THE JEAN MONNET PROGRAM

Professor J.H.H. Weiler
European Union Jean Monnet Chair

Jean Monnet Working Paper 07/05

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The Legal Regulation of Software Interoperability in the EU

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ISSN 1087-2221

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Abstract

Some prominent communications scholars divide networks in three horizontal layers: the physical layer for transferring information (e.g. radio-spectrum, cable networks), the logical or code layer which determines how the information is channeled to its intended destination (e.g. applications software, Internet protocols), and the content layer (e.g. films, music, text). In the analogue era, States used to regulate primarily the content and physical layer. The idea was that, because bandwidth (i.e. the data transfer rate) was a scarce resource, States were entitled to regulate access to the physical layer through licensing requirements, and to determine which types of content were to be sent over the networks.

In the digital age, abundant bandwidth and vast increases in processing power (i.e. computers' clock speed for manipulating data) are rendering access licences as well as content regulation and monitoring increasingly suspect from a constitutional point of view. If massive amounts of information can be communicated over the network, it is much harder to convince anyone that we ought to prevent anyone by law from doing so. Similarly, given a wealth of content, and the implicit active role of users in searching for information, it is much harder to convince anyone that there is a need for detailed content regulation; much harder even to monitor that content.

Nevertheless, the potential for abuse and bias remains; it lies in the logical layer, which is responsible for filtering and channeling information to the users. For instance, the risk exists that private players who control this layer might represent a real menace to civil liberties. One may therefore expect that software regulation will gradually become the central form of State intervention in communications networks. Surprisingly, however, the debate concerning the constitutional status of software laws is not yet on the agenda in Europe. Software goods and services do not merely form a whole industry's livelihood, but they are also foundational to many other industries. Importantly, software also constitutes the heart of our digital media sector, and thus shapes our democracy and individual autonomy.

The primary aim of this paper is thus to point to the need for a European debate on the tension between the fundamental right to freedom of expression and the fundamental right to property in European software regulation. Software code is both a medium (or platform) for expression, as well as expression in its own right. The analysis reveals that the analogous application of existing fundamental rights case law of the European Court of Human Rights as in Chassagnou *and* Appleby *would probably unduly favour private property rights in software over other individual and societal interests in the form of software expression. Courts will need more guidance regarding the foundational concept of software interoperability. Interoperability is the key to effective software expression: expression in software depends on one's ability to make one's program interoperable with another program. Just as a nuanced approach to various types of expression is warranted, so do we need a nuanced approach to interoperability. Yet, current legislation on this issue is still one-size-fits-all, and does not differentiate sufficiently between the various types and degrees of interoperability.*

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The Legal Regulation of Software Interoperability in the EU: Confronting *Microsoft* with *Appleby* and *Chassagnou*.

Boris Rotenberg[†]

I. Introduction

On 22nd December 2004, the European Court of First Instance addressed for the first time the issue of software interoperability.[1] It provisionally upheld the Commission competition law Decision in the *Microsoft* case. As a result, Microsoft is now obliged, pending the case on the merits, to disclose relevant 'interface information' to some of its competitors in order to enable these to render their own software interoperable with the Microsoft Windows platform.[2]

The legal regulation of software interoperability is particularly complex. A number of legal instruments determine whether third party software providers may render their software interoperable with a competitor's program. In essence, the main property claims for software creations are provided by software copyright,[3] while communications law and competition law constrain these rights on a number of policy grounds, in certain well-defined circumstances.

This piece re-considers the foundations of our current legal regime governing software interoperability. It approaches the issue of software interoperability from above, by focusing on the relation between software copyright and the right to freedom of expression. The key question here is whether the constraints imposed by the current

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[1] Previously, the European Courts vaguely touched upon some issues of interoperability in relation to pay-TV platforms (Case T-158/00 *ARD v Kirch/BSkyB*), telecommunications networks (Cases C-22/96 *Parliament v Council*, C-384/99 *Commission v Belgium*, C-146/00 *France v Commission*, C-79/00 *Telefonica*, and C-221/01 *Commission v Belgium*), and railway networks (Cases Case T-374/94, *European Night Services* [1998] ECR II-3141, C-460/00 *Commission v Greece*, C-372/00 *Commission v Ireland*, C-441/00 *Commission v UK*). However, none of these was about the Software Directive and its particular interoperability concept.

[2] See Commission Decision COMP/C-3/37.792, *Microsoft*, 24.03.2004. More specifically, the interoperability information relates to the workgroup server market. A server is powerful, multi-user a network computer that performs certain well-defined tasks for other computers, and which users access through their host computer.

[3] Other examples of property entitlements are provided through trade secret law [P. Samuelson, S. Scotchmer, The Law and Economics of Reverse Engineering, 111 *Yale Law Journal* (2002), p.1621], and (gradually) patent law has come in the picture [B.L. Smith, S.O. Mann, Innovation and Intellectual Property Protection in the Software Industry: An Emerging Role for Patents?, 71 *University of Chicago Law Review* (2004), pp.241]. For instance, Microsoft has begun to acquire patents governing APIs and simlar interface technology [M.A. Lemley, D. McGowan, Legal Implications of Network Economic Effects, 86 *California Law Review* (1998), p.528; J.E. Cohen, M.A. Lemley, Patent Scope and Innovation in the Software Industry, 89 *California Law Review* (2001) 1]. This trend may well have been reversed in the EU with the recent rejection by the European Parliament of the Computer Implemented Inventions Directive; see *Le Soir*, 6th July 2005, 'Pas de brevets sur le logiciel'. The Council now has three months to consider the decision, after which there may be a conciliation procedure.

software copyright regime are in line with the basic requirements underpinning the right to freedom of expression. This is a relevant question because it might turn out to be counter-productive to constrain property rights in software *ex post* through communications law and policy, if constitutional law analysis makes us question some of the impediments currently imposed *ex ante* in the form of intellectual property rights.[4]

Rather than addressing the content and physical layer issues that form the crux of many current academic and policy debates in communications law, this article thus focuses on how intellectual property law and policy can influence the future development of the logical layer.[5] The logical layer includes applications such as Web browser software to access websites and media player software for multimedia. It is built of a series of superposed platforms – information platforms – which constitute the foundation for the delivery and exchange of information – software, and content (audio, text, video).[6] Society has always relied on some form of platform for exchanging/sharing critical information. Cable networks and the radio-spectrum are perfect examples of such platforms – they are the 'Greek Agoras' of our time. With the advent of digital technology, the critical legal question thus arises how to frame laws determining who controls the present and future platforms.

In essence, the paper makes three inter-related claims. The first point is that the time has come to re-assess the terms of the 1991 EU Software Directive and its implementation in the various Member States. The Software Directive constitutes a key piece of legislation that is systematically referred to in other EU legislation. It now forms the unquestioned cornerstone of the EU's regulatory framework for the information

[4] Strangely enough, while US case law and US academics have debated this issue, no European court or author has looked into it. So far, this issue arose in two distinct types of cases, namely the constitutionality of (i) US export limitations on encryption programs and (ii) laws prohibiting copyright circumvention tools. See *inter alia Bernstein v. US Department of Justice*, 176 F.3d 1132 (9th Cir. 1999); *Junger v. Daley*, 209 F.3d 481 (6th Cir. 2000); *Karn v US Department of State*, 925 F. Supp. 1, 3 (D.D.C. 1996); *Universal City Studios, Inc. v. Corley*, 273 F.3d 429 (2d Cir. 2001); *Universal City Studios, Inc. v. Reimerdes*, 111 F.Supp.2d 294, (SDNY 2000). For US literature on this exact topic, see *inter alia* D.L. Burk, 'Patenting Speech.', 79 *Texas lawReview* (2000) 99; L.J. Camp, S. Syme, 'Code as Embedded Speech, Machine and Service.', *Journal of Information, Law and Technology* (2001), available at http://elj.warwick.ac.uk/jilt/01-2/camp.html; N.A. Crain, 'Bernstein, Karn, and Junger: Constitutional Challenges to Cryptographic Regulations.', 50 *Alabama Law Review* (1999) 869; R.C. Fox, 'Old Law and New technology: The Problem of Computer Code and the First Amendment.', 49 *UCLA Law Review* (2002) 871; L. Tien, 'Publishing Software as a Speech Act.', 15 *Berkeley Technology LawJournal* (2000), available at http://www.law.berkeley.edu/journals/btlj/articles/15_2/tien/tien.html.

[5] See for a brief overview of this three layer model described in the abstract: Y. Benkler, The Political Economy of Commons, *Upgrade*, Vol.IV, No.3, June 2003, pp.6-9; or L. Lessig, *The Future of Ideas. The Fate of the Commons in a Connected World*, (New York, Random House, 2001), pp.352.

[6] The essence of each of these platforms is the platform standard for which content can be created and the user experience created by its user interface. For an excellent introduction to information platforms: P.J. Weiser, Law and Information Platforms, 1 *Journal of Telecommunications & High Technology Law* (2002), pp.1. See also J.T. Nakahata, Regulating Information Platforms: The Challenge of Rewriting Communications Regulation from the Bottom Up, 1 *Journal of Telecommunications & High Technology Law* (2002) 95; S. Semeraro, Regulating Information Platforms: The Convergence of Antitrust, *Journal of Telecommunications & High Technology Law* (2002) 143; J.B. Speta, Maintaining Competition in Information Platforms: Vertical Restrictions in Emerging Telecommunications Markets, 1 *Journal of Telecommunications & High Technology Law* (2002) 185.

society.[7] But it was drafted at a time when networks and the centrality of software platforms therein were by no means what they are today. The software industry no longer forms an industry on its own, but has become foundational to a great many other industries.

Second, with the rise of digital media on the European continent, software goods and services are gradually taking centre stage in the media sphere. This paper argues that one compelling way to redefine 'interoperability' and third party access is through the lens of the fundamental right to freedom of expression (Art.10 ECHR), and the implicit right to non-discrimination. Approaching software regulation from the viewpoint of fundamental rights forces us to acknowledge software's unique hybrid (or dual) nature as both a means for expression, and expression in its own right. The above approach might shed new light on the question whether European law strikes the right balance between granting copyright to software writers, and enabling expression in the form of software and otherwise. Overbroad copyrights will not only silence competing software programs. Indeed, the danger exists that this same copyright enables the platform owner to have extensive control on complementary expression in the form of software code, and in the form of digital content. Eventually, this approach makes us realise that the balance struck by the law ought to be about more than just software innovation.

Third, the concept of software interoperability is then the key determining factor of whether content, complementary and competing expression can be received/imparted by users. At present, the law does not differentiate sufficiently between the various types of interoperability and their respective degrees of importance. The key task of the legislator is therefore to guide the courts, to tailor the law to society's growing needs for interoperability in a digitally networked world. The place of software in society has changed; consequently the legal arsenal for obtaining interoperability ought to be re-assessed, adapted, and diversified, too.

Part II provides a brief overview of the technical and economic dimensions surrounding software interoperability. Part III discusses the particulars of European software copyright law, and outlines the constraints on copyright holders imposed by competition and communications law. Part IV concludes by highlighting the tension at the level of fundamental rights, between property and freedom of expression, by focusing on two seminal cases of the European Court on Human Rights (ECtHR): *Chassagnou* and *Appleby*.

II. Software Interoperability: A Brief Technical and Economic Overview

1. Hardware, Software, and Software Interoperability

Computer systems are built of hardware and software. Hardware is the set of physical components such as the keyboard, hard disk, and screen. Software refers to the instructions that direct a computer (i.e. computer programs). It is usually created following a series of steps: First, the sequence of operations for the computer is commonly written out in ordinary language, with the help, if necessary, of mathematical

[7] See, for instance, Recital 20 of Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society (hereinafter: 'EU Copyright Directive'); or the various EU Communications Framework Directives.

formulae and flow charts. Second, the programmer prepares a 'source program' in computer language. That language may be far removed from, or more similar to, ordinary language.[8] Finally, this source program is converted into a binary 'object code' which is machine-readable. This conversion is effectuated by the computer through a compilation.[9] Object code is nothing more than a combination of 1's and 0's indicating whether the computer is implementing a high or low voltage.[10] The object code results in a sequence of electrical impulses which cause the machine to take the action which the program is designed to achieve.[11]

Invariably, however, software needs to 'interface' or 'interoperate' with other software, and with the hardware. An applications program, such as a spreadsheet, for instance, will have to communicate with the operating system which in turn makes the hardware perform the necessary functions. The technical key to interoperability has lain in the ability of the outsider to have access to the structure of the technical interfaces of software to which a connection is desired. For the 'interface' is a set of electronic keys which, so far as structure is concerned, must be precisely emulated, in order to secure co-operation between programs.[12]

Well-known examples of critical interfaces are the application program interfaces (APIs) which enable the interaction between a given operating system and the various application programs. Many of the tasks that those various applications are designed to accomplish are similar – e.g. drawing dialog boxes, saving documents, and providing 'help' to users. Thus, a huge duplication of efforts can be prevented by writing (or 'coding') those common tasks into the operating system code. In this context, the APIs thus enable software application writers to rely on or use those tasks or lines of operating system code for their applications. Third party application providers need to have access to the APIs for achieving interoperability between the operating system and their applications, as the applications need the APIs to call upon the services provided by the operating system.[13]

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[8] People usually distinguish between low-level languages or assembly code, and high-level languages.

[9] R.C. Fox, 'Old Law and New technology: The Problem of Computer Code and the First Amendment.', 49 *UCLA Law Review* 871, p.880.

[10] S.E. Halpern, 'Harmonizing the Convergence of Medium, Expression and Functionality: A Study of Speech Interest in Computer Software.', 14 *Harvard Journal of Law & Technology* (2000) 139, at p.143.

[11] B. Fitzgerald, *supra*, at p.343; See also K.A. Moerke, 'Free Speech to a Machine? Encryption Software Source Code is Not Constitutionally Protected "Speech" Under the First Amendment', *supra*, at p.1019. Strictly speaking, content – e.g. films, music – could also be categorised as software. For the purpose of this paper, software is executable code that instructs computers in what to do. Also, commentators make a basic distinction between system software and application software. System software controls the operation of the hardware, to which it sends instructions on behalf of 'applications' fulfilling a specific user need, such as word processing. Operating systems (OS) are system software products that control the basic functions of the computer and enable users to run applications on it for performing various types of tasks.

[12] The term 'interface' has no specific technical meaning in programming. Interfaces are those features or elements of a program that are necessary for interaction between software and hardware, or between programs. What is common to them is that copying or using them may be needed in order to create interoperable programs. S. Lai, *supra*, p.213; referring to Clapes, *Software, Copyright and Competition: The "Look and Feel" of the Law* (1989), pp.181-82.

