

# The Future of DRM – Lessons from History and the New Challenge from Open Licensing Initiatives

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## 1. Introduction

Today, in practice every major record label and movies studio sells its products on the Internet with some kind of Digital Rights (or Restrictions) Management (DRM for short) attached. Labeled as “legal downloads”, the entertainment industry is pushing their new offerings in the hope to replace old physical formats such as non-DRM CDs. In side, they aim to increase control on how entertainment is consumed.

The trend is actually nothing new. As long as there has been markets for digital products, there has been initiatives to add digital or physical restrictions on how those products can be used. The well-known problem, sometimes called as the digital dilemma, stems from the selected business model: price is per copy. And this means any additional copy made and distributed by the customer means lost sale opportunities.

Interestingly, despite decades of history, we still don't have any general DRM system in place on our personal computers. This article starts by shedding some light on DRM's unfortunate history on computer systems. It turns out that early software product companies didn't use DRM after careful analysis in the 1970s. In the 1980s, DRM systems didn't fair much better on personal computer markets. And in the 1990s all the way to early 2000s, the most prominent initiative to push DRM into digital music and movies failed. It is suggested that the main reasons for failures were that the initiatives compromised usability too much and didn't provide any benefits to users.

But today the picture looks a little bit different. The entertainment industry seems to have agreed with the technology industry to use DRM to create global entertainment markets. Now, as the typical user profile has shifted towards non-technical, the main challenge to DRM does not come from the end-users directly. It comes indirectly from the developers of free and open source software and the advocates of open content. The growing popularity of different “open” licensing models coupled with their anti-DRM policies means that a DRM-world may not still happen to the extent entertainment industry hopes for. It is argued that the problems encountered during the early history of DRM are still valid today. This time the entertainment industry should in fact strike a deal with the open source and free culture communities representing the old complaining user community. At minimum, DRM can never be mandatory and the distribution channels must be open to alternative business models as well.

## 2. Early History of DRM in the Software Industry

### 2.1 IBM's early policy

As the software product markets were about to open in the late 1960s, the practical monopolist IBM made a crucial decision not to use any kind of DRM system. The man in charge of this policy decision later remembered the grounds as follows:<sup>1</sup>

*“While we thought that cryptography might be technically feasible, particularly with special hardware assists, every approach we could think of would have made it difficult for reputable customers to use our programs. Large businesses often needed backup copies, programs were frequently moved among machines, and IBM encouraged upgrading to larger systems. With cryptography, these activities would all require IBM permission. We felt that this would be impractical and inconvenient for users and expensive for IBM. We also concluded that any single-machine locks and keys, or special time-out and self-destruct programs, would be onerous to our best customers and not effective against clever thieves. Because we could not devise practical physical security measures, we had to rely on the inherent honesty of our customers.”*

This clip has basically all the main arguments. IBM feared that software, the first easily replicable digital product generally marketed, would be copied without their authorization. With a practical monopoly position over both software and hardware markets of the time IBM could have introduced any kind of copy protection mechanism. But they did not. They didn't think about protection, restrictions or intellectual property in the first place. They thought about customer needs.

IBM's decision may sound even more astonishing when one takes into account that at that time neither copyright nor patents were available for software. US copyright law was the first in the world to explicitly grant copyright protection for software in 1980. Patents were also practically out of question at least until 1981, when the US supreme court for the first time enforced a software patent. But from the late 1960s throughout the 1970s and further to 1980s IBM's policy worked. Many software companies were in fact not worried about the legal protection of software in the first place.

## 2.2 Software Mass markets

Then came the microcomputer revolution and the software mass markets were born. In 1976 Bill Gates sent his now infamous email to software hobbyists who shared among others the software of Gates' new start-up. He wrote:<sup>2</sup>

*“As the majority of hobbyists must be aware, most of you steal your software. Hardware must be paid for, but software is something to share. ... One thing you do is prevent good software from being written. Who can afford to do professional*

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<sup>1</sup> Watts S. Humphrey (2002): “Software unbundling: a personal perspective”, *IEEE Annals of the History of Computing*, Volume 24, Issue 1, pp. 59-63.

<sup>2</sup> William H. Gates (1976): “An Open Letter to Hobbyists”, 3rd February 1976, available e.g. at <http://www.blinkenlights.com/classiccmp/gateswhine.html>

*work for nothing? What hobbyist can put 3-man years into programming, finding all bugs, documenting his product and distribute for free?"*

When personal computer software mass markets quickly expanded in the early 1980s, many of the new software companies started to use extensively different copy protection mechanisms to prevent unauthorized copying. Some of the early copy protections techniques were based on hardware tricks. For example, the popular spreadsheet program Lotus 1-2-3 had a following kind of system:<sup>3</sup>

*"The program required the user to initial the 123.EXE loader with owner information before the program would run. However, this initialization could only be performed on the original system disk. It turns out that the system disk contains a specially formatted track, which must be present for the initialization process to proceed (this track is completely trashed by the install program after the disk is initialized making it impossible to reverse the process)."*

