBIT A

SUPPLEMENTAL EXPERT REPORT

OF

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Harvard Business School

November 6, 2007

I. SUMMARY

1. As a supplement to my August 30, 2007, report, I have been asked by Microsoft to examine three points raised by the Movants in their moving papers and attached reports: (1) the extent to which today's Internet-centric or Web-based applications are merely "nascent"; (2) whether the pace of innovation or technological change slowed from 2002 to 2007; (3) the extent to which Microsoft exerts control over the consumer's ability to access Internet technologies and services. From my analysis, I conclude the following:

- **The Internet as an alternative platform is ubiquitous.** Expansive changes have swept through the software industry over these last five years. The Internet as a development and distribution platform now provides an established and growing "OS-agnostic" alternative to Windows for developers and consumers. The Internet platform does not rely on Microsoft standards, and multi-billion dollar firms have firmly established their leadership in building applications and tools for this alternative platform (including Google, Sun, Adobe, and others).
- **The rate of innovation and "pace of technological change" increased from 2002 to 2007.** The use of the Internet as a way to develop, distribute, and access software has led to significant changes in the ecosystem of information technology firms. Software R&D investments far outpaced overall industry investment rates and growth rates. In particular, Microsoft far outpaced software firms and devoted a significant percentage of its R&D budget toward Web-based technology that does not reside on the Windows Client. Accordingly, I disagree with the assessment of Professors Kwoka and Alepin that the pace of innovation and rate of technological change for Microsoft or the software industry have slowed.
- **Microsoft can neither limit nor control consumer access to, or technologies for, Internet applications.** Technologies ranging from simple HTML to Java and Flash rich media application development tools are driven by website developers and technology firms. Microsoft cannot preclude access to websites nor limit the use or development of the technologies. Attempts by Microsoft to preclude such access through the Web browser would be unsuccessful because switching costs are low. Developers would continue writing for these ubiquitous standards and users would easily find other methods of gaining access to the content they seek (e.g., by simply downloading another browser such as Apple's Safari or Mozilla's Firefox). Moreover, attempting to limit the way in which users access the Internet would decrease user satisfaction with Microsoft's

products, increase reliance on non-Microsoft products, and, in my opinion, fail to produce any competitive or financial gain for the company.

II. COMPETITION FROM THE INTERNET PLATFORM IS NOT NASCENT, IT IS ESTABLISHED AND GROWING[1]

2. Internet-based technologies and the firms that rely on them are not nascent, but instead constitute a ubiquitous platform that acts as a competitive alternative to Windows. Professor Kwoka and Mr. Alepin understate or ignore the significance this platform. A thriving set of firms with billions of dollars in revenue deliver their products over the Internet using standard technologies outside of Microsoft's control.

3. Examples of leading Internet-based companies include Salesforce.com, Google, Yahoo, eBay, and MySpace (division of News Corp.). Traditional pre-packaged software companies such as Adobe, Intuit,[2] and IBM also offer extensive Internet products as alternatives or substitutes to traditional client software. Internet-based products deliver service from a centralized server over the Internet rather than depending on the client operating system. Customers access these "OS-agnostic" products through standard browsers using the Internet for distribution. These ubiquitous, OS-agnostic applications greatly diminish traditional notions of the applications barrier to entry.

a. COMPETITIVE STRENGTH OF THE INTERNET PLATFORM AND ECOSYSTEM

4. Internet products garner billions in revenue and profits, and employ many thousands of people. From 2002 to 2006, the revenues of US public companies in Business Week's Internet Software and Services sector (which includes Google and Yahoo) grew by over 200% from $10 billion to $37 billion (a robust 38% CAGR). This subset of companies employs more than 100,000 people and is valued at over $250 billion.[3] Analysts have elevated the competitive significance from Internet companies above traditional software firms:

> Microsoft faces two formidable competitive threats – open source software and Google – that have emerged from nowhere in only a few short years. Open source and Google are changing the shape of the competitive battlefield, creating new markets, and

[1] My previous report discusses many aspects of middleware innovation and competition. I have included the relevant discussion here to address certain assertions by the Movants and their experts. This paper supplements my August 30, 2007 report.

[2] Since Intuit launched Turbo Tax Online in February 1998, it has been used to complete over 27 million Federal returns, including 6.7 million in 2006 alone. *See* http://web.intuit.com/about_intuit/press_releases/2007/01-16.html.

