INDICARE

Content Providers' Guide to Digital Rights Management

Any side effects in using DRM?

This guide intends to inform content providers as actual and potential users of DRM systems about risks and opportunities with respect to consumer acceptability.

A Publication by the INDICARE Project
http://www.indicare.org

▶▶ INDICARE

About this guide

This guide is written by INDICARE team member Philipp Bohn, Berlecon Research, with input from Carsten Orwat and Knud Böhle, both from FZK-ITAS. The guide is based on findings of the INDICARE project. You are invited to send your comments on this guide to Philipp Bohn (pb@berlecon.de) or to the project co-ordinator Carsten Orwat (orwat@itas.fzk.de).

March 2006
http://www.indicare.org/user-guide/

About INDICARE

INDICARE is the "Informed Dialogue about Consumer Acceptability of DRM Solutions in Europe". INDICARE has gathered an extensive body of experience and knowledge through its work and dialogue with industry stakeholders and interest groups. It initiated dialogue primarily through a peer-reviewed online journal, international expert workshops, interviews, and two major consumer surveys. The INDICARE project is conducted by the following partners:

- Forschungszentrum Karlsruhe, Institute for Technology Assessment and Systems Analysis (FZK-ITAS), Project Co-ordination
- Berlecon Research GmbH, Berlin
- Institute for Information Law (IViR), University of Amsterdam
- Budapest University of Economics and Technology, SEARCH Laboratory

Disclaimer

This document provides links to other internet sites for the convenience of users. The author/authors of this document is/are not responsible for the availability or content of these external sites, nor does/do the author/authors endorse, warrant, or guarantee the products, services, of information described or offered at these other internet sites.

Copyright

Table of contents

Introduction

Objective of this guide

Digital Rights Management (DRM) systems comprise all technologies that help to enforce license agreements between content providers and consumers of digital content. These technologies are intended to protect digital content from being used without the proper authorization of the rights holder.[1] Excluded are systems that merely restrict access to content (e.g. via passwords), which do not have the capability of controlling and monitoring usage.

The inherent problem of DRM technologies is that they suffer from an acute lack of acceptance by consumers when they are at odds with consumers' legitimate interests and expectations. But consumer acceptability of DRM is not merely an ethical issue. By decreasing the value and attractiveness of digital content products for consumers, DRM bears the severe risk of limiting the growth potential of digital content markets. This cannot be in the interest of DRM users such as content providers, technology developers, music labels, movie studios, but also artists and authors.

This INDICARE Guide intends to inform actual and potential users of DRM technologies, i.e. mainly content providers, about the basic risks and opportunities with respect to consumer acceptability.

Drawing from an intense dialogue with numerous stakeholders and our own research, we have compiled the most important DRM-related issues that are essential for the proper deployment of DRM systems respecting consumers' legitimate interests.[2] Following the presentation of each topic we will describe opportunities and possible implications for action. We will also present threats that might result from the deployment of DRM systems that are not convenient for consumers.

As the market for digital music is the most developed online market to date, many examples will be from this sector. However, similar issues are likely to arise when distribution of higher-value content continues to become more viable technologically as well as economically.

DRM technologies

Today, there are a few major players serving the consumer market for online music and its protection: Apple, Microsoft, Sony and RealNetworks. Some of them have developed proprietary DRM system, such as Microsoft (Windows Media DRM), Apple (FairPlay) or Sony (ATRAC). RealNetworks has licensed Windows Media DRM, while Apple does not license its technology. It must be assumed that with the advent of new services and products, new DRM technologies will enter the market. For example, Google protects video content with its proprietary DRM system[3]; the dominating protective system for mobile content is OMA DRM, developed by the Open Mobile Alliance, an industry body[4]; physical media such as CDs and DVDs are usually protected using DRM systems from Intertrust, Macrovision and SunnComm. Given the dominance of Adobe's PDF format, most electronic documents and eBooks are secured using Adobe's DRM system.

---

1 For an introduction to DRM cf. Becker, Eberhard; Buhse, Willms; Günnewig, Dirk; Rump, Niels: Digital Rights Management – Technological, economic, legal and political aspects, Berlin Heidelberg New York 2003; Rosenblatt, Bill; Trippe, Bill; Mooney, Stephen: Digital Rights Management – Business and Technology, New York Cleveland Indianapolis 2002.
2 For an overview of current DRM technologies and business models, cf. the INDICARE State-of-the-Art Reports 2004 and 2005.