[13] See D.S. Evans, 'The Antitrust Economics of Two-sided Markets', *AEI-Brookings Joint Center for Regulatory Studies*, September 2002, available at http://aei.brookings.org/admin/pdffiles/phpMt.pdf, p.17. See also, Commission Decision COMP/C-3/37.792, *Microsoft*, 24.03.2004, Recital 38.

The distinction between interface *specifications (or protocols)* and interface *implementations* is central here. A specification is a description of what the software product must achieve, whereas the implementation relates to the actual code that will run on the computer. Protocols or specifications can be compared with a language whose syntax and vocabulary are the specifications, since the mere fact that two persons learn the syntax and the vocabulary of the same language does not mean that they will use it in the same way. That is, a specification does not define all aspects of a software system, therefore many different distinct implementations of a specification are possible. These implementations may differentiate themselves by factors like ease of use, performance or scalability, and there is room for variation and future enhancements in implementations.[14] Two programmers implementing the same protocol specifications will not write the same source code and the performances of their programs will be different. Some implementations will yield better performances than others.[15]

Application developers need very precise information on how the platform sends and receives information; that is, on the particular specifications and protocols in use. This information is not always readily available. In practice, programmers may need to use tools called 'decompilers' or 'disassemblers' in order to translate the available binary code (i.e. endless strings of noughts and ones) into a human readable format. The software developer can then derive the specifications, and build interoperable products. This is called 'reverse engineering'. Reverse engineering can be defined as the process of using a finished product and working backward to determine how it was actually made. There are many reasons why one would want to reverse engineer software. For instance, to fix bugs, to customize the program for the user's needs, to detect infringement, and to learn what others have done. The main reason however is interoperability, i.e. the most economically significant reason.[16]

The main tension in the software market is currently between closed source, on the one hand, and open source and free software, on the other. Open Source Software refers to software that is distributed with its source code, thus allowing users to easily use, copy, and distribute software, either verbatim or with modifications, either gratis or for a fee, as users deem fit. Within open source, the free software movement has clear political aims and stresses the importance of free software which, according to them, is a matter of freedom, not price; hence the famous adage "free" as in "free speech," not as in "free beer." However, the differences between those categories are small: nearly all free software is open source, and nearly all open source software is free.[17] The currently still

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[14] See the reference to the opinion of expert Professor Wirsing in Commission Decision COMP/C-3/37.792, *Microsoft*, 24.03.2004, Recital 698.

[15] K. Krechmer, E. Baskin, *Microsoft Anti-Trust Litigation - The Case for Standards*, p.8 – available at http://www.csrstds.com/WSD2000.html.

[16] P. Samuelson., S. Scotchmer, *supra*, pp.1614-1615. It should be noted here that reverse engineering does not lay bare a program's inner secrets. Indeed, it cannot. The inner secrets of a program, the real crown jewels, are embodied in the higher levels of abstraction material such as the source code. This material never survives the process of being converted to object code. See A. Johnson-Laird, Software Reverse-Engineering in the Real World, 19 *University of Dayton Law Review* (1994) 843, 843. See also R. Dixon, Breaking into Locked Rooms to Access Computer Source Code: Does the DMCA Violate a Constitutional Mandate When Technological Barriers of Access Are Applied to Software?, 8 *Virginia Journal of law & Technology* (2003), p. 2

[17] The literature concerning the growing phenomenon of open source and free software is vast. See, for instance, on http://www.ssrn.com: S. Vaidhyanathan, Open Source as Culture – Culture as Open Source; J.

dominant software paradigm is the one of closed software, which stands in stark contrast with open source software distribution. Closed software is distributed without the source code, which is thus kept secret.

2. Software Platforms: Horizontal v. Vertical Interoperability

The development of software goods and services is best conceived of as a sequence of competing information (or software) platforms. Platform software not only refers to the operating system,[18] but also to any software product that exposes APIs for use by applications. Other examples are media players, instant messengers or video game platforms. Media players are software products that are essentially able to play back audio and video content; that is to say, to understand the digital content and translate it into instructions for the hardware (for example loudspeakers or display). Digital media files are voluminous and thus compression algorithms are used to reduce the need for storage capacity. The piece of code in the media player that implements the compression/decompression algorithm is called a "codec" (coder/decoder). A media player can only play the music/video/content which is in the format for its specific codec. Media player may also exhibit APIs upon which other applications will call, in order for example, to trigger the playback of a file by the player.[19] Instant messenging software provides users with the opportunity to use the Internet for real-time communication with other users. Again, the instant messenger constitutes the platform for exchange of content, and it exposes APIs for software application developers. As concerns video game consoles, the distinction between content and applications is blurred since video games can be categorised as content and as application software.

In the digital environment, there are actually a series of such platforms that are built on top of one another. An instant messenging system, for example, builds on top of the basic Internet protocol, which can be accessed from any number of hardware devices connected to the Internet, including cell phones, TV sets, or computers. For any information platform to become successful, a sponsor of the technology must ensure a critical mass of users and a critical mass of complementary software applications.[20]

Software producers face various strategic options regarding interoperability. Some developers publish interfaces, some license them freely or against payment, and others

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Lerner, J. Tirole, The Economics of Technology Sharing: Open Source and Beyond (2004); D.S. Evans, A. Layne-Farrar, Software Patents and Open Source: The Battle over Intellectual Property Rights; S. Comino, F.M. Manenti, Free/Open Source vs Closed Source Software: Public Policies in the Software Market (July 2004); J. Bessen, Open Source Software: Free Provision of Complex Public Goods (August 2004).

[18] For instance, current digital television platforms rely on a basic operating system and a set of APIs that interacts with digital content and interactive applications for digital television.

[19] One type of software that may need to interface with any given software platform is a digital rights management system (DRM). Because digital files (software and content) can be reproduced without degradation in quality, there is a heightened danger that they could be unlawfully reproduced and distributed over the networks. DRM systems seek to prevent this by hardwiring the contractual conditions for sale of digital content into the technology. The digital materials are protected before being made available to the users. The users who want to access protected materials will need to present some form of key which is evidence of the fact that they lawfully acquired the files. A platform needs to support a given DRM technology in order to interact with a file which has been protected by this specific DRM technology.

[20] P.J.Weiser, Law and Information Platforms, 1 *Journal of Telecommunications & High Technology Law* (2002), p.3.

maintain their APIs as closely held trade secrets. Firms may choose to keep their interfaces closed as a defensive measure, but also offensively as a means for capturing the market. Either complements are developed in-house, or the licence agreement with third party software producers includes a condition of exclusivity. Proprietary interfaces give the developer considerable control over interoperability with a given platform.[21]

The usefulness of the information platform concept lies in the fact that it enables us to distinguish, in principle, between *vertical* and *horizontal* interoperability. In the example of instant messenging systems, vertical access would be between an applications provider – e.g. a firm that uses instant messenging systems for a software application that reminds people of important firm meetings – and the platform owner. Horizontal access, then, would be between rival information platforms. Horizontal interoperability is achieved by 'porting' the APIs or relevant interfaces to various operating systems or platforms. This way an application can function on a set of different platforms through the same API.[22] In addition, the platform metaphor offers a good insight into the way the various *laws* interact in their respective missions. The difference with classic tangible platforms such as, for instance, cable networks, is that software platforms are built of information. Consequently, their regulation inherently implicates intellectual property, and the right to freedom of expression provides one judicial check on whether software copyright law strikes the right balance between private and public interests in software creation.

3. The Platform Operator's Stranglehold

Reverse engineering may erode platform operators' market power by facilitating unlicensed entry or by including licensing on terms more favourable to the licencee than if the reverse engineering were prohibited. The video game industry, for instance, was the battleground for many of the recent US cases focused on access to an information platform via reverse engineering. Most of these cases were about vertical access. That is, competing manufacturers of games wanted to copy the protected standard as part of a reverse engineering process to ensure that their games would work on the system.[23] A second set of cases involves horizontal access. Here the entrant wants to ensure that its system is compatible with an established one so that the games developed for one console can be played on its own platform.[24]

However, because decompilation and disassembly are time-consuming and resource-intensive, these forms of reverse engineering do not significantly undermine incentives to invest in the platform. Successful reverse engineering appears to hinge on the sheer

[21] As a number of economists have explained, how rival and complementary platforms are able to relate to one another in economic terms depends a great deal on the concept of interoperability. See, for instance, S.M. Besen, J. Farrell, Choosing How to Compete: Strategies and Tactics in Standardisation, 8 *Journal of Economics Perspectives* (1994), p.117.

[22] *Commission Microsoft Decision*, supra, recitals 40-41. One other manner for achieving horizontal interoperability is through the so-called java virtual machine developed by Sun Microsystems. As soon as a computer implements the Java specifications, applications written to the Java platform can run on it, irrespective of the underlying hardware or OS – write once, run everywhere

[23] The seminal case is of course *Sega v Accolade*, 977 F.2d 1510 (1992) (upholding as a fair use reverse engineering efforts of consoles to ensure compatibility of videogames).

[24] For an important recent example in the US: *Sony Computer Entertainment v. Connectix Corp.*, 203 F.3d 596 (2000) (addressing horizontal access through reverse engineering that led to the creation of an emulator that played Sony PlayStation Games on a computer).

volume of code that is involved.[25] For instance, Microsoft's operating system interfaces have become more and more complex over time. This has undermined competing applications (e.g. the Netscape browser). But even reverse engineering a less comprehensive set of interfaces will usually encounter the difficulty of locating the adequate points of connection.[26] And even if one market player were successful in this venture, this will always take some time. The time lag will give the platform operator a significant competitive advantage over its competitors.[27]

In addition, countering reverse engineering efforts may be a strategic choice. Players like Microsoft have responded aggresively to innovations with the potential to become alternative platforms to Windows, such as the Java programming language, which opened up new opportunities for evolution of new platforms, such as browser software, for which applications could be written. If dominant platforms regularly change their operating system interfaces, competitors would have to reverse engineer each new program to maintain compatibility.[28] Thus, Novell had problems with changes effectuated by Microsoft on a piece of code that was critical in order to enable its product to interoperate with the PC OS. In failing to disclose the extensions it makes, some of the functionality will not be available on competing platforms.[29] Platform operators can also prevent horizontal interoperability by propertising (or splitting) the standard. Even when Microsoft uses industry standards, it sometimes extends these standards in a proprietary fashion. Microsoft's development of its own proprietary version of Java essentially allowed it to destroy the cross platform compatibility of the Java platform.[30]

Reverse engineering is therefore at present an inherently unstable basis for a business model. This is especially so as regards *horizontal interoperability*: horizontal interoperability is made even more difficult due to the so-called applications barrier to entry. Although in theory possible, it would be extremely difficult, time-consuming, risky and expensive to develop an alternative client PC operating system, with a priori no application able to run on it, because users are very unlikely to buy an operating system without a wide range of applications already available, tested and used by other people. In order for a new operating system to enter the market, it would need to be able to interoperate with the existing body of applications that interoperat with the Windows operating system platform. At the same time, new application providers will write for the

[25] For smaller and less established platforms reverse engineering might sometimes be a viable solution. In 2002, Realnetworks, which produces an application that enables Internet users to view digital content (music or video), announced that it had reverse engineered Microsoft's rival Windows Media Player. This way it was able to ensure that users could use the RealPlayer for any content developed for the Media Player. P.J. Weiser, *supra*, p.552.

[26] M.A. Lemley, D. McGowan, Legal Implications of Network Economic Effects, 86 *California Law Review* (1998), p.527.

[27] For instance, the Samba server software producer is more than one generation late in the reverse engineering of windows interfaces. Furthermore, success depends on the platform operator not changing the code; this could easily be done, even through legitimate upgrading of the code.

[28] M.A. Lemley, D. McGowan, Legal Implications of Network Economic Effects, 86 *California Law Review* (1998), pp.527-28.

[29] Commission Decision – *Microsoft*, *supra*, recitals 681 and 248.

[30] A. Ottolia, D. Wielsch, Mapping the Information Environment: Legal Aspects of Modularization and Digitalization, 6 *Yale Journal of Law & Technology* (2004), p.174 ff.

dominant platform, hence reinforcing its dominance.[31] For example, the compatibility of content and applications with a specific media player constitute in their own right significant competitive factors. They help drive the media player which in turn drives the uptake of the underlying technology, including supported codecs, formats, and media server software.[32] In networks markets, where a single standard emerges as dominant, economists suggest that the market has 'tipped' to a particular product. This tipping phenomenon indicates that a sufficient mass of users have adopted it. Tipping means that a single interface succeeds in becoming the standard in the market.[33]

By contrast, *vertical interoperability*, or disclosure of interface information to applications providers for a given platform, will thus generally be less of a problem. This is because, as a complementary good, applications will add value to the platform. There are strong incentives to produce applications for any platform, irrespective of whether the interfaces are open or closed.[34] Thus, while the various providers of Instant Messengers – e.g. AOL, Yahoo!, Microsoft – have not yet made their platforms *horizontally* interoperable,[35] they acts quite favourably toward companies that provide complementary applications for their instant messenging systems, providing application providers with royalty free access to their system. The same is true for content producers. For instance, the use of the Windows media player codecs in a product is subject to a license fee.

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[31] For instance, Microsoft Windows applications are developed to use and rely on the Win32 API. Microsoft does not publicly disclose the specifications for the Win32 API and it would thus be necessary to reverse engineer the relevant specifications. The Win32 API set alone, for example, includes over 2500 separate interfaces, each of which implicates a series of actions which take place somewhere within the over 40 million lines of compiled source code that makes up the Windows OS. Likewise, the ubiquity of the Windows Media Player means that most software and content providers will make their products for the media player platform. If software developers can get nearly full coverage by writing for one specific media player, they will not incur the expense of writing to other media players. Likewise, content providers select the dominant technology (for example codecs, file formats, DRM) for encoding their content for access by end-users. Since supporting many different technologies generates additional costs, content providers generally stick with one technology.

[32] To be sure, the platform holders' stranglehold on software and content is increasingly strengthened via the use of DRM-type tools, mainly encryption. Indeed, DRM induces further vertical integration. For instance, through the Secure Digital Music Initiative it is possible to leverage market power to other stages of the value chain. The watermark must be detected by software in the player before the music can be heard. In this example, the combination of players and content becomes a "system" much like the OS and applications; see P. Samuelson, S. Scotchmer, *supra*, p.1645.

[33] P.J. Weiser, *supra*, p.575.