[3] Business Week's Internet Software & Services sector includes "[c]ompanies developing and marketing Internet software and/or providing Internet services including online databases and interactive services, Web address registration services, database construction and Internet design services." The impact of Internet technologies on the technology industry is much larger because of excluded subsidiaries such as AOL, Myspace, and divisions of IBM, Intuit, Symantec, Oracle, Apple and others.

> operating in ways where Microsoft's former strengths become significant liabilities. As a result, we believe Microsoft faces the most significant threats that it has faced in its history.[4]

5. Google's dominant position in online advertising services provides a formidable business foundation. An open-source-based, client-OS-agnostic Internet platform underpins all of their offerings.[5] Google's financial performance is remarkable: its 2001 revenues of $86 million grew to $10.6 billion in 2006 with net income of $3.1 billion. Google has $16 billion in cash and a market value of $226 billion that exceeds IBM (as of 11/05/07). Google has fully established its position by growing to 123 times its size in 2001.[6]

6. Additionally, an innovative advertising business model, implemented by Google and others, fuels Internet development. Rather than selling software licenses, Internet companies often monetize freely available software with advertising. To the consumer, free software and free Internet services have become the norm, not the exception. Rather than "sell" software, Internet companies often give away access to new content and additional services in exchange for advertising revenues.

7. Alternative technologies Linux, Java, Flash, AJAX, PHP, Python, Ruby on Rails, Shockwave, and others combined with the new, advertising-based business models have attracted a large ecosystem of developers and OS-agnostic applications. In 1996, the fraction of OS-agnostic applications developed was 10%. In 2007 the proportion is estimated at 80%.[7] Developers drive this trend by using these cross-platform technologies. For example, there are over 5 million Java developers worldwide.[8] By 2004, Macromedia (now owned by Adobe) had 800,000 to 1 million flash developers.[9] A large ecosystem of OS-agnostic developers is firmly established.

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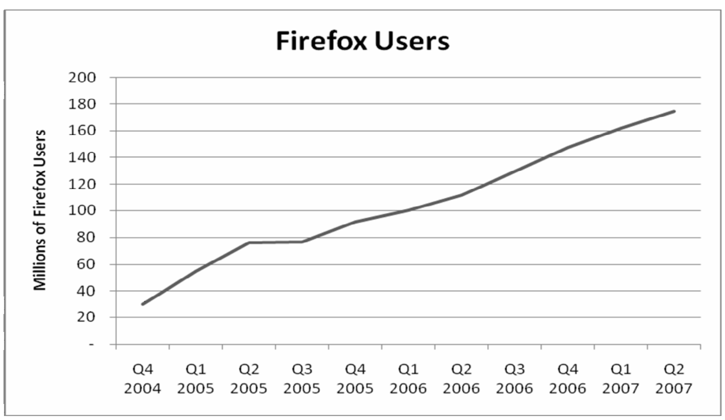
[4] Brent Williams, "Benchmark Equity Research - Initiation of Coverage Microsoft Corporation" (May 16, 2007).
[5] See Gartner, "Google's Million Servers Show Prominence in Global Class Systems" (August 22, 2007).
[6] Google 2006 10-K Annual Report, http://www.sec.gov/Archives/edgar/data/1288776/000119312507044494/d10k.htm. Google Amendment No. 9 to Form S-1, August 18, 2004.
http://www.sec.gov/Archives/edgar/data/1288776/000119312504142742/ds1a.htm#toc59330_23, p.F-4.
[7] Gartner, "Why the Client OS Matters Well Beyond 2011," August 2006.
[8] *See* http://www.sun.com/aboutsun/media/presskits/2006-1113/Java_aag_100306.pdf.
[9] *See* http://findarticles.com/p/articles/mi_zdzcz/is_200401/ai_ziff115741/pg_2

b. **JAVA AND OTHER INTERNET TECHNOLOGIES ARE UBIQUITOUS AMONG USERS**

8. End users have fully adopted non-Microsoft middleware. **Adobe's Flash has achieved 99.1% penetration of Internet-enabled PCs.**[10] Middleware like JavaScript has fully penetrated the market.[11] **Sun's Java Virtual Machine (JVM) has established 91% penetration of Windows PCs.**[12] According to the Java webpage, "[Java's] versatility, efficiency, platform portability, and security have made it the ideal technology for network computing, so that today, Java powers more than 4.5 billion devices: over 800 million PCs; over 1.5 billion mobile phones and other handheld devices; 2.2 billion smart cards; plus set-top boxes, printers, Web cams, games, car navigation systems, lottery terminals, medical devices, parking payment stations, etc."[13]

9. Netscape's browser only reached about 92 million users at its height.[14] In June of 2007, Firefox had 174 million users (80 million more than Netscape's peak achieved in about half the time, 2.5 years).[15] Despite the Movant's assertions to the contrary, Firefox growth has not stalled as shown in Figure 1.