The copy protection systems didn't however solve the problem of unauthorized copying. Instead, software buyers became annoyed since copy protections compromised usability. For example, when hard disks became more popular and copy protections effectively prevented software installation on the hard disk. Copy protections also prevented backup copies. The results was that users developed specific software to circumvent unable copy protection systems:<sup>4</sup>

*"So copy-protection removal software was born. Its original intent was to let legal software owners make legal backup copies of their software. In a day when some word processor, spreadsheet, and other software cost US\$495 or more it was much too costly to just go and buy another copy if one or more disks went bad. And many refused to pay software companies up to US\$25 PER DISK for replacements. They would simply buy a less expensive product."*

In the end, none of the software copy protection initiatives, were they based on hardware or software, proved successful enough to become standard. The role of copy protections was re-evaluated and many leading software companies chose not to use them at all. Copy protection didn't succeed in courts either. A 1988 case had explicitly stated that copy protection systems did not enjoy any special legal protection in the US. Towards the late 1980s, the software copy protections almost disappeared from the markets.

### 2.3 Legal protection of software DRM.

Interestingly enough, Europeans decided to legally ban the circumvention of software copy protections when their market-push was no longer strong. American software industry heavyweights of the time started to lobby from the

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<sup>3</sup> See Tomboy's message, 31st March 1998, for a collection of copy protection mechanisms (and easy cracks for them) used in Lotus 1-2-3 spreadsheet application during the 1980s. Available at <http://www.woodmann.com/fravia/123dos.htm>

<sup>4</sup> For a review of such software see e.g. <http://www.dans20thcenturyabandonware.com/d2ca-ssg-dos.html>

late 1980s that Europe should include a strict copy protection ban in their coming software copyright directive. They did succeed – but only partially. Article 7 of the European software directive, which was finally accepted in 1991, stated:

*“Member States shall provide, in accordance with their national legislation, appropriate remedies against a person committing... any act of putting into circulation, or the possession for commercial purposes of, any means the sole intended purpose of which is to facilitate the unauthorized removal or circumvention of any technical device which may have been applied to protect a computer program.”*

To achieve a reasonable balance, the directive added substantial exceptions to the ban. It made explicitly clear that the circumvention ban would not override (1) the right to make backup copies, (2) the right to use the software for its intended purpose, (3) the right to study how the program works and (4) the right to reverse engineer the binary code for the development of interoperable new software. Also, it was required that “the sole intended purpose” of the circumvention software would be to further unauthorized copying. If the circumvention would have any lawful justification, not explicitly specified in the directive, it would be obviously allowed.

One may still ask why was the ban needed in the first place? If someone makes a copy of a software product, then he infringes copyright. Why would the control of copying require double protection – by copyright itself and by circumvention ban on top of it? In fact, the importance of the ban becomes clearer in the long-term DRM policy development. While the directive was in the end a somewhat reasonable compromise between the interests of DRM lobbyists and software users, it was the first time when copy protection circumvention ban was implemented in any legislation. It made an example for future legislators and lobbyists no matter how balanced the outcome was.

### **3. Online music and video and the revival of DRM**

#### *3.1 Early initiatives*

Towards the late 1990s users started to have enough recording capacity to store digital music for the first time on their personal computers. Bigger hard drives, CD-R format and broadband Internet connections were breaking through. Then came Napster, the first user-to-user file exchange service. Suddenly, the hottest format for music was mp3 and not CD.

About this time the entertainment industry coined out that it could break the CD standard and introduce copy protection systems on CDs to stop the “rampant theft” of their property as the rhetoric goes. The practical initiatives have, however, been subject to many failures. Since at least 2002 tens of different copy protection schemes on CDs have been tried and quietly forgotten. The main problems have been that the systems have compromised the usability too much without giving any added value to consumer experience.

The industry's move to establish a "legitimate" DRM-protected digital delivery channel has been almost as unsuccessful. The first grand proposals like the original DivX for online movies and SDMI for online music were famous failures. For example the protection scheme used in SDMI was circumvented before the system was introduced on the markets.<sup>5</sup>

### *3.2 DRM returns with the help of technology industry*

During the last few years, DRM systems have finally been introduced to the mass markets of online music and videos. Interestingly, technology companies such as Apple and Microsoft have been in the forefront. Launched in late 2003, Apple's iTunes has become so far the most popular DRM delivery channel. One of the keys to Apple's "FairPlay" DRM standard's success has been allegedly its fairly liberal usage terms. The system allows users to make back-ups basically meaning that the user owns the copy. FairPlay has received only some (not crucial) negative consumer feedback from incompatibility issues, low quality etc. The system can be circumvented but there isn't much incentive for hacking: higher quality unprotected music and video files can be downloaded from peer-to-peer networks and each new version of FairPlay has been incompatible with the hacks.<sup>6</sup>

For Hollywood-content the question has never been whether DRM but how fair and how interoperable it is going to be. It now seems that DRM may in the end work if the entertainment industry only succeeds with negotiating a fair compromise with the technology developers. So far major technology companies such as Apple and Microsoft have not been willing to compromise with media industry's demands to extremes. The future media center PC requires that one can copy content files on hard disk and even manipulate them with software. Thus, technology industry has taken the role of mediating user interests with entertainment industry control aspirations.