3 Vance, Ashlee: Is Google DRM crippling culture as great as it seems?, The Register, 8 January 2005.
4 Cf. Open Mobile Alliance: Digital Rights Management, OMA Short Paper, December 2003.

1 The Target of DRM

Pirates or customers?

The most prominent purpose of DRM is to protect content from unauthorized use, hence to stop or at least limit illegal distribution of digital goods. There is a host of alternative protective technologies on the market which all require considerable investments by their users (see above, *DRM technologies*).

However, many times a newly developed DRM system is introduced to the market, some group or individual has announced its circumvention soon afterwards. Once a DRM system has been broken, the content it was supposed to protect can be distributed over unlicensed Peer-to-Peer (P2P) networks or other channels. Thus, high investments in DRM systems regularly turn out to miss their stated goal of preventing illegitimate use. Currently, the preferred solution to this problem appears to be developing unbreakable DRM systems, including trusted environments. Within these environments, a trusted member or third party must license all hardware and software components that are necessary to handle content.[5]

Threat: Taking into account that presently available systems already impose certain limitations on usage rights and ease of use for actual or potential consumers (see below, *2 Ease of Use*) and collide significantly with their legitimate interests and rights, alternatives to strong technical protection should be considered. Paying customers would suffer most from prohibitively tight protection measures that unnecessarily limit usage rights.

With growing complexity, sophisticated DRM systems will be ever more expensive. This would diminish profit margins or necessitate price raises for consumers, or both.

Opportunity: DRM systems can act as "speed bumps", delaying (but not entirely preventing) illegal diffusion. But more importantly, through their ability to create diverse access schemes to content, DRM systems may help to combat piracy if they support truly attractive content offerings that are tailored to consumers' individual needs (see below, *9 Content as a service*).

Implication: DRM systems' technical specifications need to aim at potential customers rather than potential pirates. Digital content products and services as well as their technical protection systems need to be designed in a way that offers customers the highest possible value-added. Instead of trying to combat piracy with DRM technologies that are not in line with consumers' expectations, media companies should focus on offering superior services for those customers that are eventually willing to pay for digital content if they get value for money.

2 Ease of Use

The best DRM comes unnoticed – but not unknown

Many DRM-based content offerings today have severe deficiencies when it comes to ease of use. Most DRM-systems require, for example, the download of specific client-software that varies from provider to provider, prohibit the uncomplicated use of different content formats on different devices, and restrict the usage of purchased content (e.g. by limiting the number of copies, burns or the sharing of files).

The first INDICARE consumer survey has shown that consumers are used to frequently burn, share, and store digital content files and will hardly accept offerings that do not support this behaviour.[6] If they repeatedly reach the boundaries of the underlying DRM system, they

---

5 Cf. Gehring, Robert A.: Trusted computing for digital rights management, INDICARE Monitor, Vol. 2, No. 12, February 2006; Kuhlmann, Dirk; Gehring, Robert A.: Trusted platforms, DRM, and beyond, in: Becker, Eberhard; Buhse, Willms; Günnewig, Dirk; Rump, Niels (eds.): Digital Rights Management – Technological, economic, legal and political aspects, Berlin Heidelberg New York 2003, pp. 178 – 205.

6 Cf. INDICARE Consumer Survey: Digital music usage and DRM, May 2005.

will be annoyed and discouraged from using the related service again. Thus, the best DRM technology actually remains unnoticed by consumers.

At the same time, however, consumers need to be transparently informed about usage restrictions that apply and about the technologies that are used to enforce these restrictions. This is not only necessary for them in order to make informed choices. It is also necessary because otherwise they might misattribute usage restrictions to technical difficulties and quality of service.

Threat: If DRM hinders ease of use, the offered content is of limited value to consumers. As a result, it will be hard to compete with illegal and free content on the internet. In addition, recent cases have demonstrated that the deployment of less transparent and intrusive DRM systems can have a negative impact on a company's public image[7], and might even result in legal action and costly callbacks.[8]

Opportunity: DRM technologies can be supportive of user-friendly features such as pre-listening or pre-viewing, recommendation and sharing tools, legal P2P distribution, community-based features or personalized services. Such features increase the value of the related content product and will help to advance the commercial digital content market.

