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Windows Vista: Securing itself against competition?

Georg Erber and Stefan Kooths

About the end of 2006, Microsoft began delivering its new Windows Vista PC operating system to large commercial customers, followed by final users and small businesses. Even before the product reached the market, the dominant provider of PC operating systems worldwide was accused over and over of abusing its market power in order to hinder competitors. After the integration of Internet Explorer (Windows 95) and the Windows Media Player (Windows XP), competitors today are objecting most strongly to the new security components associated with the Windows Vista Security Center, and the EU Commission has joined in these objections. Opponents have criticized the bundling of previously independent components (transfer of market power through bundling), and security software providers like Symantec and McAfee have argued that limiting access to the core of the operating system will hinder their product development activities. In line with the tradition in EU competition policy, Microsoft's dominance of the PC operating system market justifies supervision of that provider in the interests of preventing abuse. However, the final assessment must take into account unique circumstances arising from the specific market and competitive conditions in the standard software markets.

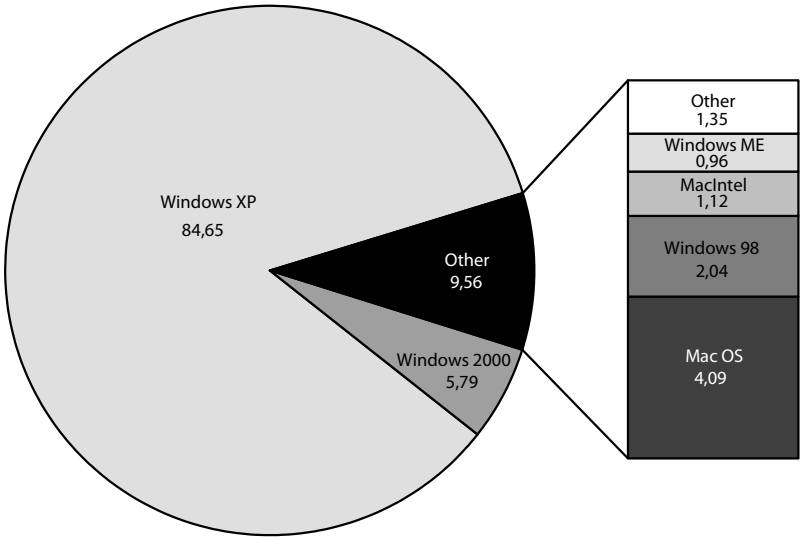
In particular, competition policy should intervene in the PC operating system market only if a demonstrable improvement in the public welfare can be attained as a result. In essence, this means that policymakers should intervene to ensure fair innovation competition, including the introduction of reasonable transparency requirements with respect to operating system interfaces in order to allow regulators to manage potential conflicts between the operating system manufacturer and providers of competing software components (e.g. web browsers, media players or security software). There is need for reform in this area in order to create a reliable and functional system of rules for all market participants. However, unbundling decrees which require strict separation of certain system components are an unsuitable instrument for this purpose.

JEL classification: K21, L41, L42, L63
Keywords: competition policy, Microsoft, operating system markets, platform competition

Figure 1:

Shares in the global operating system market

October 2006 (in%)



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Source: marketsharehitslink.com

The global PC operating system market: Microsoft's dominance intact

The total number of personal computers (PCs) worldwide is currently about one billion,[1] and estimates indicate that another 1.3 billion computers will be built between 2006 and 2010,[2] 60% more than in the first half of the decade. With a market share of over 90%, Microsoft has dominated the PC operating system for about two decades through its various Windows products (Figure 1).[3]

Apple is its only statistically noticeable competitor, with a market share of 5%. Linux and other operating systems, on the other hand, account for just around 1% of the market. Microsoft expects its new Windows Vista operating system to sell about 100 million licenses worldwide in 2007. A major percentage of these sales will come through the "OEM" business,[4] in which manufacturers supply customers with new computers featuring pre-installed operating systems. The average PC replacement cycle is currently three to four years in the US,[5] and the number should be similar in other industrialized countries. Since the transition to a new operating system usually goes hand in hand with the hardware upgrade cycle, it is expected that Windows XP will largely be replaced by the new Vista version within that time period.