[34] In economic jargon, such platforms are called two-sided markets. Platform owners generally drive demand for the platform by having applications built for the platform. Complements in such two-sided markets are much more essential, because offering the complement is the only manner to solve the chicken-and-egg problem. Although two-sided markets theory is related to vertical integration and network effects, it differs markedly from vertical restraints theory in certain respects. Economists are only beginning to research the possible implications of this fact. See J-C. Rochet, J. Tirole, 'Defining Two-Sided Markets.', *Submission for Toulouse Conference on The Economics of Two-Sided Markets*, January 15, 2004, pp.23-25; M. Armstrong, 'Competition in Two-Sided Markets.', October 2002, available at http://www.econ.ucl.ac.uk/downloads/armstrong/venice.pdf, J-C. Rochet, J. Tirole, 'Platform Competition in Two-Sided Markets.', *Journal of the European Economic Association* (2003), pp.990-1029; D.S. Evans, 'The Antitrust Economics of Multi-Sided Platform Markets.', 20 *Yale Journal on Regulation* (2003), pp.325-381.

[35] Apparently other platform owners have adopted similar strategies of facilitating third party developer access to their interfaces, although this often involves the payment of licence fees to the company or industry groups that own the technology.

But even vertical interoperability will not be self-evident in every situation. Some application providers may be denied access to a given platform depending on the applications they seek to provide. This is because, in the software environment, specific functionalities are not located at particular place of the value chain. Media players constitute excellent examples. For the moment media players are no substitute to the client operating system, because only limited purpose programs can be written for a media player's APIs. But in the long run, it cannot be excluded that there would be incentives in the future to expand the availability of APIs on media player platforms that would take some of the functionalities of the operating system. Likewise, middleware such as Java in combination with a media player could in fact be a general purpose platform substitute today.

This extended control over new software platforms may in turn reinforce control over existing critical infrastructure. For instance, by integrating the media player into its Windows operating system, Microsoft might well seek to reinforce its dominance in the client operating system market, as users gradually consider it an integral part of the client operating system. Control over the media player facilitates control over the operating system, as it prevents entry in the operating system market. This is because competing operating system vendors would need to have access to the specific media player technology in order to compete with the Windows platform.[36]

In sum, in the computer world, the proprietary model relies on the ability of software firms to maintain close control over the APIs of the programs they develop. Control over these interfaces enables the platform owner to maintain control over its platforms both defensively as well as offensively.[37] The dominant strategy for software platforms thus appears to be to prevent horizontal interoperability and to induce vertical interoperability in the majority of cases. However, even vertical interoperability will be hampered by a platform operator if the complementary software program has the potential to become a platform. Reverse engineering does not appear to be a sufficient counterweight to platform dominance.

However, the particular intellectual property regime is a factor to take into account too in this context. If players are unable to prevent third party software providers from achieving interoperability through technical means, they may well turn to legal tools – intellectual property – as a means of defeating interoperability. On the other hand, a legal regime which is very lenient for reverse engineering may provide a quasi-compulsory licence to a platform. By allowing access to a standard, intellectual property law creates an incentive for the standard bearer to licence its product to rivals at an amount equal to the cost of reverse engineering the platform standard.[38]

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[36] The media player is in fact a strategic gateway to a range of related markets such as content encoding, format licencing, wireless information device software, DRM solutions and music delivery. See *Commission Decision*., recitals 972-75.

[37] In *US v. Microsoft*, the government forcefully made that point: "to control the APIs is to control the industry". *United States v. Microsoft*, 65 F.Supp.2d (1999) 1, at p.15.

[38] In fact, the price will normally be a little higher than that because the platform owner has valuable specification information above and beyond access to the technical interface itself. A. Gawer, M.A. Cusumano, Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation, (2002), pp.100-103.

III. The Legal Regulation of Software Interoperability in the Communications Sector

Copyright law defines the scope of a provider's control over a platform. Communications law and competition law determine whether, when and how access to a platform should be granted. Finally, the right to freedom of expression provides a judicial check on the interaction of those bodies of law.

1. Copyright Law & Control through Technological Protection Measures

The 1991 Software Directive aimed to remove barriers to trade between EU Member States, and requires them to introduce copyright protection for writers of software programs.[39] It is a compromise solution resulting from intense lobbying efforts from, and heated debates between, *inter alia* ultra-protectionists (i.e. big software companies), and proponents of the free software foundation.[40] The final text did not provide for total harmonisation but left some room for Member States to use their discretionary powers in the light of subsidiarity where such national measures do not affect the proper functioning of the internal market.[41]

The Directive confers software writers very strong legal claims. The definition of computer program is very broad, including preparatory materials and computer programs fixed in hardware (Art.1). The rightholder is entitled to restrict the unauthorized permanent or temporary reproduction in part or in whole; the translation, adaptation, arrangement and any other alteration; as well as any form of distribution of the program or copies thereof (Art.4).

The most important exception is the permissibility to decompile a program in order to make it interoperable with other programs (Art.6).[42] The law allows competing software writers to reverse engineer software programs without the authorization of the copyright holder where reproduction of the code and translation of its form are indispensable to obtain the information necessary to achieve the interoperability of an independently created computer program with other programs.[43] The Directive itself defines

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[39] The Directive is generally recognised to have been influenced by the result of the early IBM competition law case.Case 60/81, *IBM v. Commission* [1981] ECR 2639. See T. Dreier, The Council Directive of 14 May 1991 on the Legal Protection of Computer Programs, 19 *European Intellectual Property Review* (1991), p.323.

[40] See Directive 91/250/EEC of 14 May 1991 on the Legal Protection of Computer Programs (as amended by Directive 93/98/EEC), *O.J.* 17 May 1991, L.122/42. See, for a discussion of this debate on software innovation in the EU: J. Band, M. Katoh, *Interfaces on Trial. Intellectual Property and Interoperability in the Global Software Industry* (Oxford, Westview Press, 1995), pp.369.

[41] Report from the Commission to the Council, European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM(2000)199 final, p.4.

[42] The Directive also gives persons who have the right to use a copy of the program the basic right to observe, study or test the functioning of that program in order to determine the ideas and principles which underlie any element of the program (Art.5(3)).

[43] Indeed, a number of proposals for introducing a requirement that third party programmers should request the necessary information prior to engaging in decompilation were rejected. See S. Lai, *supra*, p.101. Note also that there is no exception as concerns programs which would compete with the decompiled program. See T. Dreier, The Council Directive of 14 May 1991 on the Legal Protection of Computer Programs, 19 *European Intellectual Property Review* (1991), p.323.

'interoperability' very broadly as functional interconnection and interaction, as required to permit all elements of software and hardware to work with other software and hardware and with users in all the ways in which they are intended to function; or the ability to exchange information and mutually to use the information which has been exchanged.[44]

The conditions for permissible reverse engineering are that (a) reverse engineering acts are performed by the licensee or by another person having a right to use a copy of a program, or on their behalf by a person authorised to do so; (b) the information necessary to achieve interoperability has not previously been readily available to them; and (c) these acts are confined to the parts of the original program which are necessary to achieve interoperability (Art.6(1)). Art.6(2) furthermore provides that the information thus obtained may only be used for the latter purpose; and may not be disclosed to other program providers except where necessary for the interoperability of his independently created program. This provision was the subject of intense debate and, according to the Commission, it resulted in a pragmatic compromise which has the effect in practice that the information required for establishing interoperability is made available.[45]

By far the most important recent development is the extension of copyright in the realm of technical protection measures. The 2001 EU Copyright Directive seeks to provide for harmonised legal protection against circumvention of such effective technological measures and against the intentional manufacture or provision of devices and products or services to this effect.[46] The risk existed that copyright law could thus give protection to technical protection measures implemented with a view to precluding software interoperability. As a result, the Directive states that it should neither inhibit nor prevent the development or use of any means of circumventing a technological measure that is necessary to enable rightful users to study, observe or test a computer program, or to decompile a computer program with the aim of achieving interoperability.[47] Nevertheless, some US cases already provide indications that market players may seek to

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[44] Software Directive, Recitals 10-12. In contrast, interoperability in the DTV market, for instance, is often used in a more narrow sense (i.e. *horizontal* interoperability). It has been taken to mean the disappearing of authoring costs (which would be incurred in translating applications from the API for which they were written to another) or the situation in which any application can be run on any STB middleware and APIs. See OXERA, '*Study on Interoperability, Service Diversity and Business Models in Digital Broadcasting Markets*.', February 2003, pp.6-7.

[45] It is generally the provision which was implemented to the fullest extent by the Member States. Most implementations are verbatim. See C.M. Guillou, The Reverse Engineering of Computer Software in Europe and the United States: A Comparative Approach, 22 *Columbia Journal of Law and the Arts* (1998), p.550. See also Report from the Commission to the Council, European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM(2000)199 final, p.4.

[46] The EU Copyright Directive (EUCD) aims to adapt and supplement the current law on copyright and related rights to respond adequately to economic realities such as new forms of exploitation. See Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society. See in particular Recital 5, Recital 47 and 48.

[47] See Recital 50. Recital 54 furthermore encourages standardisation, compatibility and interoperability of the different systems. See for general discussion of the Directive: B.W. Esler, Protecting the Protection: A Trans-Atlantic Analysis of the Emerging Right to Technological Self-Help, 43 *IDEA* (2003) 553; A.M. Casellati, The Evolution of Art.6.4. of the European Information Society Copyright Directive, 24 *Columbia Journal of Law and the Arts* (2001) 369.

use anti-circumvention legislation as a means to defeat software (and hardware) interoperability.[48]

2. The "Essential Facilities" Doctrine & The EU Communications Framework

The software copyright regime is itself constrained by communications and competition law in digital networks. The most relevant competition law cases are the ones on refusals to supply and essential facilities. Indeed, in theory competition law could be be used to force access to software interfaces, provided that there is dominance and that this dominance is being abused.[49] A widespread view is that competition authorities and courts should show great deference, in the interest of innovation.[50] This is because it is feared that allowing too easy access to essential facilities will hamper innovation. In this view, firms are less likely to innovate if third party can obtain fair, reasonable and non-discriminatory (FRND) access by means of competition law. The conditions laid down by the ECJ for granting FRND access are rather stringent; namely that (i) the refusal to supply is likely to eliminate all competition in the downstream market, (ii) that such refusal could not be objectively justified and (iii) that there is no actual or potential substitute. The key elements of the third criterion are thus that access is genuinely indispensable; it is not possible practically to replicate the facility; even by an undertaking of the same size and resources as the holder of the facility.[51]

The emphasis in competition law is clearly on innovation. Most recently, for instance, in the *IMS Health* litigation, the Commission compelled IMS Health to grant its competitor NDC Health a licence to its so-called 'brick structure.' Both players provide data on regional sales of pharmaceutical products in Germany. IMS's copyright protected brick structure for presenting those data, consisting of 1860 bricks corresponding to a designated geographic area, had become the de facto industry standard. The ECJ found that such a refusal to supply an undertaking with access to an essential facility is only anti-competitive provided that the undertaking requesting access does not intend to limit

[48] See *Chamberlain Group Inc v Skylink Technologies Inc*, 381 F3d 1178 (Fed Cir 2004) (considering garage door openers); *Lexmark International Inc v Static Control Components Inc*, 387 F.3d 522 (6th Cir 2004) (addressing locks between printers and toner cartridges). See R.C. Picker, *Copyright and the DMCA: Market Locks and Technological Contracts*, March 2005, available at http://ssrn.com/abstract_id= 690901

[49] This was, for instance, the case in *IBM*, where the Commission had taken a preliminary view that IBM was abusing its dominant position in the data processing (hardware) market by, in part, refusing to supply sufficient technical information to its competitors for them to be able to compete in the associated market for interconnected (software) products/services; see Case 60/81, *IBM v. Commission* [1981] ECR 2639. The case was never decided: in the IBM Undertaking, IBM agreed to supply the necessary interface information; see Undertaking given by IBM, *Bull EC* 10-1984, pp.96-103.

[50] Apparently, many commentators advocate even greater deference in the case of intellectual property rights. See for a convincing criticism: C. Ritter, Refusal to Deal and "Essential Facilities": Does Intellectual Property Require Special Deference Compared to Tangible Property?, (forthcoming) *World Competition*, September 2005. See for a good overview of the application of antitrust law to software: A. Chin, Antitrust Analysis In Software Product Markets: A First Principles Approach, 18 *Harvard Journal of Law and Technology* (2004) p.1.

[51] Case C-7/97, *Oscar Bronner* [1998] ECR I-7791, para.44; opinion AG Jacobs, paras.65-66. The first two conditions can be found in earlier cases on refusals to supply (e.g. Case 311/84, *CBEM v. CLT & IPB (Telemarketing)* [1985] ECR 3261; Case 18/88, *RTT v. GB-Inno-BM* [1991] ECR I-5941), the third condition is the most stringent one and comes from *Ladbroke*, a case concerning IPRs. See Case T-504/93, *Tiercé Ladbroke SA v. Commission* [1997] ECR II-0923, see para.131.

itself essentially to duplicating the goods already offered by the holder of the facility. It needs to show that it has the intention to produce *new* goods or services, for which there is a potential customer demand.[52]

As for communications law, the Commission introduced a completely new legal framework for electronic communications. The 2002 New Framework consists of a limited number of Directives deemed to facilitate 'the convergence' of the computing, telecommunications and broadcasting industries.[53] The Framework relies heavily on the competition law methodology. That is, it includes an obligation for the Commission and the national regulatory authorities to carry out regular market reviews; the aim being that regulation *only* be imposed in case the market is not effectively competitive. A market is not effectively competitive if there exists on that market one or more players with significant market power (SMP). The concept of SMP in the existing regulatory framework has been re-defined in the new regime so that it equates to the competition law concept of 'dominance.'

Nevertheless, '[t]he separation between the regulation of transmission and the regulation of content does not prejudice the taking into account of the links existing between them, in particular in order to guarantee media pluralism, cultural diversity and consumer protection.'[54] In practice, a number of exceptions to the above methodology were introduced with regard to the broadcasting sector.[55] For instance, fair, reasonable and non-discriminatory access conditions may be applied to APIs for digital television

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[52] Case C-418/01, *IMS Health* (29.04.2004), para.49. See also Case T-184/01 R, *IMS Health Inc. v. Commission*, 26 October 2001, paras.78-81 and para.105. See, finally, Commission Decision COMP D3/38.044 - *NDC Health/IMS Health*, OJ [2002] L59/18. The same emphasis on the 'innovative nature' of the product in question can be found in Joined Cases C-241/91 P and C-242/91 P, *RTE and ITP v. Commission (Magill)* [1995] ECR I-743.