Implication: DRM systems should be in line with customers' needs and consumption behaviour, so consumers can remain "ignorant" of the technology. At the same time, the scope of technical protection measures must be communicated in a transparent and easy way.

3 Interoperability

Consumers want to access paid content on any device

Consumers buy content and devices from a multitude of vendors and distributors. On the one hand, a broad range of offerings is welcome from the perspective of consumers. On the other hand, the lack of interoperability between competing services, devices and the applied DRM systems presents a significant drawback for them. If a consumer decides to buy a specific player, he or she can often purchase online content only from a download store supporting the respective DRM technology. The same is valid for the opposite direction: content purchased from a specific store may require specific soft- and hardware.

Another interoperability issue is one-way versus two-way interoperability between mobile and stationary devices. Although some content providers support transfer from mobile devices to PCs, transfer in the opposite direction is not enabled in many cases. The so-called "walled-gardens" created by competing DRM systems remain strictly separated from each other.

Threat: Finding out with hindsight that purchased content and hardware is not interoperable leads to frustration of consumers, ultimately limiting the growth potential of commercial content offerings. This is particularly relevant if one considers that the DRM-free MP3 format is compatible with almost any device and player software.

Opportunity: Device interoperability is a key demand of consumers and they attach significant value to services that support the easy transfer of content between devices.[9] Improving interoperability of different services and devices will therefore help to increase the value-added of commercial digital content offerings for consumers and their willingness to pay.

7 Helberger, Natali: The Sony BMG rootkit scandal, INDI-CARE Monitor, Vol. 2, No. 1, January 2005.

8 Russinovich, Mark: Sony, rootkits and digital rights management gone too far, Sysinternals, 31 October 2005; Ward, Mark: Sony BMG repents over CD debacle, BBC News, 9 December 2005.

9 Cf. INDICARE Consumer Survey: Digital music usage and DRM, May 2005.

Implication: Some companies have already reached (bi-lateral) agreements to support each other's file- and DRM-formats.[10] Furthermore, a number of industry consortiums have been established to make DRM and file formats compatible (e.g. the Open Mobile Alliance, the Coral Consortium or Marlin JDA, assembling major hardware and entertainment companies).[11] The efforts within these bodies and between companies need to be further intensified, in order to give more choice and freedom to consumers.[12] Where interoperability cannot be provided, consumers need transparent information about compatibility of related products and services to avoid frustration and to help them make informed decisions.

4 Long-Term Impact

DRM can conflict with product life cycles

Online content wrapped into DRM can be authenticated to be accessible only on a number of stationary and mobile devices. It is up to content providers and distributors to set the limit. If consumers move content from one device to another that also belongs to them, that second device must be authenticated. This measure is supposed to inhibit illegal distribution. However, at the end of the respective product life cycle, owners will replace their authenticated devices. Although in most cases licenses can be saved and transferred, consumers may risk the loss of legitimately acquired digital files. The same also holds true for vital parts of computers, like a central processor or motherboard.[13]

Similar frustrations may emerge when consumers do not fully realise that DRM-protected con-

tent from subscription services will be inaccessible after the subscription period.

Threat: The effort a single consumer is faced with when transferring DRM licenses from one device to another can become prohibitively complex when multiple vendors and distributors are involved. In some cases, even support from the original device manufacturer may be required. Additionally, in some cases, changes in business practices of the DRM technology provider can cause not only burden for consumers but also extra costs for content providers to adjust their distribution solutions. For instance, it can be necessary to acquire and install a new system when the old one is no longer supported by the technology provider.

Opportunity: Content that remains playable without investing any additional effort means added usability and thus value to the consumer.

Implication: DRM users need to evaluate its long-term impact when deploying a specific DRM system. Technical specifications and cooperation agreements need to be designed promoting ease of use for consumers in the long run.