Due to the consistently high growth in the PC market, especially in developing countries like China and India, the number of PC operating system licenses is clearly on the rise. In the case of China, this trend should be reinforced by the fact that those purchasing PCs in the future will have to furnish documentation that they have obtained an operating system license, as an anti-piracy measure.[6]

1 Since the beginning of the PC era in 1981, 1.54 billion units have been sold, of which 850 million are less than five years old; cf. Computer Industry Almanac 25-Year PC Anniversary Statistics: www.c-i-a.com./pr0806.htm

2 Cf. Computer Industry Almanac: Cumulative PC Sales Over Next Five Years: www.c-i-a.com./pr0606.htm

3 The market shares reported by Net Applications (marketshare.hitslink.com) are based on the evaluation of website hits and therefore reflect actual user behavior, although only computers with internet access can be counted, of course (which comprise about 60% of the installed base). Other studies, which are based on sales data, come to very similar conclusions as to the market shares of Windows product lines.

4 OEM = Original Equipment Manufacturer

5 Cf. Dunn, D.: The PC Replacement Decision. In: InformationWeek of 20 June 2005.

6 Batson, A.: China makes progress on curbing piracy. In: Wall Street Journal of 27 November 2006. The software industry currently estimates worldwide losses due to piracy at around one third of total sales. With USD 98 billion in total sales in 2005, the loss therefore amounts to around USD 34 billion. Only 65% of installed software worldwide is lawfully acquired. Western Europe's piracy rate is average, Germany's is well below-average (27%) and Eastern Europe (69%) is the piracy leader, ahead of Latin America, with 68%, and the Asia-Pacific region, with 54%. Cf. BSA & IDC: Third Annual BSA and IDC Global Software Piracy Study, May 2006: www.bsa.org/germany/.

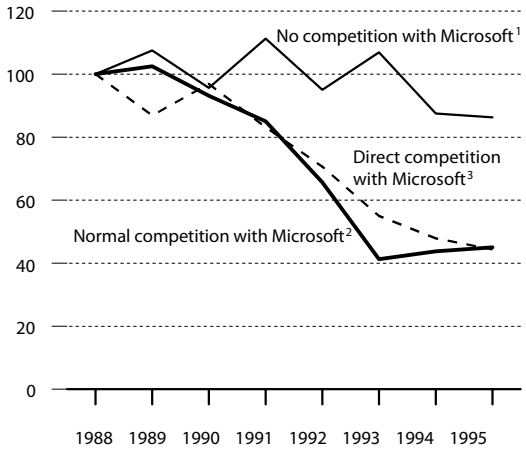
Box

Market leadership and consumer use

Figure 1 – Box

Price trend in PC software markets with and without Microsoft as a competitor

Index 1988 = 100



1 recordkeeping, graphics programs, formula generators, high-end desktop publishing

2 mid-range desktop publishing, personal financial management, presentation graphics, spreadsheets, word processing, database and project management, Office packages

3 PC operating systems, utilities, communication programs

Source: Liebowitz and Margolis, 2001

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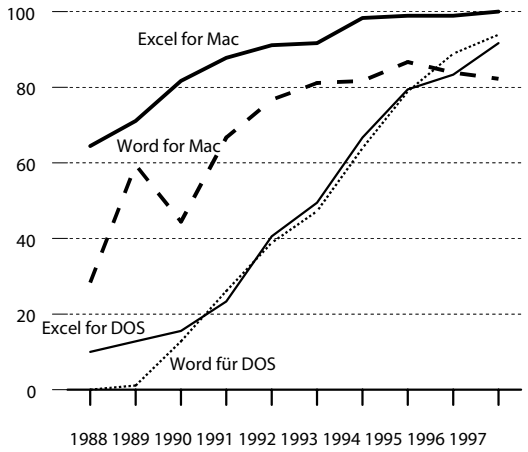
Figure 2 – Box