[53] Indeed, due to digitisation, it is increasingly difficult to distinguish those three industries, and the Framework is the world's first regulatory model to attempt to put the law in line with technology, by introducing a so-called layered model, with a basic divide between 'content' and 'infrastructure' – instead of the classic vertically segmented regulatory model which distinguished between broadcasting, telecommunications and computing. In particular, the new framework includes the following Directives (formally adopted on 7 March 2002): Directive 2002/21/EC on a Common Regulatory Framework for Electronic Communications Networks and Services ('*The Framework Directive*' – FD), *O.J.* [2002] L.108/33; Directive 2002/20/EC on the Authorisation of Electronic Communications Networks and Services ('*The Authorisation Directive*' – AD), *O.J.* [2002] L.108/21; Directive 2002/19/EC on Access to, and Interconnection of, Electronic Communications Networks and Associated Facilities ('*The Access and Interconnection Directive*' – AID), *O.J.* [2002] L.108/7; Directive 2002/22/EC on Universal Service and Users Rights Relating to Electronic Communications Networks and Services ('*The Universal Service Directive*' – USD), *O.J.* [2002] L108/51; Directive 2002/58/EC on Privacy and Electronic Communications ('*The Data Protection Directive*' – DPD), *O.J.* [2002] L.201/37. These Directives are effective on the day of publication in the *Official Journal*, namely 24 April 2002. See for an excellent overview of the framework: S. Farr, V. Oakley, *EU Communications Law.* (Bembridge, Palladian Law Publishing, 2002), pp.195.

[54] See Directive 2002/21 on a Common Regulatory Framework for Electronic Communications Networks and Services ('The Framework Directive'), OJ [2002] L108/33, Recital No.5.

[55] Broadcasting is defined as the transmission by wire or over the air, including that by satellite, in unencoded or encoded form, of television programmes, consisting wholly or mainly in visual images, sounds or other information, and intended for reception by the public. See Directive 89/552/EEC of 3 October 1989 on the Coordination of Certain Provisions laid down by Law, Regulation or Administrative Action in Member States Concerning the Pursuit of Television Broadcasting Activities, O.J. L.298/23 of 17 October 1989 (hereinafter: TVWF Directive).

irrespective of whether there is SMP. Indeed, access to APIs controlled by non-SMP operators may in particular be imposed on operators to provide access to EPGs and APIs on a FRND basis, to the extent that this is necessary to ensure accessibility for end users to specified digital radio and TV broadcasting services (*vertical interoperability*).[56]

There are also a number of initiatives toward standardisation of essential interfaces (*horizontal interoperability*). First, the Commission has the legal duty to publish a list of standards and specifications whose adoption ought to be 'encouraged' by the MS when the standard is not mandatory. This provision seeks to ensure interoperability of services and to improve freedom of choice for users.[57] Second, Art.18 FD encourages the use of an open API, whose ultimate goal is to enable consumers to receive DTV services notwithstanding the transmission mode.[58]

3. Pursuing Efficiency and Software Innovation?

The classic concern in intellectual property law is the trade off between private and public interests in software creations. That is, copyright in software is meant to incentivise the production of computer programs. At the same time, copyright protection should not be so inhibitive as to prevent subsequent innovations in software production. The law should strike the right balance between the private and public interests in software creation.

A striking fact is the absence of any originality requirement in the Software Directive. The text itself contains no clear definition of the originality requirement, but the Commission clarified the fact that the only requirement for copyright protection is that '[t]he program must be the own intellectual creation of its author. No other criteria are allowed.'[59] Apparently one may not even decompile a program to learn from it, not even if one has the intention of subsequently making a program which would interoperate with the decompiled program.[60] This is very worrying for innovation in the software sector because a significant source of consistency between programs arises out of programming practices and techniques that have become widely used and accepted in the computer software industry. Most programmers rely on a number of traditional solutions to recurring problems in their programming. Standard programming techniques are as much

[56] See article 5(1)(b) Annex I, Part 2, AID. See S. Farr, V. Oakley, *supra*, p.116. Broadcasters are also to be granted fair, reasonable and non-discriminatory access to the so-called conditional access system, irrespective of whether a given operator has SMP.
[57] See Art.17 FD for a list of standards
[58] The most prominent open standard is the Multimedia Home Platform (MHP). See European Commission, *Staff Working Paper on the Interoperability of Digital Interactive Television Services*., SEC(2004)346, 18th March 2004, pp.38.
[59] Report from the Commission to the Council, European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM(2000)199 final, p.4.
[60] Indeed, the Swedish implementation gave rise to objections. This is because the phrase "independently created program" was missing. The Commission reasoned that these words were necessary to prevent decompilation of a target program before the independently created program existed. Report from the Commission to the Council, European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM(2000)199 final, p.9.

the stock element of computer programming as are the common themes, incidents and plot elements referred to in traditional literary cases.[61]

Such a low threshold should be seen in the same vein as practical difficulties in reverse engineering software programs. The Directive undoubtedly provides for a very circumscribed right for third party programmers to try and obtain interface information through reverse analysis. As explained above, this right to reverse engineer a program is limited to certain well-defined *purposes* (obtaining interoperable products), *circumstances* (indispensability; unavailability; being a licensee or authorised person; and confined to the interface) and *uses* (obtaining interoperability, even when it is about disclosing the information to others; not for marketing substantially similar programs).[62] Hence, interoperability depends primarily on copyright holders' willingness. This is so, first, because they may decide to whom they will disclose relevant interface information and at what price;[63] second, software providers may only undertake reverse analysis provided they are the copyright holder's licensees or authorised users; finally, interface disclosure to third parties is limited to achieving interoperability between the decompiler's and the other third party's program.

In theory, once intellectual property is clear, parties should be able to agree on a reasonable licence for access to platform standards. But transaction costs and imperfect information may well prevent many such resolutions from taking place. And indeed, interested parties must grapple with much uncertainty and inconsistency. There is insufficient guidance concerning the concept of "interoperability", despite the fact that interoperability is the threshold criterion for determining whether the act of decompilation is to be sanctioned.

The term interoperability can be used by technicians in various contexts and with various meanings – there is a wide array of different *types* of interoperability.[64] As explained above, one might distinguish vertical and horizontal interoperability. That is, one may want to introduce different legal regimes for reverse engineering interfaces between applications and OS and for reverse engineering aimed at enabling interoperation between applications.[65] There might be a need to consider whether or not to distinguish between vertical interoperability between a platform and an application, or between a platform and content. Also, there are at least three distinct types of horizontal interoperability. There is the interoperability between platforms or their ability to run the same application software (e.g. the ability of one OS to run the applications that are

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[61] R. Dixon, Breaking into Locked Rooms to Access Computer Source Code: Does the DMCA Violate a Constitutional Mandate When Technological Barriers of Access Are Applied to Software?, 8 *Virginia Journal of law & Technology* (2003), p.7.

[62] Of course, even when falling within the ambit of the exception, software reverse engineering (interface research) has rightly been described a "lengthy, costly and inefficient procedure." See the Commission's Explanatory Memorandum to the Software Directive, *O.J.* C.91/7, para.3.41; cited in S.Lai, *supra*, p.101.

[63] In the initial stages, it was not clear that payment could be demanded for the provision of interface information. For opposing views, see Czarnota and Hart, *Legal Protection of Computer Programs in Europe – A Guide to the EC Directive* (1991), at p.80 (concluding that payment could be demanded) and Dreier, 'The Council Directive of 14 May 1991 on the Legal Protection of Computer Programs' [1991] 19 *EIPR* 319, at 324 (who seems to conclude that no payment could be demanded).

[64] Commission Decision COMP/C-3/37.792, *Microsoft*, 24.03.2004, recital 32.

[65] See, for instance, J.A. Andrews, Reversing Copyright Misuse: Enforcing Contractual Prohibitions on Software Reverse Engineering, *Houston Law Review* (2004), p.1011.

produced for another OS); the horizontal interoperability between applications (e.g. the ability of one application to decipher the data or information that is meant to be viewed, using another application); finally, the latter type of interoperability implies some interoperability at the level of the user interface (i.e. toolbars, menus, etc.).[66]

In addition, some conditions for lawfully decompiling a program are not in line with real world practices. First, it is not possible, practically speaking, to confine one's decompilation acts to the interfaces; the entire program needs to be decompiled.[67] Second, there is no way to find out whether the purpose of the decompiler was to obtain interoperability, if he does not get the information through licencing and engages in decompilation. Finally, it is disputable whether or not the information is 'readily available', and thus reverse engineering necessary. This is because interoperability exists in various *degrees*. For instance, in the on-going *Microsoft* case, the court acknowledged that there is a disagreement between the commission and Microsoft as to the level of interoperability required. This is closely linked to the type of *information* that software providers disclose in order to enable other providers to make their products interoperable. To use the Directive's own terms, when is the information necessary for interoperability readily available?[68] Hence, a software developer may be willing to licence a minimal amount of information, but not enough to make the program fully interoperable. The licencing price that is fair for one party mught not be fair to the other. In sum, the necessity based rule in the Software Directive is largely nonsensical given that the software developer would not incur the huge costs of decompilation if the information were already available.

This cost is increasing as a result of the growing use of anti-cicrumvention tools preventing reverse engineering. Companies increasingly use encryption technology and digital locks in an arms race to make it more difficult for rivals to gain access to their protected standard.[69] This comes in addition to the fact that there are few economic incentives for independent software writers to engage in the costly and time-consuming process of reverse engineering in the absence of some right to licence interface information to third parties, as a means for recouping the costs of reverse engineering.

The most obvious criticism is thus that the low originality threshold, combined with the legal uncertainty of the Software Directive threatens to undermine the careful balance that characterises good intellectual property legislation. The bottom line is however that

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[66] Note that this paper does not address the issue of interoperability at the user-end (i.e. of user interfaces – scroll-down menus, toolbars, etc.).

[67] C.M. Guillou, *supra*, p.544.

[68] Sometimes there is more than one way of obtaining interoperability. Microsoft gives a number of examples of how to achieve interoperability between server OS supplied by different vendors. See *Microsoft* Interim Decision, para.100. Microsoft argued that the concept of interoperability of the 1991 Directive is one-way. That is, Microsoft is of the view that sufficient information needs to be supplied to allow the third party's program to reach its own full functionality. The Commission refutes these contentions and claims that it is about the proper functioning and fulfilment of the full functionality of *all* the programs involved. The word inter-operability by its very nature relates to a two-way relationship. The Directive implies this in the preamble in that it includes the words "mutually", "work together", and "computer system". Commission Decision *Microsoft*, recital 33.

[69] For a technical explanation: M. Hecht, Reconciling Software Technology and Anti-Circumvention Provisions in the Digital Millenium Copyright Act, *UCLA Journal of Law and Technology* (2004), pp.12-14.

the private player who controls a software platform gathers tremendous power through control of relevant interfaces. Even if the competitor achieves interoperability, the interoperation might not be of the same quality as the platform owner's own product. The power is eventually the power to decide how well and when the other can speak in the form of software. Even in allowing expression, private players decide how this expression will be connected to their software. This is because they decide which information is available to the other software providers. It is like allowing people having opposing views access to the agora but only at certain hours of the day, when everyone is sleeping.

The question must, in other words, be posed whether the balance struck in the field of intellectual property (i.e. the balance between inducing private players' software creations, and ensuring that society at large benefits from this) is also, by the same token, convincing from a fundamental rights point of view (i.e. the balance between individual expression and the public interest in restraining/inducing expression). The issue can be reframed as a tension between the fundamental right to freedom of expression (Art.10 ECHR) and the fundamental right to property (Art.1, 1st Protocol ECHR).

IV. Software Interoperability & Fundamental Rights

1. Software as Private Property & Tension with Freedom of Expression

The European Court of Human Rights (ECtHR) has held many times that "[t]he Convention is a living instrument, to be interpreted in the light of present-day conditions."[70] The ECtHR takes technological reality into account.[71] As more and more communication is taking place via digital communications networks, existing software regulation ought to be re-considered in the light of those changing circumstances. Sooner or later, European courts will face the issue regarding the constitutionality of (some form of) software regulation in light of the right to freedom of expression, as enshrined in Art.10 of the European Convention on Human Rights (ECHR).[72]

Likewise, the fundamental right to property is clearly relevant to the issue of software copyright.[73] Software copyright law grants copyright holders the right to peaceful

[70] See, among other cases, *Airey v Ireland*, judgment of 9 October 1979, Series A, no.32, pp.14-16, para.26; *Loizidou v. Turkey*, judgment of 23 March 1995, Series A, no.310, pp.26-27, para.71.

[71] In *Tele 1*, for instance, it reiterated the key importance of technical progress made over the last decades in the broadcasting context – notably the vanishing spectrum scarcity. *Tele 1 Privatfernsehgesellschaft v. Austria*, Judgment of 21st September 2000, para.38.

[72] That provision reads as follows: "(1) [e]veryone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers. This article shall not prevent states from requiring the licensing of broadcasting, television or cinema enterprises. (2) The exercise of these freedoms, since it carries with it duties and responsibilities, may be subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society, in the interest of national security, territorial integrity, or public safety, for the prevention of disorder or crime, for the protection of health or morals, for the protection of the reputation or rights of others, for preventing the disclosure of information received in confidence, or for maintaining the authority and impartiality of the judiciary."

[73] This provision provides that "(1)[e]very natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the public interest and subject to the conditions provided for by law and by the general principles of international law. (2) The preceding

enjoyment of their property over a software creation, and the provision is applicable to all kinds of 'goods'. A law interfering with a person's property right must satisfy three conditions. First, any deprivation must be in line with national and international law. Second, it must be in the public or general interest.[74] Third, even if the two above conditions are fulfilled, the ECtHR will still scrutinise whether the interference in question strikes a proper balance between the demands of the interests of the whole community and those of the individual who is deprived of the peaceful enjoyment of her property.[75]

First, it is not clear at all whether regulating access to a software platform constitutes a taking. It could be argued that the software platform is not left without meaningful use, and that access regulations merely amount to control of the use of the platform by the platform operator.[76] On the other hand, one could also hold the view that access regulations deprive the platform operator of revenues, and in this sense constitutes a taking.[77] However, either way, software copyright will be considered to be in the public interest. The court leaves States a wide margin of appreciation when considering whether a fair balance was struck. The importance of the public interest will weigh in the balance. The particular field of the regulations is very relevant here.[78] Software regulation will no doubt play an increasingly important role in social and economic policies. The issue of compensation is also critical: if compensation is offered, the measure is more likely to be considered proportionate by the ECtHR.[79]

There is a clash between intellectual property rights, and the right to freedom of expression. If the State grants someone a temporary monopoly over a given expression, every expression of this information or ideas is constrained by it during that lapse of time. The same potential clash (between private property and freedom of expression) exists with respect to software. Software copyright constrains the expression of complementary or competing expression that is dependent on the expression for which that temporal

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provisions shall not, however, in any way impair the right of a State to enforce such laws as it deems necessary to control the use of property in accordance with the general interest or to secure the payment of taxes or other contributions or penalties." Note that Art.17 of the EU Charter of Fundamental Rights unambiguously refers to intellectual property in this context.