5 Special Needs

Not all consumers will access and use content in the same way

When applying DRM, content providers need to be aware that consumers are very heterogeneous and have very different needs. Consumers with physical disabilities may be confronted with particular disadvantages caused by DRM systems. For example, digital content often needs to be re-formatted to make it accessible for visually impaired people (e.g. text-to-voice transformation).[14] However, it is DRM technology's purpose to prevent use that is not explicitly covered by the license agreement – such as

---

10 Bohn, Philipp: Mobile DRM convergence, INDICARE Monitor Vol. 2, No. 6, August 2005.

11 Rosenblatt, Bill: Coral Consortium aims to make DRM interoperable, DRM Watch, 7 October 2004.

12 Cf. IFPI Digital Music Report, London 2006, p. 22 (DRM & interoperability: The keys to future growth).

13 Cf. Microsoft: The Windows media digital rights management system may not work if your computer hardware changes, last review 6 January 2005 (company's support website).

14 Mann, David: Digital rights management and people with sight loss, INDICARE Monitor, Vol. 2, No. 11, January 2006.

altering the file. Ordinary DRM systems cannot differentiate between consumers' legitimate and illegitimate needs or cannot grant exceptions.

Threat: Consumers with special needs, in particular those who are physically impaired (be it permanently or temporarily), face the threat of being hindered to access digital content. This is caused by the fact that DRM is normally used to tie consumers to a certain piece of player software preventing the transformation of formats (e.g. from text to speech) and the transfer to other devises including special readers for e.g. people with disabilities. However, in the case of iTunes, for example, the graphic interface is unsuitable for blind users. Being unable to play songs purchased at iTunes Music Store, these costumers might be driven to get content from other, probably unlicensed and DRM-free sources or to illegally circumvent technical protection measures.

Opportunity: Meeting the needs of physically disadvantaged customers is an obligation for companies aiming to accomplish ethical or moral standards. Granting access to digital content goods to all parts of society is an important prerequisite for a thriving digital economy. Also, communities with special needs are very loyal to accessible products and services. This means untapped commercial potential for those companies that specifically serve these markets.

Implication: There are two approaches to deal with special needs. First, channels could be established where consumers with special needs access and purchase digital content that fits their needs. The other, probably less complicated way is to employ passive DRM systems like watermarking. This would allow for altering the original file. At the same time, the watermark could contain information about the specific customer's right to do so.

6 Public Interest

Digital goods are an integral part of science and culture

Libraries and other public institutions also rely on access and usage rights as it is their task to make information goods widely available. DRM systems may collide with these institutions' mission to serve the public or scientific communities.[15] Scientific communities may suffer from restricted access to library materials. They may also be affected as authors by scientific publishers applying DRM systems to limit wide dissemination of knowledge they produce.[16]

Threat: DRM might prevent knowledge from being disseminated within or between scientific communities. In addition, DRM can conflict with public institutions' need to long-time preserve and archive information as part of the world's cultural heritage.[17] This can include digital music, movies, books, articles, or data.

Opportunity: DRM systems can be well deployed to replicate public institutions' services in the online environment. It is possible to design the DRM system so that only a defined group or number of persons is granted access to specific copyrighted material. Access rights can also be limited to a certain amount of time.

Implications: Peculiarities like these outlined above demand the stakeholders' close technical cooperation for viable solutions. Otherwise the industry could risk "collateral damages".

15 Tyrväinen, Pasi: Fair use licensing in library context, INDICARE Monitor, Vol. 2, No. 2, April 2005.
16 De Kemp, Arnoud: Science can't accept technical barriers to content use!, INDICARE Monitor, Vol. 2, No. 6, August 2005.
17 Steinke, Tobias: National libraries, preservation and digital rights management, INDICARE Monitor, Vol. 2, No. 3, May 2005.

7 Creativity and Innovation

Consumers are also distributors and producers of content

In the past, the production and distribution of music, films, and other cultural goods was prohibitively expensive for the average person. With affordable technology, today almost everyone can be a creative recipient and processor of content and information at the same time. This is often referred to as the "remix and mashup" culture, or "amateurisation".[18]

Another creative output from the side of consumers is self-published podcasts, blogs and related formats. User generated content or "mass amateurisation" is developing from being a side-phenomenon of the media landscape to forming an integral part of it.[19]

Threat: DRM largely prohibits the use of content for creative and other derivative purposes.

Opportunity: Creative people are part of a larger creative community. Especially in case an individual artist's popularity is still on the rise, remixing his or her work helps to increase awareness and circulation. Receiving constructive creative input and critique is valuable as well. The importance of user-generated content is expected to increase further in the coming years. New business models trying to profit from this development might open up new revenue opportunities.