Market shares of Word and Excel in MS-DOS and Mac computers

In %



Source: Liebowitz and Margolis, 2001

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In a study of Microsoft's role in standard software markets, Liebowitz and Margolis[1] used empirical Dataquest data to investigate the effects of Microsoft's entry into the market on consumer welfare, to which end they analyzed the price and quality trend of the competing software products. The qualitative comparison revealed that Microsoft, after a few years, was able to offer a product of comparable or higher quality than those of its competitors.

After Microsoft attained market leadership, there were no price increases of any kind, as might have been expected using a monopoly pricing model. Instead, price remained well below those of comparison markets (Figure 1).

According to Liebowitz and Margolis, the success of the word processing (MS Word) and spreadsheet applications (MS Excel) was not based on the shifting of market power from the operating system market. Instead, those Microsoft applications already had high market shares for the Apple operating system, which spread only gradually to the version for Microsoft's own operating systems (Figure 2).

1 Liebowitz, S.J., Margolis, S.E.: Winners, Losers & Microsoft- Competition and Antitrust in High Technology, 2nd ed., Oakland, CA, 2001.

Market power in standard software markets not surprising

In view of Microsoft's dominant position in the global market, it would appear that regulators are justified in devoting more attention to that provider. However, standard software markets have unique features, so that competition policy models which may be acceptable for traditional markets are not necessarily applicable (see box). The specific market conditions arise above all from the interplay of

- high development costs;
- non-rivalry in consumption; and
- direct and indirect network effects.

These features are especially significant in operating system markets.

The cost of software production runs in similar patterns to those in other R&D-intensive industries (e.g. the pharmaceutical and film industries). *High development costs* (first copy costs) are paralleled by negligible marginal costs for distribution to final consumers. The higher the number of licenses sold, the lower the individual license price needs to be in order to cover overall costs. If a software developer can expect to sell large quantities of a new product thanks to a large customer base and high customer loyalty, it will be in a position to invest much more heavily in product development. The mere fact that a dominant company is able to invest more in product development reduces the incentive for potential competitors to engage in direct innovation competition, even if general technological capacities are equal.[7]

Since software, as a result of its physical properties, can be installed over and over again and can be used by different users, there is *non-rivalry in consumption.* Without effective copy protection, free-loading practices would proliferate among users and providers would be unable to achieve the cost degression effects of a large user base. Therefore, only the availability of low-cost copy protection methods can ensure that software will become a marketable commodity.

User groups can derive advantages in the form of direct and indirect *network effects.*[8] Direct network effects result if use of a program is beneficial for the very fact that many other users are also using it (e.g. greater ease in exchanging data and switching workstations). Indirect network effects arise from the availability of complementary products and services, e.g. in the form of applications. Featuring pronounced network effects on both the supply and demand sides, operating system markets have the characteristics of a "two-sided market": the challenge for operating system providers is to unite third-party providers[9] and users on their platform.[10] The value of that platform for users increases with every application developed or service provided by third-party providers for the platform (diversity of supply). At the same time, an operating system platform becomes more attractive for third-party providers when more users decide to use it (market size).

In view of the high first-copy costs and pronounced network effects, it is hardly surprising from an economic perspective that a dominant provider has emerged on the PC operating system market, even without an abuse of market power.