[74] See *Mellacher and Others v. Austria*, 19th December 1989, Series A no. 169, pp. 24-25, para. 42; *James and Others v. the United Kingdom*, 21st February 1986, Series A no. 98, pp. 29-30, para. 37.

[75] See *Sporrong and Lönnroth v. Sweden*, 23rd September 1982, Series A no. 52, p. 26, para. 69; *Immobiliare Saffi v. Italy*, no. 22774/93, ECHR 1999-V, para. 49; *Chassagnou and Others v. France*, 29th April 1999, para. 75; *Iatridis v. Greece*, no. 31107/96, para. 55

[76] See, for instance, *Fredin v Sweden*, Judgment of 18 February 1991, 192 ECHR, Series A, 1991, para.47.

[77] See, for instance, *Dogan and others v Turkey*, Judgment of 29 June 1994, para.155. In that case, the Court ruled that all the applicants' economic activities in their village and the revenue they derived from them qualified as "possessions" for the purposes of Article 1 of Protocol 1 to the ECHR. (§ 139) Since the forced expulsion deprived them of the revenues on which they subsisted and of the use of their property for several years, the Court found that they had had to bear an excessive burden which upset the fair balance that should be struck between the competing interests.

[78] Housing regulations, for instance, will be well-considered due to the central role these tend to have in current social and economic policies. See *Mellacher and others v Austria*, supra, para.45. Note that a taking of property effected in pursuance of legitimate social, economic or other policies may be 'in the public interest' even if the community at large has no direct use or enjoyment of the property taken. See *James and others v the United Kingdom*, supra, para.45.

[79] H. Mountfield, 'Redgulatory Expropriations in Europe: The Approach of the European Court of Human Rights', 11 *NYU Environmental Law Journal* (2002), p.141.

monopoly has been granted. Software acquires value to the extent that it is able to interoperate (or exchange information) with other software programs. To speak in software is to be able to make one's program interoperable with another. The scope of copyright protection therefore potentially constrains software expression in two ways: First, the more demanding the laws are concerning the originality requirement, the less the reproduction of particular forms of software will be constrained by copyright. Second, the more lenient the laws are on the issue of decompilation, the less competing and complementary software expression will be constrained.

The law typically attempts to resolve the tension through a number of mechanisms. For example, copyright does not cover the idea, but only the particular expression of an idea. States also recognise a number of 'fair use' exceptions, whereby copyright protected materials can be used for well-defined purposes without monetary compensation (e.g. education). Recently, courts in some EU Member States have started acknowledging that these mechanisms internal to copyright law may not always adequately resolve the conflict.[80]

In the US, the debate on the constitutional nature of software code pitted two camps against each other. Some commentators held that software was expression, because the act of distributing software in the form of source code is similar to the act of speaking in a natural language to the extent that both acts intentionally convey information.[81] Others were of the view that software is a device, a functional means in the same manner as more conventional electrical and mechanical devices. As a result, they thought it did not deserve constitutional protection as speech.

However, the point is that both categories are not mutually exclusive. Software is both functional (a device) *and* expression.[82] A work is expressive if it conveys an idea. A work is functional if it performs a useful purpose in the physical world. Prior to the advent of software, the functional/expressive dichotomy was fairly useful. It was often the case that a particular work was either expressive or functional. Software may be either expressive or functional, or both, perhaps in degrees that vary from case to case. A particular piece of source code may be highly expressive (i.e. expressing a wide variety of complex ideas unambiguously) and highly functional (i.e. reliably and repeatedly performing a wide variety of complex functions). Thus, software regulation raises Art.10 issues in two inter-related respects. First, disseminating software may constitute an expression of information or ideas in its own right, in the sense of Art.10(1) ECHR.

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[80] See, for instance, Philips M.R. in *Ashdown v. Tel. Group Ltd [2001] 4 All E.R. 668*, at para.45. 'There will be occasions when it is in the public's interest not merely that information should be published but that the public should be told the very words used by a person. On occasions, indeed, it is the form and not the content of a document which is of interest. In those cases, one ought to interpret the copyright act in accordance with Art.10 ECHR.' See for a good account of the clash: M.D. Birnhack, Copyrighting Speech: A Trans-Atlantic View, in Paul L.C. Torremans (Ed.), *Copyright and Human Rights*, (Kluwer International, New York, 2004), pp.37-62; M.D. Birnhack, Acknowledging the Conflict between Copyright Law and Freedom of Expression under the Human Rights Act, *Entertainment Law Review* v. 14 no. 2 (February 2003), pp. 24-34.

[81] L. Tien, Publishing Software as a Speech Act, 15 Berkeley Technology Law Journal (2000), p.629; available at http://www.law.berkeley.edu/journals/btlj/articles/15_2/tien/tien.html

[82] R. Plotkin, Fighting Keywords: Translating the First Amendment to Protect Software Speech, *Journal of Law, Technology and Policy* (2003), p. 337; available at http://www.ssrn.com

Second, software regulation also falls within the ambit of Art.10 ECHR as a medium or means for imparting/receiving 'information' or 'ideas'. The section analyses how these relate to the right to property, enshrined in Art.1, 1st Protocol ECHR (Art.1-1 ECHR).

Analysing the clash between Art.10 and Art.1-1 ECHR is complexdue to the lack of legal precedents. Except for two antiquated decisions of the now defunct Commission of Human Rights,[83] the issue has not been extensively addressed within the ECHR system.[84] Thus, it is necessary to reason by analogy, using two seminal ECtHR judgments about the clash between private *tangible* property rights and the right to freedom of expression (or association): *Appleby* and *Chassagnou*.

A. Software as Expression of 'Information' or 'Ideas'

In recent years, the tension between the right to freedom of expression and the owners' right to exclude has become more acute. It is suggested that software copyright lies right at the 'conflict zone' between property rights and freedom of expression. This is so, first, because software constitutes expression in the sense of Art.10 ECHR. This may come as a surprise, but one should bear in mind that source code is written in a language, and is a form of scientific expression and instructional literature (i.e. showing how to produce something).[85] Exchanges in the form of source code amount to a search for 'better' software through deliberation. Like mathematics for mathematicians, source code is the language of computer scientists. Scientific or instructional expression of this kind has always been at the core of the right embedded in Art.10(1), as exemplified in *Handyside*, in which the prohibition to disseminate a schoolbook was at stake.[86]

[83] See *Geillustreerde Pers* where the Commission wrongly concluded that only the ones producing certain information had the right to freely express that same information, and *France 2* where the Commission believed that it was not upon the organs of the convention to decide on the clash between the right to freedom of expression and author's property rights. See B. Hugenholtz, Copyright and Freedom of Expression in Europe, in R.C. Dreyfuss, H. First, D.L. Zimmerman (Eds.), *Innovation Policy in an Information Age*, (Oxford, OUP, 2000).

[84] Indeed, in a few cases the relation between copyright and freedom of expression *was* considered, but it was not a classic clash between the two. In *News Verlag* (Application No. 31457/96, Judgment of 11th January 2000) and *Krone Verlag v Austria* (Application No.34315/96, Judgment of 26th February 2002), the question was whether the Austrian courts, in preventing the publication of the pictures in execution of the balance struck by copyright law, had acted in acordance with the right to freedom of expression. In other words, the private interest that copyright law aimed to protect in these cases was not the interest of the copyright holder, as in the classic cases, but the private interests of the people on the pictures.

[85] S.E. Halpern, Harmonizing the Convergence of Medium, Expression and Functionality: A Study of Speech Interest in Computer Software, 14 *Harvard Journal of Law and Technology* (2000), p.158, 151 and 161.

[86] *Handyside v. United Kingdom*, 7 December 1976 (No.24), 1 EHRR 737; See for another example involving 'scientific speech', before the Human Rights Committee: *Robert Faurisson v. France*, Communication No. 550/1993 , U.N. Doc. CCPR/C/58/D/550/1993 (1996). One may object that object code is different, but object code and source code are perfectly equivalent: when a program is written in a high-level language, it can be converted into assembly code and further into binary executable code. Similarly, a program written in binary executable code can be disassembled into the assembly version. Provided the high-level language is known, it can also be 'decompiled' into the high-level language version. See D. Bainbridge, *Software ©opyright Law*, (London, Butterworths, 1999), p.154.

In any event, the Court subscribes to a very broad construction of the terms 'information' or 'ideas' by avoiding any restriction on their ambit. In *Groppera*, for instance, it did not consider it necessary to give on this occasion a precise definition of what is meant by 'information' and 'ideas'.[87] In fact, Art.10 ECHR is intended to be interpreted broadly, and the arguments of contracting States that a particular type of activity is not expressive are usually unsuccessful.[88] This is logical since any restriction on Art.10(1) would undermine the balancing test to be carried out under Art.10(2).

The relevant question is thus whether – through the balancing exercise carried out under Art.10(2) ECHR – the right to freedom of expression might trump property rights in software. Software acquires value to the extent that it is able to interoperate with other software. In order for software to interoperate, third party access might be necessary to pieces of proprietary software code, and proprietors of software might not be willing to impart this information. Access might be hindered on two distinct grounds. First, the core right of Art.10 ECHR – i.e. the right to impart 'information' or 'ideas' – might be hampered; second, Art.10 equally refers to the right to receive 'information' or 'ideas'. In *Leander*, the ECtHR held that Art.10(1) ECHR 'basically prohibits a government from restricting a person from receiving information that others wish or may be willing to impart to him.'[89] Thus, the Court must balance the end-users' general right to receive 'information' or 'ideas' against the platform operators' willingness to impart the relevant interface information.

Obviously, the right to impart and receive 'information' or 'ideas' goes together with a set of State duties. First, the State incurs the classic obligation not to interfere with the exercise of the rights embedded in Art.10. Second, the Court has long held that, although the essential object of many provisions of the ECHR is to protect the individual against arbitrary interferences by public authorities, there may in addition be positive obligations inherent in an effective respect of the rights concerned. The State duty to protect is based on the principle that fundamental rights must also be effectively secured against threats emanating from non-State sources.[90] In *Plattform*, applicants successfully argued that the State had failed to grant them their right to hold a demonstration, because it had failed to prevent a counter demonstration from hindering their own demonstration. The ECtHR confirmed that '[g]enuine, effective freedom of peaceful assembly cannot (…) be reduced to a mere duty on the part of the State not to interfere: a purely negative conception would not be compatible with the object and purpose of the provision [but] sometimes requires positive measures to be taken, even in the sphere of relations between individuals.' The State is supposed to take 'reasonable and appropriate measures to secure the effective enjoyment' of the right. In other words, the State has a positive duty

[87] *Groppera Radio v. Switzerland*, Judgment of 28 March 1990 (No.173), 12 EHRR 321, at para.55.
[88] A. Nicol, Andrew, G. Millar and A. Sharland, *Media Law and Human Rights* (London, Blackstone, 2001), at p.14.
[89] *Leander v. Sweden*, Judgment of 26 March 1987, 9 EHRR 433, at para.74. Note that it is standing case law that these rights embodied in Art.10 can be invoked by natural and legal persons alike.
[90] L. Jaeckel, 'The Duty to Protect Fundamental Rights in the European Community.', 28 *European Law Review* (2003), p.524.

to protect fundamental rights. Non-action by the State may also constitute an unlawful interference with Art.10 ECHR.[91]

As the rights laid down in the ECHR are by definition fundamental, they are inherently applicable without discrimination. Thus, the 'positive duties'-doctrine of the ECtHR is no more than a recognition that the State is obliged to ensure that there is a general equality among (legal) persons in their enjoyment of the right to freedom of expression, thus furthering the various rationales enshrined in Art.10 ECHR. This equality can be hampered by the State, but also by private individuals. To be sure, it is suggested that Art.10 ECHR entails a positive duty to prevent the ability (or potential) of certain voices to silence or inhibit competing voices. Indeed, this can be inferred from the ECtHR's reasoning in *Plattform*. It was held that '[t]he participants must, however, be able to hold the demonstration without having to fear that they will be subjected to physical violence by their opponents; such a fear would be liable to deter associations or other groups supporting common ideas or interests from openly expressing their opinions on highly controversial issues affecting the community. In a democracy the right to counter-demonstrate cannot extend to inhibiting the exercise of the right to demonstrate.'[92] Put differently, expression occurs in competition with other expression. If a dominant voice is left with the ability (or potential) to inhibit or silence the expression of dissenting 'information' or 'ideas', this may have adverse effects on the general interest.[93]

Of course, different types of software expression will enjoy different degrees of protection. Most software creations are still commercial endeavours. The margin of appreciation is generally broader for States in commercial matters, otherwise the ECtHR would have to undertake a re-examination of the facts and all the circumstances of each case. The ECtHR must confine its review to the question whether the measures taken on the national level are justifiable in principle and proportionate.[94] By contrast, an interesting consequence under the ECHR of holding the imparting of 'information' or 'ideas' to constitute political (or at least public interest) expression is that the State's margin of appreciation to restrict that particular expression is much narrower if it still exists at all. By the same token, however, it is often not at all clear when a statement should be designated as 'commercial' rather than 'political'.[95]

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[91] *Plattform 'Ärzte für das Leben' v. Austria*, Judgment of 21 June 1988, Series A no. 139, p. 12, para.32. The case is on the right to demonstrate (Art.11 ECHR) but the two rights are intimately connected, and the Court has applied this reasoning with respect to Art.10 ECHR, for instance, in *Özgür Gündem v. Turkey*, Judgment of 16 March 2000, at paras.43-46.

[92] *Plattform 'Ärzte für das Leben' v. Austria*, Judgment of 21 June 1988, Series A no. 139, p. 12, para.32.

[93] See O.M. Fiss, *The Irony of Free Speech.* (Cambridge Massachusetts, Harvard University Press, 1996), pp.98; T. McGonagle, 'Does the Existing Regulatory Framework for Television Apply to the New Media.', *IRIS Plus* (Strasbourg, European Audiovisual Observatory, 2001).