Figure 1: Firefox Users, Q4 2004 – Q2 2007[16]



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[10] Adobe, "Shockwave content reaches 58.5% of Internet viewers," http://www.adobe.com/products/player_census/shockwaveplayer/, as accessed on October 25, 2007.

[11] Internet Explorer, Firefox, and Safari all support JavaScript, as of October 29, 2007, see: http://blogs.msdn.com/ie/archive/2005/03/03/384723.aspx; http://www.mozilla.org/support/firefox/options; http://developer.apple.com/documentation/AppleApplications/Reference/SafariJSRef/Intro/Intro.html)

[12] August 30, 2007 Report of Marco Iansiti at page 11.

[13] Sun Microsystems, http://www.java.com/en/about/, as accessed on October 25, 2007.

[14] Users calculated by multiplying the usage shares of Netscape browser by the number of Internet users. *See* NUA, http://www.netbanker.com/2000/04/internet_usage_web_users_world.html and http://www.internetworldstats.com/emarketing.htm for Internet users and http://www.ews.uiuc.edu/bstats/latest.html for browser usage share, accessed October 29, 2007

[15] Netscape launched its first browser in 1994 and peaked in 2000; Firefox launched in 2004 and is still growing. As of September 2007, Firefox has been downloaded more than 400 million times. http://mozillalinks.org/wp/2007/09/firefox-400-million-downloads/.

[16] Users calculated by multiplying the usage shares of Firefox browser by the number of Internet users. *See* Internet World Stats, http://www.internetworldstats.com/emarketing.htm for Internet users and http://marketshare.hitslink.com/ for browser usage share, accessed October 29th, 2007

III. RAPID CHANGE AND INNOVATION HAVE CONTINUED TO OCCUR FROM 2002 TO 2007

10. Experts for the Movants suggest that no significant innovations have arisen and that innovation in the information technology industry and from Microsoft has slowed. I disagree. The number and types of different competition that have emerged since the Final Judgments to provide an alternate platform for developers and consumers is truly remarkable. To the contrary, the overwhelming consensus is that the pace of change and innovation has increased and that some of the most important developments and breakthroughs in the history of the IT industry have occurred during the previous five years.

a. ALTERNATIVE PLATFORMS AND DISTRIBUTION HAVE GROWN RAPIDLY

11. Ubiquitous OS-agnostic technologies and extremely low-cost Internet distribution have fueled the rapid adoption of new platforms. Today, leading technologies rely far more on the Internet as a highly effective distribution channel than on OEM's. Not only has **Firefox reached over 170 million users** without OEM distribution but it also provides a distribution channel for software by making Google the default option in the Firefox search toolbar, and making Google.com the default homepage. **iTunes for Windows has reached a user base of 500 million users** as of June 2007, almost exclusively through Internet download distribution. (iTunes had zero Windows users in 2002.) Since the Final Judgments, the collaboration and communications Internet service **MySpace has signed 200 million registered users** all through online distribution.[17]

12. In enterprise software, Salesforce.com has garnered 646,000 subscribers and 29,800 customers as of January, 2007.[18] The company has generated $451 Million in revenue FY-07 YTD and has a valuation of over $6 Billion.[19] It also opened its product to developers with the AppExchange platform in June 2005. As of December 2006, AppExchange had attracted 230 independent partners and 400 add-on software solutions.

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[17] Iansiti page 31; MySpace also recently joined Google's platform called OpenSocial, whose goal is to provide any social website the APIs to implement and host 3rd party social applications. These API's extend Google's broad Gadget platform, and are supported by more than a dozen consumer social sites, and by business sector partners such as Oracle and Salesforce.com. *See* Gartner, "Google Takes First Step in Face-off With Facebook," November, 2007; See also http://code.google.com/apis/opensocial/.