Innovation competition for the market as a whole

The past success of Microsoft, whose business model focuses on standard software markets with high user numbers,[11] is not by itself sufficient evidence of the abuse of market power. Competition in standard software markets takes place not so much *in* the market as *for* the market. Alternative products seeking to compete with an established software platform can only succeed if the added benefit attainable to consumers exceeds the cost of switching over the long term.[12] This essentially requires new products (e.g. software architectures like Web 2.0, or other licensing forms like open source software). In that case, the existing provider would lose its customer base and the dominant position would pass to the innovator ("winner takes all"). Due to the shifts associated with each technological advance, the software industry is characterized by a succession of dominant providers. Therefore, competition in software markets typically amounts to innovation competition for the market for the duration of a given technology. In the case of such technological paradigm changes, dominant market positions are not necessarily secured by existing market penetration.[13] Thus far, however, Mi-

7 Scherer, F.M.: International High-Technology Competition. Cambridge, MA, 1992 Kamien, M.I., Schwartz, N.L.: Market Structure and Innovation, Cambridge, MA, 1982

8 Cf. Farrell, J. Klemperer, P: Coordination and Lock-in: Competition with Switching Costs and Network Effects, May 2006; www.paulklemperer.org; Liebowitz, S.J., Margolis, S.E.: Network Externality: An Uncommon Tragedy. In: Journal of Economic Perspectives, Vol. 8, No. 2, 1994, 133-150, and Erber C, Hagemann, H: Economics of Networks. In: Zimmermann, K.F. (ed.): Frontiers in Economics, 2002, 235-368

9 Including independent software vendors (ISVs) and IT service providers which perform installation, support and training services.

10 Cf. Rochet, J-C, Tirole, J: Platform Competition in Two-sided Markets. In: Journal of the European Economic Association, June 2003, 990-1029, or Bresnahan, T.F., Greenstein, S: Technological Competition and the Structure of the Computer Industry. In: The Journal of Industrial Economics, Vol. 47, 1999, 1-40

11 Microsoft currently earns over 80% of its income and almost 60% of its revenue from its operating systems and Office applications; cf. Laube, H., Ottomeier, M.: *Office tritt gegen Vorläufer an.* In: Financial Times Deutschland of 27 November 2006, 6.

12 However, business from new customers from the expanding software markets in developing countries like China and India essentially offers competitors the opportunity to gain a critical mass of customers who would not incur any cost for switching operating systems.

13 Christensen, C.M.: The Innovator's Dilemma, Cambridge, MA, 1997; Adner, R.: When are technologies disruptive? A demand-based view on the emergence of competition. In: Strategic Management Journal, 2002, Vol. 23, 667-688

crosoft has been able to withstand such shifts, due in no small part to its massive development efforts.

Potential competition no empty phrase

Changes in IT and communications technology, driven by a growth in broadband communication infrastructure, are creating new uses for the internet. These new fields depend on software technologies which are compatible with various platforms and are based on open standards and protocols, thus allowing a more decentralized self-organization on the part of users.

In recent times, technological access hurdles for the exchange of multi-media content have been lowered considerably thanks to user-friendly software environments. In addition, a large part of the software needed to transport digital content for this purpose is already fully integrated in the interactive applications of web services like Wikipedia, Youtube and Flickr. Users transport their private content from their terminal devices to the web service provider through the respective browser interface.

While the terminal device's operating system retains control over the terminal device itself, it has no control over the administration of the web services, i.e. the content level of internet communications, which is controlled by the relevant web service. In the traditional PC universe, the operating system had complete control over all activities, including applications. New developments make it easier for users to switch operating systems. For example, Google's Web 2.0 model no longer requires any specific operating system, thus posing a direct threat to Microsoft's business model.[14]

Bundling software functions does not necessarily impair competition

Software innovations are undertaken in order to create more user-friendly products, as well as to improve performance and add functions, and operating systems are no exception. In view of Microsoft's dominant market position, however, the addition of new functions to the Windows operating system is often seen not as a desirable product advance but as vertical integration of associated markets by a market-dominant company (bundling). In fact, the addition of new functions gives the operating system provider advantages over manufacturers whose business model consists of offering those functions as supplementary components of the operating system. In particular, competitive advantages through bundling arise from the fact that cost degression effects can be fully applied to the market for supplementary components.