[94] See *Markt Intern and Beermann v. Germany*, supra, at para.33. It is logical that the margin be broader in commercial matters since the regulation of commercial expression arguably poses less of a threat to the 'democracy rationale' underpinning Art.10 ECHR. Moreover, the ECtHR is in a poor position to evaluate decisions in such a highly complex and fluctuating area.

[95] See for instance, in *Barthold* a veterinary was enjoined under the unfair competition Act from repeating statements in the press concerning the provision of night services at his own clinic and suggestions for the establishment of a regular night service. The interview was accompanied by the applicant's picture and name, as well as the name of the clinic. The ECtHR considered the restricted publication a normal press interview, not commercial advertising. *Barthold v. Germany*, Judgment of 25 March 1985, A.90, pp.25-26.

It has been argued that software code is not about making a point, particularly not a political one.[96] This is very unconvincing a statement. Today the form of software itself implies a political stance.[97] When Microsoft sells software in object code form and prohibiting the viewing of the source code, it is saying, "don't read the software even if you can."[98] Diametrically opposed to this stands the free software movement. This critical mass of software developers, linked through the Internet and working by thousands on a large series of software projects, disseminates software products with a clear political intention.[99] Software, whether open or closed, is more than just bits and bytes. It determines which programs can be run, it empowers some speakers and can exclude others, and helps to determine a specific society's culture.[100] To be sure, the power to construct and control channels of communication through law is a most serious *political* question in the digital era. On one side the school of thought that believes information as the basic building block of knowledge should (and wants to) be free. On the other side stands the idea that in a market economy, value added to raw information has been and inevitably will be commodified and sold in the market."[101] The fierce debate over open versus proprietary code is intimately connected with this construction of identity through software.[102]

In sum, it is suggested that, depending on the circumstances, software writers and end-users may successfully contest the rightfulness of interoperability laws on the basis of the right to impart and receive information or ideas in the form of software. At times the State's margin of appreciation will be very narrow, since the debate might clearly be political in nature.

B. Software as a Means for Expressing Information or Ideas: Media Pluralism

Like TV sets, software is a widely used means for receiving/conveying information or ideas. Also, like TV sets, software is considered a 'mere tool' for imparting/receiving information. The first question is thus whether the issue of media pluralism is relevant here. In *Vgt*, the Court recognised that the existence of powerful financial groups in the advertising sector may curtail the freedom of expression of broadcasters. This was because it was likely to undermine the 'fundamental role' of Art.10, in particular where it serves to impart information and ideas of general interest, which the public is moreover

[96] K.A. Moerke, 'Free Speech to a Machine? Encryption Software Source Code is Not Constitutionally Protected "Speech" Under the First Amendment.', 84 *Minnesota Law Review* 1007, p.1029.
[97] The *Bernstein* and *Reimerdes* lines of case law in the US, for example, were heavily political. In the former, it was about the right of citizens to interact in complete privacy, through the wide availability of encryption technology. In the latter, it was a clear political dissent, claiming the right we all have to learn how technology works. R.C. Fox, 'Old Law and New technology: The Problem of Computer Code and the First Amendment.', 49 *UCLA Law Review* 871, p.896.
[98] L. Tien, 'Publishing Software as a Speech Act.', 15 *Berkeley Technology Law Journal* (2000), p.19; available at http://www.law.berkeley.edu/journals/btlj/articles/15_2/tien/tien.html.
[99] Cf. Supra for an explanation of free and open source software.
[100] See E. Moglen, 'Anarchism Triumphant: Free Software and the Death of Copyright.', http://moglen.law.columbia.edu.
[101] B. Fitzgerald, *supra*, p.339-340.
[102] Of course, it does not matter whether the object code is intelligible or not to everyone. The right to freedom of expression protects the dissemination of *ideas.* The political idea behind running open or closed software can be understood – indeed, it might even be the most convincing way of expressing certain ideas.

entitled to receive. Such an undertaking could not be successfully accomplished unless it is grounded in the principle of pluralism of which the State is the ultimate guarantor.[103] The main idea was that one of the recognised ways to achieve media pluralism consists in preventing too large financial groups from controlling the advertising sector. The point, of course, is that it is unimportant whether a given firm has *direct* control over what is being broadcast. The principle of media pluralism also applies *in*directly. That is, it may be sufficient to show that economic power in a given segment of the media value chain is so concentrated that the market players having that power could potentially exercise influence on the right to freedom of expression.

With the advent of digital TV, for instance, software has become an increasingly critical part of the media value chain. The main problem is that, in the analogue world, we appear to have confused media with media companies – those intermediaries who filter and select the content that viewers might be interested in. With this focus in mind, media pluralism is about ensuring that a sufficient number of firms is involved in the imparting of *content*. However, in a context of increasing bandwidth (or capacity to transmit audio, text, and video), media pluralism is mainly about the fact that the *medium* itself for information transmission (e.g. radiospectrum, cable networks) should not be controlled or determined by too few companies.[104] Similarly, the State might incur the duty to prevent any one company from having such a stranglehold on the *software* part of the media value chain. In other words, if all media companies (or intermediaries) and all users are dependent on, or using, a software platform produced or controlled by one and the same company,[105] is this not just as worrisome from the point of view of media pluralism? Clearly, in this sense media pluralism rules ought to be imposed on software platform operators, just as they are being imposed on broadcast licence holders or cable network operators (i.e. must-carry rules).

The question arises whether there is currently a *right* to media pluralism. In *Autronic*, the European Court of Human Rights (ECtHR) recognised that Art.10 applies not only to the content of information but also to the means of transmission or reception since any restriction imposed on the means necessarily interferes with the right to receive and impart information.[106] Media pluralism is an important aspect of the right to freedom of expression.[107] Concrete support for the proposition that States have a positive, enforceable obligation to avoid media concentrations under the terms of Art.10 ECHR may be gleaned from the view of the European Commission for Human Rights.[108] In *De Geillustreerde Pers NV*, it was held that 'States have a duty' under Art.10 to protect against excessive press concentrations.[109] In *Verein Alternatives Lokalradio Bern* the

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[103] *Verein gegen Tierfabriken v. Switzerland*, Judgment of 28 June 2001, Application No. 24699/94, para.73; referring to *Lentia*, supra, para.38.

[104] In other words, the law should strive for modularity – with as many potential simultaneous participants.

[105] Especially software at the user end – OS, browser, applications – which are nearest to the user's eyeball and eardrum.

[106] *Autronic AG v. Switzerland*, Judgment of 22 May 1990 (No.178), 12 EHRR 485, para.47.

[107] See for a recognition of the paramount importance of the media pluralism principle for the right to freedom of expression Recommendation (99) 1 & Recommendation 1506(2001) of the Council of Europe.

[108] The European Commission for Human Rights was abolished a few years ago. It used to provide preliminary decisions within the ECHR system, and some cases were referred to the ECtHR.

[109] App. No 5178/71, *De Geillustreerde Pers NV v. Netherlands*, 8D & R5. See discussion in R. Craufurd Smith, *supra*, p.181.

same organ held that 'a licensing system not respecting the requirements of pluralism, tolerance and broadmindedness, without which there is no democratic society' would infringe Art.10(1).[110]

Some authors argued that the ECtHR never confirmed these very antiquated opinions, and the emphasis in its judgments related to communications networks was usually on preventing States from interfering with the right to *impart* information or ideas.[111] For instance, the emphasis in the ECtHR case law on broadcasting is on the sender of information, not on the receiver. Consequently, it has been argued that the media pluralism principle might not be all that enforceable, and the ECHR does not appear to impose on MS a positive duty to bring about media pluralism.[112]

However, several decision of the ECtHR in relation to the broadcasting sector acknowledged that the concern to safeguard media pluralism may justify imposing certain restrictions on the freedom of expression of market players in the media.[113] This led some authors to contend that there was such a positive duty: respect for freedom of expression may require States to intervene.[114] Though it is true that decisions of the ECtHR regarding broadcasting have tended to emphasise the right of broadcasters to *impart* information, the Court has also repeatedly implied an extensive right to *receive* pluralistic information from the media, for instance in its judgments with respect to the printed press. Indeed, in its various cases on issues of freedom of the press,[115] the essential "watchdog role" of the press is in fact the corollary of a broad right of end users to be informed, and to have access to a pluralistic array of information or ideas.[116]

While the principle of media pluralism enjoys growing recognition at the European level, it remains to be seen how it will be applied as regards the software medium. A recognition of positive duties in the interest of media pluralism appears to be essential in a context of tension between Art.10 and Art.1-1 ECHR.

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[110] App. No 10746/84, *Verein Alternatives Lokalradio Bern v. Switzerland*, 49D & R126. See discussion in R. Craufurd Smith, *supra*, p.181. Note that the European Commission for Human Rights, which used to precede the Court in proceedings within the ECHR legal order, was subsequently abolished.

[111] See for a recent example *Demuth v. Switzerland*, Judgment of 5 November 2002, Application No. 38743/97, available at http://www.echr.coe.int, at para.30. See D. Voorhoof, *IRIS* 2003-1, pp.2-3.

[112] R. Craufurd Smith, *Broadcasting Law and Fundamental Rights*, (Clarendon Press, Oxford, 1997), pp.179-80 and 196. In the EU, the media pluralism principle is expressly recognised in Art.11 of the (non-binding but authoritative) EU Charter for Fundamental Rights.

[113] See EU Network of Independent Experts on Fundamental Rights, *Report on the Situation of Fundamental Rights in the EU in 2003*, January 2004, pp.70 ff.

[114] J. Cappiau, 'EC Must-carry Rules on the Brink of a Lost Opportunity: Harmonisation and Free Movement of TV Broadcasts within the Communications Review (Proposed Directive on Universal Service and Users' Rights).', 2 *Journal of Network Industries* (2001) 277, at p.294 (referring to *Lentia* and *Tele 1 Privatfernsehgesellschaft mbH v. Austria* (2001)); and C.A. Jones, 'Television without Frontiers', in P. Eeckhout and T. Tridimas (Eds.), *Yearbook of European Law 1999-2000*, (Oxford, Clarendon, 2000), p.306-307. See EU Network of Independent Experts on Fundamental Rights, *Report on the Situation of Fundamental Rights in the EU in 2003*, January 2004, pp.71 ff.

[115] See J.G. Merrils, A.H. Robertson, *Human Rights in Europe. A Study of the European Convention on Human Rights*, (Manchester, Juris Publishing, 2001 – fourth edition), p.180; referring to *Lingens* and *Sunday Times*.

[116] The Court has also reiterated on numerous occasions that this freedom is applicable not only to information or ideas that are favourably received, but also to those that shock or disturb. See, for instance, *Handyside*, Series A, No.24, para.49.

2. *Chassagnou*, *Appleby* & Access to Software Platforms

This section will now focus on two leading cases regarding the tension between property rights and freedom of expression: *Chassagnou* and *Appleby*. In *Chassagnou v. France*, all the applicants, who vehemently opposed hunting, had to become members of the local hunting associations and to transfer hunting rights over their land to these associations, so that all hunters living in the relevant municipality could hunt there. They could not evade the obligation to join the association and to transfer their hunting rights to it unless the area of their land exceeded a given threshold. Applicants objected on the ground that the obligation to join an association of whose objects they disapproved had violated, inter alia, their right of property and their right to freedom of association. They also complained of discrimination contrary to Article 14 of the Convention.

The ECtHR agreed with them, and made clear that this obligation was a disproportionate interference with their right to property, regardless of compensation paid, mainly because their objection to the hunting was ethical, not economic. The Court noted that, "although the applicants have not been deprived of their right to use their property, to lease it or to sell it, the compulsory transfer of the hunting rights over their land to a hunting association prevents them from making use of the right of property, as they see fit. Although opposed to hunting on ethical grounds, they are obliged to tolerate the presence of armed men and gun dogs on their land every year. This restriction on the free exercise of the right of use undoubtedly constitutes an interference with the applicants' enjoyment of their rights as the owners of property. (…) Compelling small landowners to transfer hunting rights over their land so that others can make use of them in a way which is totally incompatible with their beliefs imposes a disproportionate burden which is not justified under the second paragraph of [Art.1-1 ECHR]."[117] In other words, the importance of the land owners' right to freedom of expression was the critical factor in this decision. They had the fundamental right *not* to be part of a hunting association, and not to make their land available for hunting.

On the other hand, it is clear from recent case law of the ECtHR that States may sometimes incur a positive duty to limit private players' property rights, in the interest of free expression. In *Appleby*, a shopping mall owner had refused to grant demonstrators the possibility to object to the creation of the large shopping mall. Security guards of the shopping mall would not allow them to continue collecting signatures on the premises.[118] The Court conducted an extensive analysis of US case law,[119] and acknowledged the fact that '[w]here (…) the bar on access to property has the effect of preventing any effective exercise of freedom of expression or it can be said that the essence of the right has been destroyed, the Court would not exclude that a positive obligation could arise for the State to protect the enjoyment of Convention rights by regulating property rights.'[120]

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[117] See *Chassagnou v. France*, supra, paras.74 and 85.

[118] *Appleby and Others v. United Kingdom*, Judgment of 6th May 2003, Application No. 44306/98.

[119] The leading cases are of course *Marsh v Alabama* (326 US 501) and *Pruneyard Shopping Center v. Robbins* (447 US 74).

[120] *Appleby*, para.47. Even when such a positive duty falls upon the State, it 'must in principle be left a choice between different ways and means of meeting this obligation. The Court's supervisory function being of a subsidiary nature, it is limited to reviewing whether or not the particular solution can be regarded as striking a fair balance." See Case *Hatton and others v. United Kingdom*, Judgment of 8 July 2003, Application No.36022/97, para.123. In addition, in *Rees v UK and Osman v UK* the ECtHR hakd that

The Court was not convinced, however, having regard to the concrete facts of the case, that their right to freedom of expression had been infringed by the lack of State action. This is because the applicants were in a position to 'employ alternative means, such as calling door-to-door or seeking exposure in the local press, radio, television', or 'distributing their leaflets on the public access paths into the area.' The applicants were not therefore effectively prevented from communicating their views to their fellow citizens.[121] The rationale of the ECtHR in *Appleby* was thus that Art.10 ECHR, notwithstanding the acknowledged importance of freedom of expression, does not bestow any freedom of forum for the exercise of that right.'[122]

Normatively Art.10 and Art.1-1 are given equal weight. This is surprising given the fact that, at a positive level, Strasbourg has never explained the wider social value of the right to claim undisturbed private ownership of property. The ECtHR has always avoided this type of analysis. This stands in sharp contrast with its case law on Art.10 which appears to be much more developed, and gives indications regarding the longer-term teleological function and value of free expression for promoting democracy and self-fullfilment.[123] In addition, even the balancing of those two interests against one another appears muddled. In *Appleby*, the property interests of the property owner are artficially inflated. The demonstrators were responsible for a relatively minor infringement of his property rights, qualitatively uncomparable to, for instance the invasion of a private house. On the other hand, the expressive interests were real: the demonstrators were denied the most effective way of voicing their discontent, and there was no guarantee that their voice would have been allowed on the local media, or in the individual shops of the mall, as the Court suggested. More importantly, the ruling seems to indicate that States, through privatisation and inaction, might be able to prescribe the medium of dissent and thus the extent of dissentient voices. The right to choose the medium of expression is an essential part of Art.10 ECHR.[124] In *Chassagnou*, the negative speech interests (i.e. not being associated with hunters) are critical, but the Court avoids any reference to positive expressive interests of hunters.