Implication: Instead of trying to curb these developments, appropriate rights management, marketing and content distribution systems can help to financially benefit from them.[20]

---

18 Hunter, Dan: Digital rights management and mass amateurization, INDICARE Monitor, Vol. 2, Nr. 3, May 2005.
19 Cf. Pew Internet & American Life Project: Teen content creators and producers, Washington D.C., November 2005.
20 Dufft, Nicole: Podcasting-profit-possibilities, INDICARE Monitor, Vol. 2, No. 5, July 2005.

8 Alternatives

Active DRM systems are not the only way to distribute digital content

Content delivered by major providers and download stores is in most cases protected by active DRM systems. They are active in the sense that they determine what a customer can do with purchased files, e.g. the number of times they can be burned to a CD.

Threat: These technical protection measures can interfere with consumers' legitimate usage interests, such as backup copying of purchased files. As described above, they also limit the value and attractiveness of purchased content for consumers by impairing ease of use.

Opportunity: Passive and cheaper technical protection systems such as watermarking rely on the consumer's willingness to obey the license agreement. This technology refrains from limiting usage rights or inhibiting usability and is widely used by the Independent music industry, for example.[21] In case of infringement the person who violated the license agreement can be traced back and legally persecuted, if necessary. Watermarks can be used as file extensions that identify the person or entity that legally acquired the digital good.

It must be acknowledged, however, that the system has an important insufficiency: the infringing person cannot be identified with absolute certainty. After all, a third party with access to watermarked files can illegally transfer and distribute them without the legal owner's consent.

Other approaches substitute technical protection measures with levies on blank media (e.g. rewritable CDs) or co-called "cultural flatrates". In the latter case, consumers pay a premium on broadband access. A certain amount of content can then be downloaded and providers are com-

---

21 Bohn, Philipp: Attitudes towards DRM in the Independent music sector, INDICARE Monitor, Vol. 2, No. 6, August 2005.

pensated by the revenue generated by the access fee.

Implication: DRM systems should be deployed in a way that fits the requirements of the specific type of content, industry and consumers alike – as secure as necessary, and as convenient as possible.

9 Content as a Service

DRM enables attractive service-oriented business models

The discussion of DRM often concentrates on its negative impact on usability. But DRM can also help to offer more attractive products and services. Content can be provided in versions with different types of usage rights at variable prices to meet different consumer demands. One typical example is subscription. Here, DRM helps the service provider to make content accessible for the duration of the individual contract. After its expiration, the files remain on the consumer's devices but are rendered inaccessible.[22] Product-service-bundles combining digital content with other products (e.g. provide digital soundtrack with the purchase of a movie ticket) are another example that can be realised with the help of DRM.

Threat: We can see today that many consumers no longer value content as a stand-alone product. While in the analogue age consumers paid for the carrier medium of the content (CD, book, video cassette), in the digital age, consumers rather pay for complementary products and services built around content.

Opportunity: When content was still tethered to physical carriers such as CDs or paper, providers delivered static products. With the opportunities of digital online distribution, the same content can become truly versatile. It can be complemented with related services and offerings that not only offer added value to consumers

but also open up new marketing opportunities for providers. For example, with super-distribution content can be delivered within online communities that are difficult to approach with traditional instruments of mass distribution and marketing. Or customers can be offered bundles of content that are based on what they previously purchased and that reflect their preferences. If a service provides less usage options than a physical content product it should be offered with reduced prices, so that consumers can at best choose among different price-performance ratios.

Implication: If digital content is offered as a service that smoothly and intuitively integrates into consumers' online and offline lifestyles, there may be no need for overly restrictive DRM systems. Instead of trying to combat piracy with the help of technologies that limit the value of digital goods, it might make more sense to offer attractive and innovative services that are superior to illegal offerings.