Nevertheless, the view that adding functions to the Windows operating system can be interpreted only as an anti-competitive bundling strategy is oversimplified.[15] Component manufacturers may retain competitive opportunities if their innovativeness continues to give them a technological advantage or if their product is better suited to certain user groups. In such a case, the operating system provider's bundling strategy has the effect not of reducing the incentive to innovate, but of diverting this incentive into the development of products which supplement the operating system or which improve the quality of its components. This may certainly occur with the object of becoming part of the next-generation operating system themselves through subsequent sale of the technology to the platform provider.[16] Therefore, intervention by competition policymakers with the object of unbundling the operating system is of dubious value as a method of regulating software markets.

Moreover, the purpose of competition policy is not to protect specific markets and business models. In particular, acting to prohibit bundling for the protection of independent component manufacturers would discriminate against companies whose strategy is to seek acquisition by the operating system provider.

Experience with the EU Commission's decrees with respect to the unbundling of Media Player and Windows XP has shown that the optional separation of supplementary functions from the rest of the operating system is ineffective without also regulating prices; the negligible market share of the unbundled operating system (Windows XP/N) demonstrates that this product clearly does not meet the specifications of the vast majority of consumers. Regulating the price of individual system components, on the other hand, would overburden regulators and the intensity of the intervention would be unjustified. Therefore, there is good reason not to regulate prices. As this

14 Cf. *Nach IBM haben wir jetzt die Google-Ära.* In: FAZ, No. 270 of 20 November 2006, 21

15 Cf. S. Kooths: *Die Unbundling-Entscheidung im EU-Wettbewerbsverfahren gegen Microsoft.* In: HWWA Wirtschaftsdienst. 5th ed., 2005, 335 et al.

16 Cf. Croson, D., Saunders A.: Composition and Cooperation in the Bundled Software Market, WISE Conference Paper, 2004, opim-sun.wharton.upenn.edu/wise2004/sun221/pdf

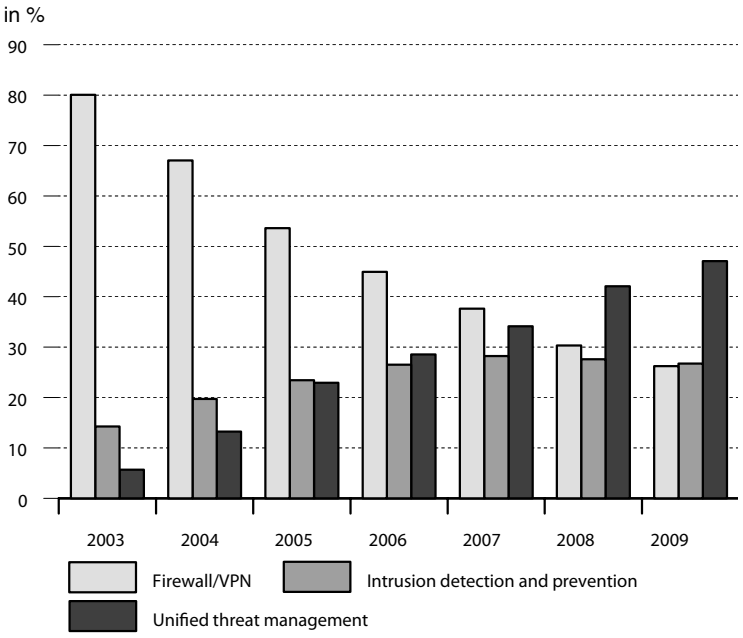
leaves the overall unbundling regulation toothless and because there are serious other economic arguments against it, unbundling software packages should not be considered a suitable instrument to regulate the software industry.

Operating system openness: conflict between independent software providers and Microsoft

Although dominant software providers with platform properties are much more vulnerable to potential competition and technological changes than is the case in physical network markets (e.g. gas and power grids), dominant platform producers do hold considerable market power as long as the current technology is in use. This is particularly true for Microsoft, as provider of the Windows operating system. Accordingly, it is necessary from the perspective of competition policy to ensure platform access for independent software manufacturers. Conflicts may be expected in cases where the platform provider is itself a manufacturer of user software, and can therefore obtain an unfair competitive advantage through the use of undocumented functions. This would suggest regulating access by imposing reasonable transparency requirements with respect to Windows interfaces.