[18] *See* Salesforce.com company website : http://www.salesforce.com/company/milestones/ accessed October 26, 2007

[19] *See* Salesforce.com company website: http://library.corporate-ir.net/library/14/141/141811/items/258278/DetailedFinancialsQ2FY08.pdf accessed October 26, 2007 and Yahoo! Finance http://finance.yahoo.com/q/ks?s=CRM accessed October 26, 2007

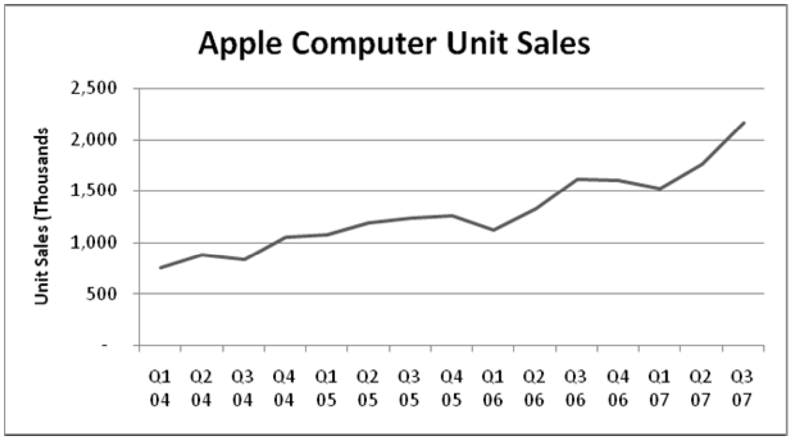
13. As these examples illustrate, companies routinely deliver important applications independently of the Windows client or of other Microsoft technologies. These applications are distributed to millions of users without using the OEM channel. Furthermore they employ an advertising business model that makes selling traditional software licenses for similar products difficult.

b. APPLE COMPETITION IN OPERATING SYSTEMS FOR INTEL-BASED PERSONAL COMPUTERS

14. At the end of 2002 Apple Computer, Inc.'s share of U.S. personal computer sales was 3% and Apple was the fifth largest U.S. computer vendor.[20] In contrast, Apple's share of the U.S. personal computer sales for the third calendar quarter of 2007 was 8.1 percent, up from 6.2 percent during the same period one year ago, according to preliminary results released from Gartner on October 24, 2007. Apple's Mac shipments grew 37.2 percent year-over-year -- more than twice as fast as any other leading manufacturer ranked from Gartner's for the three-month period ending September -- helping Apple become the No. 3 U.S. personal computer vendor overall.[21] Apple now competes directly in the Intel-architecture client operating system market, and uses a similar chip set to more traditional Windows-based computers. Figure 2 shows Apple's computer sales from 2004 to the last reported quarter. Apple's success stems from the popularity of OS-agnostic Internet applications which tend to reduce any applications barrier. Apple's "iLife" branding, such as iPod and iMac, reflects their focus on Internet applications and "Internet life."

[20] Mac Observer, "TMO Reports: Apple's US Market Share Declines Slight in 2003 & Fourth Quarter" January 15, 2004
[21] AppleInsider, "Apple's U.S. Mac market share rises to 8.1 percent in Q3," October 17, 2007.

Figure 2: Apple Computer Sales (Thousands of Units)[22]



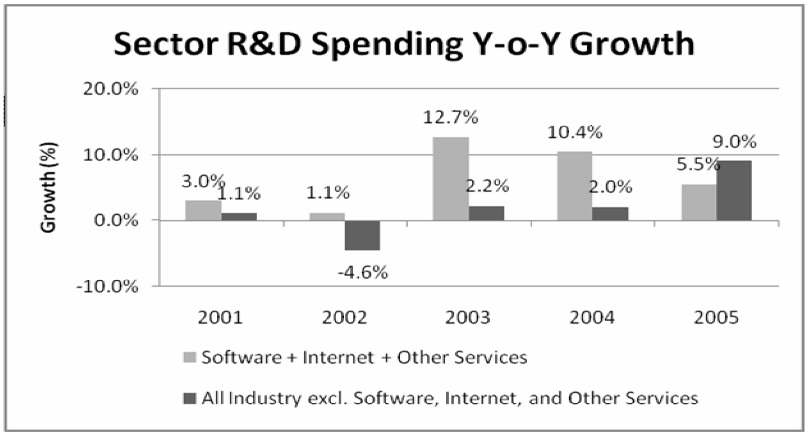
c. INVESTMENTS IN INNOVATION IN THE INFORMATION SECTOR OUTPACED THE REST OF INDUSTRY FROM 2002 TO 2005