But one can not take it for granted that the achieved balance would be maintained in the future. For example, the recent legislative changes in the form of EU copyright directive from 2001 and US Digital Millennium Copyright Act from 1998 have arguably strengthened the position of the entertainment industry. Article 6 of the directive clearly states that:

*"Member States shall provide adequate legal protection against the circumvention of any effective technological measures, which the person concerned carries out in the knowledge, or with reasonable grounds to know, that he or she is pursuing that objective."*

Thus, it is now generally illegal to circumvent any technical protection mechanism used in digital content products. Further, the new laws do not

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<sup>5</sup> See SDMI.org.

<sup>6</sup> In fact, competitor complaints may end up being more crucial to open up the FairPlay standard. Currently, FairPlay-encoded music and videos can be only played on Apple's software (iTunes) and devices (iPod).

include such balancing factors found in earlier legislation on software DRM. Once the content is locked, it will always remain locked.

#### 4. Open source and free culture challenge

Somewhat surprisingly, a more long-lasting future balancing factor to entertainment industry control aspirations may come from user developers. Different “open” –licensed digital products have brought a new challenge to the triumph of DRM systems and entertainment industry control. As technology industry is using more and more open source software in critical systems, the usage policies set by open source developers are gaining more role.

A new draft version of the most popular open source license GNU GPL takes an explicitly opposing role towards DRM. It states:

*“... this License intrinsically disfavors technical attempts to restrict users’ freedom to copy, modify, and share copyrighted works. Each of its provisions shall be interpreted in light of this specific declaration of the licensor’s intent. Regardless of any other provision of this License, no permission is given to distribute covered works that illegally invade users’ privacy, nor for modes of distribution that deny users that run covered works the full exercise of the legal rights granted by this License.*

*No covered work constitutes part of an effective technological protection measure: that is to say, distribution of a covered work as part of a system to generate or access certain data constitutes general permission at least for development, distribution and use, under this License, of other software capable of accessing the same data.”*

In other words, the license tries to make sure that software licensed under it can not be used as a part of a DRM system. First, it says that DRM can not be enforced against its terms so the copying, modification and distribution of the software can not be restricted. Second, the system itself can not gain legal protection as defined in EU copyright directive or Digital Millennium Copyright Act (“effective technological protection measure”).

Also open content initiatives challenge the “DRM-future” by building a stock of “free” content, which explicitly can not be distributed in DRM-only channels. Since its launch in 2002, the licenses of the most popular open content project Creative Commons have been already attached to over 15 million works on the Internet. These licenses explicitly prohibit that any DRM system could add further restriction on the licensed products:

*“You may not distribute, publicly display, publicly perform, or publicly digitally perform the Work with any technological measures that control access or use of the Work in a manner inconsistent with the terms of this License Agreement.”*

If software and content under this kind of license clauses become more common it is entirely possible that the amount of DRM-free delivery channels and DRM-

free content increases. It also means that the future media center PC can not discriminate software or content because it uses or does not use DRM.

## 5. Conclusions

In their popularized book about the economics of information, Carl Shapiro and Hal Varian concluded that one should maximize the value of information, not its protection.<sup>7</sup> On this basis, what the entertainment industry is doing may sound counter-intuitive. If copy protections do not work why use them in the first place? The only plausible answer is that the existing price-per-copy business models is too profitable. Thus, the entertainment industry has decided to use restrictions and has also been fairly successful in lobbying laws that protect their business model. However, the history of DRM also shows that it is impossible to control how the products will be used in the end. If usage restrictions are too strict, there will be incentives to circumvent.

For the society as a whole, the first best solution may be no technical protection at all. In software, open source has proved both the production and delivery system can work without usage restrictions. In other digital product categories, the world wide web has proved there will always be good quality text, pictures, music and videos available without DRM. The main question now is, whether the DRM-enabled and DRM-free models will coexist in the same communication channel.

Recent trends in open licensing suggest that if the entertainment industry wishes to build delivery channels that satisfy the needs of the majority of the users, there must be "open" alternatives available. And the open alternatives may not co-exist in DRM-only channels. Thus, it is hard to think of a future where DRM would be mandatory. A more probable future brings us with entertainment industry distribution channels, in side with the open Internet, which do not discriminate alternative business models and DRM-free digital products.

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<sup>7</sup> Carl Shapiro and Hal Varian (1998): Information Rules. Harvard University Press.