However, the resulting conflict with the protection of the platform manufacturer's intellectual property is a problem for which no satisfactory solution has been presented so far, since there is a fine line between interface documentation and giving away technology. Moreover, there is disagreement as to what precisely is to be understood by "documentation," and what form it is to take. These problems are especially clear in connection with the current dispute involving security components of Windows Vista, as those components touch the very core of the operating system.

Figure 2
Market shares in security software worldwide



Sources: IDC 2005, DIW Berlin estimates

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Current dispute: security software

Around US-Dollar 2.5 billion in revenue was generated worldwide from security software in 2005 and existing estimates expect the market volume to more or less double through 2009.[17] Due to the variety of potential threats, security problems are becoming increasingly complex. Viruses, Trojan Horses, worms and spyware ("malware") destroy or manipulate data and allow unauthorized persons to access sensitive data. Because such attacks may result in considerable financial losses, the willingness of consumers to pay for security programs is high, opening up attractive growth and profit opportunities for businesses specializing in this area.

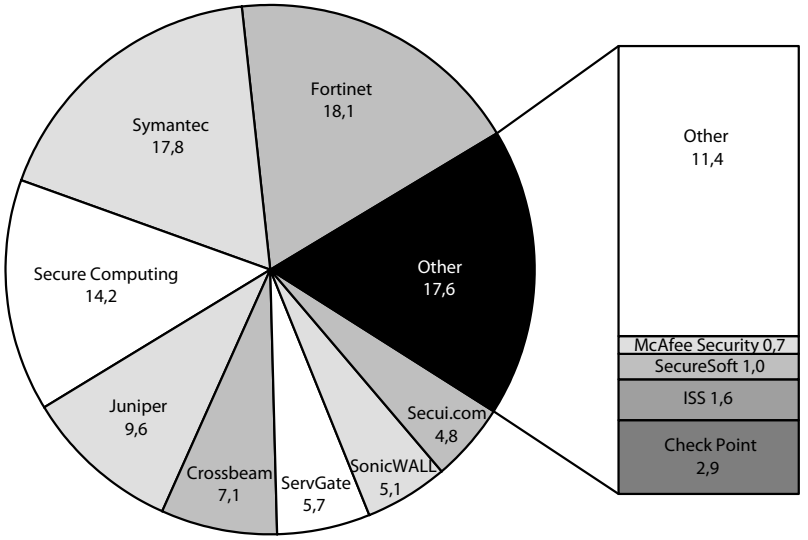
Since partial security solutions offer protection only against individual types of malware, integrated system solutions (UTM: Unified Threat Management) are becoming ever more attractive. As a result, the growing computer security problems have led to a situation in which the UTM software market has grown faster than the market as a whole. This circumstance clearly reflects the preference for

17 Kolodgy, C. J.: Worldwide Threat Management Security Appliances 2005-2009 Forecast and 2004 Vendor Shares: Security Appliances Remain a Well-Oiled Machine. IDC Study No. 33997, September 2005, www.fortinet.com/news/IDC/33997.htm

complete solutions which allow secure network operations and are more difficult to circumvent (Figure 2).

Since all input and output operations carry the potential of malware penetration, such interfaces are regarded by PC operating system designers as well as a decisive starting point for integrated security architecture. As a result, they must be closely integrated with the operating system, as is the case with Vista. The IT and communications industry has therefore created a global consortium, the Trusted Computer Group,[18] including leading international software and hardware manufacturers like Microsoft and Intel, in order to develop a security concept for trusted computing and communication applicable to all platforms.