15. I disagree with Dr. Kwoka's assertion that no significant innovations (i.e., "breakthrough technologies") have occurred,[23] and his implication that innovation as measured by R&D in the software industry declined over the period. He only cites less than a year of data since the Final Judgment was entered,[24] and fails to mention how investments in the software industry grew rapidly to outpace other industries.

16. National Science Foundation data in the years 2001 to 2005 shows investment in Software and Internet Services outpaced the rest of industry. Figure 3 shows the growth in annual R&D expenditure for the Software and Internet Services sectors versus all industry in current year dollars. From 2001 through 2005, Software and Internet Services R&D spending grew faster than the rest of industry in four of the five years and, overall, grew at a 7.3% CAGR, far outpacing other industries—the rest of Industrial R&D grew at only 2.0% CAGR.

[22] Apple SEC filings.
[23] Kwoka Report, (¶39, "…none has in fact occurred in recent years").
[24] Kwoka Report, see ¶41 and footnote 28 ("… in 2001 growth in R&D spending in the Software Publishing Industry slowed to 4.0 percent from the previous year's 15.4 percent. In 2002 it actually declined by 1.5 percent before beginning to recover in 2003 and more recent years.").

Figure 3: US R&D Expenditure Year over Year Growth, 2001-2005[25]



d. MICROSOFT INVESTED MORE THAN EVER IN INNOVATION FROM 2002 TO 2007

17. Dr. Kwoka puts forth the hypothesis that slowing investment in innovation (which, as discussed above, did not occur) might be attributable to Microsoft. He asserts that Microsoft's own pace of innovation slowed.[26] These assertions are incorrect. To the contrary, Microsoft's own investments in R&D and software development also grew substantially during the time period. From 2002-2006, Microsoft spent almost $30 Billion in R&D, compared to $15.6 Billion in the preceding 5-year period.[27] Furthermore, the proportion of Microsoft's revenue devoted to R&D has been highly consistent over time. Outside of a spike in 2004, Microsoft's R&D spending as a percentage of revenue has stayed between 15 and 17% from 1995 to 2006.[28]

18. Microsoft has invested these significant resources in both traditional software businesses and Internet products to meet demand from consumers. For example, Microsoft has invested substantially in Internet-based Windows Live and Office Live products. Microsoft has launched numerous Web-based products under its Windows "Live" brand.[29] In productivity applications, Office Live Small Business provides small business services to "create a professional online presence without the expense of buying a server, setting up a complicated infrastructure, and hiring technical staff to maintain it.

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[25] National Science Foundation, "Research and Development in Industry: 2003," NSF 07-314, February 2007; National Science Foundation, "Info Brief: US Industrial R&D Performers Report Increased Expenditures for 2004," NSF 07-304, December 2006; National Science Foundation, "Info Brief: Expenditures for US Industrial R&D Continue to Increase in 2005; R&D Performance Geographically Concentrated," NSF 07-335, September 2007. *Note that for 2005 Software Publishing was estimated based on the average percentage share of software publishing from all publishing from 1999 – 2004.*
[26] Kwoka Report, ¶46.
[27] Compustat, Microsoft SEC filings.
[28] Compustat, Microsoft SEC filings
[29] Microsoft press releases, 2005-2007

Microsoft Office Live Small Business is a hosted service." Users do not install it on their PCs.

Internet Products	Description
Windows Live Events	Event-planning site that lets people share and plan different types of events
Windows Live Home	A home page that provide a dashboard view for users of their Windows Live experience
Windows Live Hotmail	Online e-mail program with spam protection and online storage of 2 to 5 gigabytes of information
Windows Live Mail	E-mail program that can be downloaded to the client for e-mail access through the Internet
Windows Live Messenger	Instant messaging service allowing people to connect with others in real time
Windows Live OneCare	Security program including virus and spyware scanning, firewalls, tune-ups, and file backups
Windows Live OneCare Family Safety	Security program that offers built-in family safety features, including safer browsing for children
Windows Live Photo Gallery	Downloadable program for finding, fixing, organizing, and sharing digital memories that connects with Windows Live Spaces and Soapbox to allow sharing over the Internet
Windows Live SkyDrive	Web-based file storage and sharing program
Windows Live Spaces	Social networking and blogging service
Windows Live Toolbar	Software toolbar for Internet Explorer that accepts custom buttons to add shortcuts to selected sites
Windows Live Writer	Downloadable program that simplifies the process of publishing content to a blog