The connecting factor between *Chassagnou* and *Appleby* is the fact that in both cases property rights of landowners appear to override conflicting interests of an expressive nature. First, the Court seems to have more consideration for the nature of the property, than for the nature of the expression. In *Appleby* the ECtHR ruled that alterations in the 'ways in which people move around and come into contact with each other' do not

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positive obligations may not be interpreted in such a way 'as to impose an impossible or disproportionate burden on the authorities', See Sanderson, *supra*, p.168.

[121] See, for a critical discussion of the *Appleby* case, O. Gerstenberg, Private Law and the New European Constitutional Settlement, *European Law Journal* (2004), Vol.10, Issue 6, pp.766-786; P. Leach, *European Human Rights Law Review*, Issue 5 (2003), pp.547-572.

[122] *Appleby*, para.47. This is reminiscent of case law on broadcasting.

[123] Non.democratic justifications might include the longer term economic benefits which accrue as a result of the ownership and use of capital; the social and scientific advances derive from the protection of intellectual property; the socially allocative function of new forms of property such as social security; the greater social good (as well as the individual benefit) served by title to real property in some form; and the cultural cohesion effected by recognition of ownership of types of possessions. See J. Harris, *Property and Justice*, (Oxford, OUP, 1996), chapter 15.

[124] D. Mead, Strasbourg Succumbs to the Temptation "To Make A God of the Right of Property": Peaceful Protest On Private Land & The Ramifications Of Appleby v UK, *Journal of Civil Liberties*, Issue 8, pp103-105 and p.109.

require 'the automatic creation of rights into private property.' At the same time, it hinted to the fact that the only limit might be a situation like in the US case *Marsh v. Alabama* in which the entire municipality is controlled by a private body, and 'the essence of the right had been destroyed'.[125] The negative right of the landowner not to speak, or not to belong to a given association is considered of paramount importance and appears to prevail when backed up by property rights. This view seems to be derived mainly from traditional conceptions of property. Under traditional rules, third party access is granted only at the discretion of the owner of the facility. Even if access is granted, this access licence can be revoked, subjected to conditions, or limited to access for a specific purpose.[126] In other words, although Art.1-1 ECHR does not appear, on its face, to grant strong fundamental property rights ('peaceful enjoyment of property'), it may be very hard for freedom of expression to trump property rights when those are, as usually, backed up by the (negative) right to freedom of expression. Since any private property right implies negative rights to freedom of expression (i.e. the right not to be associated with certain views), we may conclude that property rights will usually trump conflicting rights to freedom of expression.

There are two recurrent arguments that are used by platform owners. First, the right-owner may claim that a right of access conflicts with the expression rights of the platform operator. The platform operator may oppose the views expressed – in software (e.g. open source)[127] or otherwise – by the person seeking access to his platform. As a matter of their own autonomy, owners may not wish to be associated with messages with which they disagree.[128] Second, he may argue that allowing third party access to his property effectively means that he has to bear the cost of a public good. Indeed, the platform operator may need to provide third parties with interface information and ensure

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[125] In that case, a corporation wholly owned Chickasaw, a suburb of Mobile, Alabama. The property was open to the public and contained residential buildings, streets and a business block. The First Amendment claim arose when a Jehovah's Witness was arrested while distributing religious literature on a sidewalk in Chickasaw. The US Supreme Court held that the company town could not curtail First Amendment liberties for several reasons. Ownership does not always mean absolute dominion: '[t]he more an owner, for his advantage, opens up his property for use by the public in general, the more do his rights become circumscribed by the statutory and constitutional rights of those who use it.' Justice Black, writing for the majority; 66 SCt 276, at 278. The ruling was extended to include privately run parks, see *Evans v.* Newton, 382 US 296 (1966) but not to purely recreational parks; see *Flagg Bross v. Brooks*, 436 US 149 (1978), at 159. Subsequently, the ruling was extended to include shopping malls; see *Amalgamated Food Employees Union Local v Logan Valley*, 391 US 308 (1968); discussed in J. Mulligan, *supra*, pp.542-543. In effect, for any piece of property (park, shopping mall, business district) which constituted a 'functional equivalent' of a traditionally public area, owners would lose much of their power to exclude individuals. But *Hudgens v NLRB* (424 US 507 (1976)) clearly overruled *Logan Valley*. The Court ruled that the pickets in this case did not have the right to enter this shopping center for the purpose of advertising their strike against the Butler Shoe Co. The Court essentially narrowed the Marsh holding to situations in which the entity in question undertakes all of the responsibilities of a municipality.

[126] J. Rowbottom, Property and Participation: A Right of Access for Expressive Activities, *European Human Rights Law Review* (2005), Issue 2, p.188.

[127] See the current political battle between closed source software and open source software in the *Microsoft* litigation. Micrsoft is trying to avoid access of open source server software to its interoperability information. See ZDNet News, *Microsoft details EU* Concessions, June 6, http://news.zdnet.com/2100-3513_22-5733536.html

[128] For a recognition of the right *not* to speak, see *Gaskin v. UK*, Judgment of 7 July 1989, [1989] ECHR 13, para.52.

backward compatibility and will be held liable by users for non-functioning of the platform with a number of interacting applications, thus incurring substantial costs.[129]

The analogy with software platforms is very enlightening. Public spaces occupy a crucial place in any democracy as a forum for protest, discourse, and other political dialogue. Streets have immemorially been held in trust for the public, and have been used for purposes of assembly, communicating thoughts between citizens, and discussing public questions. [130] However, modern shopping centers and private property increasingly take over the functions of a traditional downtown area. It is much more important to be able to express opinions or demonstrate there than in the public space because this is the place where people gather. In order to reach people, one needs access to those private places.[131] At the same time, shopping malls routinely expell people who don't have the 'appropriate' dress code: demonstrations may not be particularly conducive to consumption and buying behaviour. Just like privately held shopping malls, privately controlled software platforms increasingly replace the streets and public pathways.

The above highlights the fact that the traditional distinction between private and public property is increasingly blurred. The private/public distinction is based on a number of wrong assumptions. States might have equally compelling rights to exclude access to its property (e.g. nazi demonstrations). At the same time, the private owners' right to exclude varies according to the type of property – hence, there is a greater interest (i.e. privacy and respect for family life) to exclude access to one's home than to a shopping mall. Finally, and most importantly, political and other expression can also be directed toward private players; even when demonstrations are directed at a State policy, it may be necessary for the expression to take place on private property. By contrast, one ought to accept that the private right to exclude access to property may be curtailed by the right to freedom of expression in certain cases: private power may just as much represent a threat to the exercise of the right to freedom of expression as State power. In *Appleby*, Judge Maruste persuasively expressed the dissenting view that '[i]t cannot be the case that through privatisation the public authorities can divest themselves of any

[129] In the US, courts seem to have had regard to the nature of the property and the nature of the expression. In *Pruneyard*, for instance, the US Supreme Court was of the view that the views of the leafletters was unlikely to be equated with that of the owners of the shopping mall. It also held that the nature of the property was such that the additional cost for the owner was negligible. See *Pruneyard Shopping Center v. Robbins* (447 US 74). In *Lloyd Corp v. Tanner*, the US Supreme Court found that anti-Vietnam war protestors could be excluded from distributing literature at a shopping mall. This is because 'the handbilling by respondents in the malls of Lloyd Center had no relation to any purpose for which the center was built and being used." 407 US 551 (1972), at 569; see C. Lockard, *supra*, p.776.

[130] For democracy to work, some spaces need to be allowed for democratic deliberation and dialogue. Access to a shopping mall for leafletting is not just beneficial to those who request access, but also to third parties who will thereby gain awareness of new views, opinions or debates. J. Rowbottom, Property and Participation: A Right of Access for Expressive Activities, *European Human Rights Law Review* (2005), Issue 2, p.189; M. Warren, *Democracy and Association* (Princeton, Princeton University Press, 2001); J. Mulligan, Finding a Forum in the Simulated City: Mega Malls, Gated Towns, and the Promise of Pruneyard, 13 *Cornell Journal of Law and Public Policy* (2004), p.535.

[131] As one judge put it "[i]f free speech is to mean anything in the future, it must be exercised at these centers. Our constitutional rights encompass more than leafleting and associated speech on sidewalks located in empty downtown business districts. It means communicating with the people in the new commercial and social centers; if the people have left for the shopping centers, our constitutional right includes the right to go there too, to follow them, and to talk to them." See New Jersey Supreme Court in *NJ Coallition v. JMB Realty Corp*, 423 A.2d 615 (NJ 1980), at 779.

responsibility to protect rights and freedoms other than property rights.'[132] Transferring rights to private owners' without the corollary duties associated with the type of property may well lead to a socially unacceptable concentration of power in the landowner.[133] The public/private divide is rendered increasingly less important. Thus, it should not matter whether the protest took place on public, quasi-public or private land.[134]

In other words, it is not the public/private nature of the property which ought to be determinative of access rights,[135] but rather the nature of the property and its use for the purposes of participation and free expression.[136] Platform operators may have to be more lenient toward types of expression that are obviously related to the purpose and use of the platform. Second, where a particular platform opens itself to one particular speaker, it may have more difficulties excluding other speakers who wish to express themselves in an identical manner. Owners of private spaces may not discriminate amongst viewpoints of speakers. [137] Finally, one should be wary of letting positive externalities accrue to the software owner only, while having Society at large bear the negative effects of media concentration for society (i.e. a negative externality). This is all the more so given the fact that the users themselves participated in creating this value for the platform in the first place. By analogy, if we decide to create a road, the costs are born by everyone, but also the social gains and returns (e.g. increased trade, social cohesion, etc.).[138] The next section considers the various facets for striking the appropriate balance.

3. Striking the Right Balance between Individual and Societal Interests

First of all, one might wonder who ought to strike the balance. One way to do this is to leave the balancing to the courts; courts would then examine the nature of the expression and the nature of the property interest in question. The difficulty would be the *ad hoc*

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[132] See the dissenting opinion of Judge Maruste in *Appleby and Others v. United Kingdom*, Judgment of 6th May 2003, Application No. 44306/98.

[133] D. Mead, *supra*, pp.106-107.

[134] See D. Oliver, Common Values and the Public-Private Divide, (London, Butterworths, 1999). Traditionally, the value of private property depends on successful public property. For instance, the public property-based road system creates positive externalities for private land owners. See C.M. Rose, The Comedy of the Commons: Custom, Commerce, and Inherently Public Property, 53 *University of Chicago Law Review* 711, 774 (1986). One may conclude that, if those roads were to be made private property, there is a compelling interest in extending public law-type access rights to them in order to preserve those externalities.

[135] Hence, the difficult in qualifying interfaces as either private or public property should not, in principle, be an argument for or against access.

[136] J. Rowbottom, supra, p.192-194. He refers to the US public forum doctrine which is used to describe public property which may be used for expressive activities, citing G. Stone, 'Fora Americana: Speech in Public Spaces" [1974] *Supreme Court Review* 233.

[137] In *Laguna Publishing v. Golden Rain Foundation*, defendant wished to distribute free newspapers to residents that lived inside a private gated community. The California Supreme Court held that it had the right to do so because other equivalent newspapers were being distributed in the gated community. Discussed in J. Mulligan, *supra*, p.552.

[138] Note that the same criteria are highlighted in the competition law context. In *IMS Health*, the Court held that it was relevant, in determining indispensability of access to copyright protected materials, that the pharmaceutical companies had participated in the creation of the 1860 brick structure, and that the costs for users to change the structure used might economically rule out any such change. See Case C-418/01, *IMS Health*, 29th April 2004, para.30; C. Stothers, *IMS Health* and Its Implications for Compulsory Licensing in Europe, *European Intellectual Property Review* (2004), p.470.

nature in which the claim of the speaker and the landowner remain uncertain until resolved by a court. Any extension of fundamental rights between and among private actors would have the effect that courts be required to engage in an intricate process of balancing the competing fundamental rights. This difficulty does not arise in disputes against the State as the latter are no right-bearers. As there is no pre-established hierarchy between competing constitutional values, an order between them can only be established with regard to the specifics of context and situation. In doing this, the courts are somehow usurping legislative power.[139]

Another, more convincing way, would thus be to regulate more precisely the issue of interoperability, and determine when which constitutional value would take precedence, in order to guide courts in this process. It is the task of private law to create a fair balance when rights such as property rights and freedom of expression collide.[140] A rigid categorisation would pose problems in view of the dynamic nature of the relation between public fora and expression. However, it would reverse the nature of the problem, and remove the power of the individual landowner to influence political debates. It would also create greater certainty than the vague balancing test. The important point is that a limit to property rights would best be sanctioned by the legislator.