Figure 3:
Shares in the worldwide market for unified threat anagement software based on 2004 sales data
In %



Source: IDC 2005

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The UTM software market is still relatively fragmented. Eleven providers accounted for about 90% of global revenue in 2004, of which the three largest were Fortinet, with 18.1%, Symantec, with 17.8% and Secure Computing, with 14.2% (Figure 3). Microsoft's entry into the market with its new Windows Vista operating system, featuring integrated security solutions,[19] may generate a shift in favor of Microsoft if Microsoft's security technology proves to be at least as effective as that of its competitors. If that happens, competitors would still have the opportunity to convince Vista users of the superiority of their security technologies. While they have maintained that this would require access to the core of the operating system, allowing such access would conflict with Microsoft's interest in preventing other programs from accessing this core, for security reasons. Moreover, some security software providers apparently have had no problem integrating their products into the new operating system.[20]

Conclusion

Highly concentrated markets for standard software are not sufficient evidence of inadequate competition. Even a company which has dominated the PC operating system market as much as Microsoft has is not free from competition, and is continually challenged by technological changes which threaten its core business. The charges of unfair hindrance of competitors which were made in the course of the launch of Windows Vista are, upon closer examination, by no means as clear as they may appear at first glance. In fact, this case exemplifies the urgent need to develop an adequate competition policy framework in order to accommodate innovation competition in highly dynamic markets.[21]

The convergence of markets, such as results in the case of Windows Vista from the merging of the

18 Cf. the TCG website, www.trustedcomputinggroup.org/home, as well as a brief history of the TCG and a description of its goals and functions at de.wikipedia.org/wiki/Trusted_Computing_Group (viewed on 4 January 2007).

19 These include the Defender program to protect against malware (spyware, adware, dialers, etc.), a new firewall, a program to protect the core of the operating system (PatchGuard) and the renewed Security Center, as a console which can be used to manage the various security components of the operating system.

20 Sophos: *Hersteller hätten sich besser auf Vista vorbereiten sollen, Sphos sieht keine Benachteiligung durch Microsoft.* In: Sophos Mitteilung of 24 October 2006

21 This is an argument in favor of continuing the reform of EU competition rules; see „Modernisation of EC antitrust enforcement rules; Council Regulation (EC) No. 1/2003 and the modernisation package," Directorate-General of Competition, Brussels-Luxembourg, 2004. In particular, the review process in Article 82 should give more attention to the unique features of platform competition and innovation competition in converging markets; cf. the relevant website of the EU Commission: ec.europa.eu/comm/competition/antitrust/art82/index.html.

operating system and security components, typically creates asymmetrical competitive relationships between participants in the various markets affected by the convergence process. Since the competitive situation in such a market and the emerging market structures cannot be reliably predicted, competition policymakers would be well-advised to show restraint. Such a course is not inconsistent with ensuring that independent software providers have fair access to the operating system.

From the consumer's perspective, a low-cost, high-performance operating system offering comprehensive protection from unwanted threats is highly desirable. This consideration should serve as an important guideline for competition policymakers in choosing when to intervene in the market. Instead of ad hoc intervention in the highly complex standard software markets, a clear system of rules should be created for all market participants. The regulation of electronic communications services can serve as a model for this purpose.[22] In that case, the need for intervention due to rapidly changing competitive relationships in the network industries is regularly examined through routine inspections of the regulatory framework.[23] Due to the specific circumstances prevailing in standard software markets, one might even consider whether those markets would be more efficiently governed by a special section of competition policy newly created for the purpose, which would better reflect their specific combination of technologies.

22 Cf. Stumpf, U.: *Exante Regulierung: Weiterentwicklung oder erneuter Paradigmenwechsel?* WIK-Newsletter, Bad Honnef, 2006, and the study commissioned by the EU Commission conducted by Caves, M., Stumpf, U., Velletti, T.: A Review of Certain Markets Included in the Commission's Recommendation on Relevant Markets Subject to ex ante Regulation, WIK, Bad Honnef, July 2006

23 Cf. Gual, J., et al: An Economic Approach to Article 82, Report by the Economic Advisory Group for Competition Policy, July 2005, www.diamondintelligence.com/download/files/epgcp_july_21_05.pdf.