IV. ALLEGEDLY HIGH SERVER SHARE AND INTERNET EXPLORER DO NOT RESULT IN "CONTROL" OF THE INTERNET.

19. With regards to Windows Server, Dr. Kwoka overstates Microsoft's share of server operating systems. The moving states claim "While Microsoft has defaulted on its §III.E obligations, it has consolidated its hold on the server market where its share of shipments has increased from 55% in 2002 to 73% in 2006."[30] They rely on Dr. Kwoka's report which relies on unit volumes for *paid* shipments, rather than revenues, to calculate share. First, if considering shipments only, one must include unpaid installations of the Linux operating system. Customers frequently purchase a single distribution of the Linux operating system and install it many additional times unpaid (instead customers often pay Linux vendors maintenance and support fees). As discussed elsewhere, Google alone owns more than 1 million servers running the Linux operating system all of which would be considered "unpaid," and therefore not reflected in Dr. Kwoka's market share calculation.

20. Server Operating Environments such as UNIX, Windows, Linux, Netware, and mainframe operating systems are highly differentiated. When firms are distinguished primarily by differentiation of their products, using dollar sales is appropriate for calculating market shares.[31] IDC reports that Server Operating Environment (SOE) sales for 2005, the latest year available, show Windows sales-based

[30] "Plaintiff States' Motion to Extend the Modified Final Judgment Until November 12, 2012," October 16, 2007, p.3.
[31] See for example "1992 HORIZONTAL MERGER GUIDELINES," http://www.ftc.gov/bc/docs/horizmer.htm.

share of a putative server market is less than 30%.[32] Even if one were to choose to use unit sales, unpaid Linux units have very high competitive significance and must be included—firms avoid purchasing Windows or Linux by installing free copies of Linux. Including unpaid units of Linux would result in a similarly lower share for Windows.

21. With regards to the control of Internet standards, I disagree that Microsoft has the ability to use Internet Explorer APIs to control users' access. Internet standards are driven by Internet software firms, not Internet Explorer. To provide content available to all users, developers rely on standards that work with all browsers. Any vendor that seeks to lock in its application gains by controlling the platform will, by definition no longer be playing to the strengths of the platform.[33]

22. Website developers fully understand this strength, and therefore choose standard, ubiquitous technologies. Internet publishers also offer their own application-programming-interfaces (APIs) for others to extend their Internet products. Value is shifting from the client operating system and browser API's to the Internet content and services and their API's. Content and service providers control the standards that browsers must support—popular content attracts users who will download plug-ins if necessary to access the service. For example, YouTube delivers well over 100 million video downloads a day in Flash Player 7 or later formats.[34] Users are required to install the flash player in order to view the content. By comparison, ABC.com uses Flash but also requires the use of a proprietary media player.

V. CONCLUSION

23. Based on the facts discussed above and in my report dated August 30, 2007, I disagree with opinions of Dr. Kwoka and Mr. Alepin. Alternative platforms are established. Some of the most important innovations and breakthrough changes in information technology have occurred over the past five years. I find it technologically and commercially infeasible for Microsoft to use Internet Explorer to impact the importance of the Internet as a software development and distribution platform.

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[32] Operating System market shares were: Mainframe and Other SOE 42.1%, Microsoft Windows SOE 28.6%, Combined Unix SOE 25.7% and Combined Linux SOE 3.6%; IDC, "Worldwide Client and Server Operating Environments 2007-2010 Forecast and Analysis: Don't Count Anybody Out Yet," IDC Report #205411, February 2007.

[33] O'Reilly,"What is Web 2.0- Design Patterns and Business Models for the Next Generation of Software;" September 30, 2005

[34] TechCrunch, "YouTube serves 100m videos each day," July 17, 2006 *See* http://www.techcrunch.com/2006/07/17/youtube-serves-100m-videos-each-day/ accessed November 2, 2007