The balance struck in the context of software copyright would need to be seriously reconsidered. For instance, there is a very fundamental problem in achieving media pluralism in digital media – particularly in the software layer. On the one hand, software goods/services themselves tend to dominance. Due to the existence of pervasive network effects, software markets have a natural tendency toward concentration and are thus particularly prone to 'inhibiting' or 'silencing' competing expressions of 'information' or 'ideas' in software.[141] However, such market power appears to be temporary as a new technology will ultimately knock off every incumbent. Firms compete *for* the market through innovation for temporary market dominance, from which they may be displaced by the next wave of product advancements. For many commentators, monopolies are thus both acceptable and desirable for facilitating technological innovation.[142] Indeed, some economists argue that dominance in software markets is not as big a problem since even entrenched market players would just as quickly be displaced if a superior alternative came along. Thus, they argue, we need not be as wary of large market power as in classic markets – in fact, seeking this short-lived dominance is the main incentive for innovating in those markets.[143]

But large market shares *in themselves* appear to be in contradiction with media pluralism. The power itself to exercise influence (i.e. 'power over content' rather than 'power over prices') is the central focus of media pluralism. Media pluralism is about precluding the mere potential to overly influence society – no evidence of abuse of that

[139] O. Gerstenberg, *supra*, p.769.
[140] O. Gerstenberg, *supra*, p.773. In *Marsh v Alabama*, however, the court stated that First Amendment rights occupy a preferred status, because the right to exercise liberties safeguarded by the First Amendment "lies at the foundation of free government by free men".
[141] For instance, users will opt for the OS which will run the highest number of, and the most popular, applications. At the same time, software application writers will write for the leading OS.
[142] P.J. Weiser, *supra*, p.577; referring to the ongoing battle which Schumpeter called "creative destruction."
[143] See for instance, D. Evans, R. Schmalensee in *Did Microsoft Harm Consumers? Two Opposing Views* (AEI Brookings Joint Center on Regulation).

potential or dominant position is needed (as would, in contrast, be necessary in competition law). This is logical since there are no parameters for measuring a lack of media pluralism and abuses are increasingly in the form of subtle influences on opinion-formation rather than obvious and open propaganda.[144] The point is that, from a media pluralism point of view, one should be wary of allowing monopolies, *even* in the short term, *even* if they arguably stand for more innovation.[145] Media pluralism is about ensuring that media firms compete *in* the market (not just *for* the market). In sum, the application of the right to media pluralism in software markets is highly likely to develop on a series of head-on collisions with economic regulation, more so than is the case with classic communications 'infrastructure.'

In addition, the balance thus struck by the regulator will lean toward one of two diametrically opposed models of media regulation: the broadcast and the printed press model. The broadcast model is *vertical*, in the sense that the right to distribute information or ideas is limited to a few players who control the broadcast means – i.e. via control over cable networks, broadcast licences, etc. In this model, courts generally rely on two characteristic of the broadcast means – bandwidth scarcity (*scarcity rationale*), and lack of user control over content (*impact rationale*) – to justify intrusive content regulation and monitoring, as well as access regulations such as media concentration and must-carry rules.[146]

However, the scarcity rationale,[147] has come under pressure following the steady increase in transmission capacity or bandwidth.[148] This increase in bandwidth is a result of satellite and cable technology, and more recently digital technology.[149] The impact rationale is definitely more convincing. In the broadcast model, the audience does not actively seek the information, but (passively) receives it as it is transmitted. For instance, in *Jersild* – a case about racist expression on a radio station – the ECtHR acknowledged this. It distinguished between print and audio-visual media, and stated that the latter often have 'a much more immediate and powerful effect.'[150] But interactive media are

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[144] See J. Cavallin, 'European Policies and Regulations on Media Concentration.', *International Journal of Communications Law & Policy* (1998), at p.4; http://www.digital-law.net/IJCLP/1_1998/ijclp_webdoc_3_1_1998.html

[145] Of course, even short-lived monopoly power may enable monopolists to harm consumers. For instance, Microsoft's control over the OS platform has prevented market entry of the open Java standard.

[146] J. Berman, D.J. Weitzner, Emerging Media Technology and the First Amendment: Abundance and User Control: Renewing the Democratic Heart of the First Amendment in the Age of Interactive Media, 104 *Yale Law Journal* (1995), p.1630.

[147] Note that this rationale, in itself was never fully convincing. Indeed, many goods are scarce without therefore being subjected to access licences. see R.H. Coase, 'The Federal Communications Commission.' 2 *Journal of Law and Economics* (1959), pp.1 ff.; cited in Y. Benkler, 'Some Economics of Wireless Communications', 16 *Harvard Journal of Law & Technology* (2002), p.27; see also T.W. Hazlett, 'The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Faux Pas, and the Punchline to Ronald Coase's "Big Joke": An Essay on Airwave Allocation Policy.' 14 *Harvard Journal of Law & Technology* (2001), pp.335-567.

[148] This rationale was dominant in many countries; see for example the German *First Television* case 12 BverfGE 205, 262 (1961), and Decision 59/1960 of the Italian constitutional court Giur. Cost. 759, where this rationale was moreover used to justify a public broadcasting monopoly; cited in E. Barendt, *Broadcasting Law: A Comparative Study*. (Oxford, Oxford University Press, 1993), p.5.

[149] R. Craufurd Smith, *Broadcasting Law and Fundamental Rights.* (Clarendon Press, Oxford, 1997), p.199-200.

[150] *Jersild v. Denmark*, Judgment of 23 September 1994, A.298, p.23.

materially different from analogue broadcasting in that they offer users the ability to exercise control over precisely what information they access.[151]

In sharp contrast with the centralised broadcast model stands the decentralised or *horizontal* model of the printed press or the Internet. This open access model holds the promise of unlimited number of information sources, and decentralised control over the means of information transmission.[152] Hence, the Internet model appears to be much more in line with the two rationales underpinning the right to freedom of expression (i.e. autonomy and democracy). Conversely, abundant bandwidth and vast increases in processing power (i.e. the computers' capacity in processing information) are rendering access licences as well as content regulation and monitoring, increasingly suspect from a constitutional point of view. If infinite amounts of information can be conveyed over the network, it is much harder to argue that one ought to restrict anyone from doing so. Similarly, given a wealth of content, and the implicit active role of users in searching for information, it is much harder to convince anyone that there is a need for detailed content regulation; let alone, to monitor that content.

Nevertheless, as bandwidth capacity increases, scarcity of attention gradually replaces bandwidth scarcity as the very reason for informational asymmetry. Given that there are only few moments to impact, only a few will manage to get to the viewers' eyeball or eardrum. And thus the potential for abuse and bias remains: it lies in the logical layer, which is responsible for filtering and channeling the content to the users. As discussed above, software naturally tends to concentration. The balance struck by the law in this conflict between software copyright and freedom of expression will thus ultimately determine which model prevails; the centralised broadcast model, or the decentralised Internet model.

It appears that the Internet model is more in line with the right to freedom of expression. In essence, two fundamental values form the foundation of the right to freedom of expression: individual autonomy and deliberative democracy. The ECtHR has held many times that freedom of expression 'constitutes one of the essential foundations of a democratic society *and* one of the basic conditions for its progress and for each individual's self-fulfillment.'[153] If resources are scarce, not everyone can speak. The State then typically empowers some actors to speak, at the expense of others.[154] The more

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[151] J. Berman, D.J. Weitzner, Emerging Media Technology and the First Amendment: Abundance and User Control: Renewing the Democratic Heart of the First Amendment in the Age of Interactive Media, 104 *Yale Law Journal* (1995), p.1632.

[152] Note that, in the current distributed computing systems, the functionality and applications are distributed between the PC and one or more servers. The processing power is taken out of the central processor (such as a mainframe) and placed in the constituent parts of the network. In order to enable such distribution, there is a need for interoperability between the various pieces of code located on various servers and PCs in the network. This is achieved through rules for interconnection and interaction called "protocols". A good illustration is provided by the Internet protocols (TCP/IP).

[153] For example, *Lingens v. Austria*, Judgment of 8 July 1986 (No. 103), 8 EHRR 103 (emphasis added).

[154] Y. Benkler, 'Siren Songs and Amish Children: Autonomy, Information, and Law.' [hereinafter 'Siren Songs'], 76 *NYU Law Review* (2001) 23, pp.26-27. One might solve this conflict by choosing for one of those values or normative commitments. For example, Fiss is of the view that the democracy-rationale warrants State intervention for the purpose of improving public deliberation of important societal issues. O.M. Fiss, *Liberalism Divided: Freedom of Speech and the Many Uses of State Power,* (Oxford, Westview Press, 1996), pp.37-38. Alternatively, one might consider that respect for autonomy is more critical, and actually represents the key reason for protecting the right to freedom of expression. Post, for instance,

resources there are, the more those two normative criteria underpinning Art.10 ECHR will support the introduction of access rights in the interest of Art.10 ECHR. This is because autonomy is grounded in a person's communicative environment. Just like a robust political debate, autonomy depends on the widespread availability of information about diverse ways of living, coming from a large number of, sometimes conflicting, sources. We are not fully autonomous, or cannot achieve self-fulfillment until we actually perceive the other options that are open to us; or until we deliberately fulfill our goals by rejecting conflicting, sometimes antithetical solutions. [155]

In software environments, the scarcity in information is *created* by the law, not by the facts or characteristics of the good. The current policy lever used in the 1991 Software Directive is the permissibility of reverse engineering for achieving interoperability. This paper has argued that it is doubtful whether the balance struck by the law is correct from an innovation point of view. More importantly, as software takes center stage a number of equally important facets come to the fore, and innovation and current property rights in software are on a collision course with the right to freedom of expression and its inherent foundations: autonomy and democracy. A law that values those normative underpinnings will strive for a maximum modularity and decentralization.[156] To this effect, there are many additional ways to fine-tune the law according to society's interests in property, innovation and free expression. Thus, the law could impose interface disclosure in certain well-defined circumstances, it could impose standardization of critical interfaces, or foster the creation of a market in interfaces by allowing for third-party licensing of interface information obtained through reverse engineering.

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argues that State intervention in media matters actually undermines the very respect for autonomy that is foundational to the democratic ideal. R. Post, 'Equality and Autonomy in First Amendment Jurisprudence', 95 *Michigan Law Review* (1997) 1517, pp.1538-1539.

[155] Y. Benkler, Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment, 11 *Harvard Journal of Law & Technology* 287 (1998), p.387. Y. Benkler, 'Siren Songs', *supra*, pp.39-40.

[156] Modularity is a means of managing complex systems. It involves breaking up complex systems into discrete pieces which can then communicate with one another only through standardized interfaces with a standardized architecture. J. Farrell, P.J. Weiser, Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age, 17 *Harvard Journal of Law & Technology* (2003), pp.87 and 95. Due to this modularization, *function* can now be placed freely within the system. Consequently, each layer of functionality is potentially open to new entrants which specialise in further developing the components of the system. Innovation and improvement is vested in many potential hands. The whole system will become more complex as old modules are split and new ones added to the system to existing interfaces. A. Ottolia, D. Wielsch, Mapping the Information Environment: Legal Aspects of Modularization and Digitalization, 6 *Yale Journal of Law & Technology* (2004), p.174; See C.Y. Baldwin, K.B. Clark, *Design Rules. The Power of Modularity.* (Cambridge Massachusetts, MIT Press, 2000), pp.6-14; Y. Benkler, 'Coase's Penguin, or, Linux and the Nature of the Firm.', 112 *Yale law Journal* (2002).

V. Conclusion

A badly designed dam does not only affect the flow *down*stream, but also creates floods *up*stream. Similarly, overly concentrated media impact the flow of information that reaches end-users, and at the same time affect the type of content that will be produced. This is so, first, because the ownership of the media will determine the type of content and opinions that are submitted to these media in the first place. Second, the input of opinions and content that will be produced depends on the previous output of content. Like the dam, media companies and their artifacts (networks, software, etc.) act as powerful filters on the flow of information that reaches the end-user. Overly concentrated media markets create a downward spiral to more concentration.

This paper has used the above insight to analyse the software layer of our communications infrastructure. Indeed, concentrated ownership of the software layer will impact the flow of information or ideas that reaches, and is produced by end-users. In its report on the 1991 EU Software Directive, the Commission expressed the view that "[t]he overall results show that the objectives […] have been achieved and the effects on the software industry are satisfactory. […] On the basis of these results there appears to be no need to amend the Directive."[157] The thrust of this piece is however that the balance struck in the Directive with a view to fostering software innovation, needs to be re-assessed in the light of the right to freedom of expression (Art.10 ECHR). Copyright law is often referred to as an "engine of free expression"; it arguably incentivises creation. But software itself, in its functional capacity, is also an increasingly important engine or medium for imparting information or ideas. Problems may arise when those two "engines" fail to push in the same direction. Many communicative acts now take place by means of digital communication paths, of which software forms the heart. The balance struck by the law thus also needs to account for the autonomy and democracy rationales underpinning Art.10 ECHR.

In essence, the issue can be reframed as a conflict between two fundamental rights – property rights in information, and freedom of expression. The software layer is built of information; a series of superposed information platforms. In view of the tendency of software platforms to lead to concentration, controllers of those platforms might increasingly face access claims from both content and software producers on the basis of the right to freedom of expression. In the software market, copyright law has *two* interrelated silencing effects. First, the balance struck by copyright law has the effect of silencing at least some software expression. Second, this is likely to affect other types of expression in that some software expression that is being silenced by copyright constitutes an alternative means for (non-software and software) expression. Certain players will thus acquire tremendous power over content producers.

This debate can best be understood in the light of two recent trends; namely the rise of private property and increasing protest of small interest group protests against the

[157] Report from the Commission to the Council, European Parliament and the Economic and Social Committee on the implementation and effects of Directive 91/250/EEC on the legal protection of computer programs, COM(2000)199 final, p.1.

latter phenomenon.[158] In this respect, the seminal *Appleby* and *Chassagnou* cases suggest that third party access claims might not be successful all that easily. In those two cases the Court appeared to favour private property rights in tangible facilities, backed up by (negative) rights of freedom of expression, against third party access claims to this private property. As any property right contains an inherent negative facet not to express cedrtain information or ideas, one may wonder under what circumstances the Court will allow third party expression to override the property owner's interests. The court may be criticised for its decisions in both *Appleby* and *Chassagnou* for its overly static approach, lack of normative reasoning, and its excessive reliance on the public/private distinction.

Software interfaces are perfect examples of the difficulty in applying the latter distinction in the communications sector. Interfaces are neither completely private, nor completely public property, but something in between. Interfaces are examples of information whose regulation will favour certain players' influence over other players' participation in the market. Instead of relying on the private or public nature of a facility, courts ought to focus on the nature of the expression and the nature of the property interest at stake. This paper argues that courts will need help for accurately evaluating this and that more regulatory guidance is needed for a proper regulation of software interoperability. A society that values media pluralism and free expression will strive for a legal framework favouring maximum modularity and decentralisation, in the interest of autonomy, democracy, and access to markets.

[158] See *Steel and Morris v. UK*, Judgment of 15 February 2005, available at www.coe.int. In *Steel*, the ECtHR criticised the way in which UK laws had failed to protect the public's right to criticise corporations whose business practices affect people's lives and the environment, thus violating Art.10 ECHR. The McLibel campaign concerned widespread grass roots protests and defiance against McDonald's business practices.