---

22 Bohn, Philipp: Rent-A-Star: Do you subscribe to digital music?, INDICARE Monitor, Vol. 2, No. 4, June 2005.

Literature

INDICARE Publications

INDICARE Monitor Articles, edited by Knud Böhle, from June 2004 ongoing, http://www.indicare.org/tiki-page.php?pageName=IndicareMonitor

INDICARE State-of-the-Art Report (2004): Digital Rights Management and Consumer Acceptability. A Multi-Disciplinary Discussion of Consumer Concerns and Expectations, authored by Natali Helberger (ed.), Nicole Dufft, Stef van Gompel, Kristóf Kerényi, Bettina Krings, Rik Lambers, Carsten Orwat, and Ulrich Riehm, Dec 2004, http://www.indicare.org/tiki-download_file.php?fileId=60

INDICARE State-of-the-Art Report, First Supplement (2005): Digital Rights Management and Consumer Acceptability. A Multi-Disciplinary Discussion of Consumer Concerns and Expectations, authored by Natali Helberger (ed.), Nicole Dufft, Margreet Groenenboom, Kristóf Kerényi, Carsten Orwat, and Ulrich Riehm, May 2005, http://www.indicare.org/tiki-download_file.php?fileId=111

INDICARE Consumer Survey (2005): Digital Music Usage and DRM, authored by Nicole Dufft (lead analyst), Andreas Stiehler, Danny Vogeley, and Thorsten Wichmann, May 2005, http://www.indicare.org/tiki-download_file.php?fileId=110

INDICARE Consumer Survey (2006): Digital Video Usage and DRM, authored by Nicole Dufft (lead analyst), Philipp Bohn, Andreas Stiehler, and Thorsten Wichmann, Feb 2006, http://www.indicare.org/tiki-download_file.php?fileId=170

INDICARE Workshop Report (2004), Business Models for Mobile Music and DRM, authored by Kristóf Kerényi, Sep 2004, http://www.indicare.org/tiki-download_file.php?fileId=49

INDICARE Workshop Report (2005): E-Payment and DRM for Digital Content, authored by Ernő Jeges and Kristóf Kerényi, Feb 2005, http://www.indicare.org/tiki-download_file.php?fileId=98

INDICARE Workshop Report (2005): Fair DRM Use, authored by Mara Rossini and Natali Helberger, May 2005, http://www.indicare.org/tiki-download_file.php?fileId=146

INDICARE Workshop Report (forthcoming in 2006): Digital Rights Management in Public Science, authored by Carsten Orwat

INDICARE Workshop Report (forthcoming in 2006): Human Factors of Digital Rights Management, authored by Kristóf Kerényi

INDICARE Guide (forthcoming in 2006): Consumer's guide to copy-protected music, film and text, authored by Margreet Groenenboom and Natali Helberger.

References

Bohn, Philipp: Attitudes towards DRM in the Independent music sector, *INDICARE Monitor*, Vol. 2, No. 6, August 2005, http://www.indicare.org/tiki-read_article.php?articleId=130

Bohn, Philipp: Mobile DRM convergence, *INDICARE Monitor*, Vol. 2, No. 6, August 2005, http://www.indicare.org/tiki-read_article.php?articleId=135

Bohn, Philipp: Rent-A-Star: Do you subscribe to digital music?, *INDICARE Monitor*, Vol. 2, No. 4, June 2005, http://www.indicare.org/tiki-read_article.php?articleId=112

De Kemp, Arnoud: Science can't accept technical barriers to content use! Interview with Ulrich Riehm, *INDICARE Monitor*, Vol. 2, No. 6, August 2005, http://www.indicare.org/tiki-read_article.php?articleId=129

Dufft, Nicole: Podcasting-profit-possibilities, *INDICARE Monitor*, Vol. 2, No. 5, July 2005, http://www.indicare.org/tiki-read_article.php?articleId=122

Gehring, Robert A.: Trusted computing for digital rights management, *INDICARE Monitor*, Vol. 2, No. 12, February 2006, http://www.indicare.org/tiki-read_article.php?articleId=179

Helberger, Natali: The Sony BMG rootkit scandal, *INDICARE Monitor*, Vol. 2, No. 1, January 2005, http://www.indicare.org/tiki-read_article.php?articleId=165

Hunter, Dan: Digital rights management and mass amateurization, *INDICARE Monitor*, Vol. 2, Nr. 3, May 2005, http://www.indicare.org/tiki-read_article.php?articleId=106

IFPI: *Digital Music Report 2006*, London, http://www.ifpi.org/site-content/library/digital-music-report-2006.pdf

Kuhlmann, Dirk; Gehring, Robert A.: Trusted platforms, DRM, and beyond, in: Becker, Eberhard; Buhse, Willms; Günnewig, Dirk; Rump, Niels (eds.): *Digital Rights Management – Technological, economic, legal and political aspects*, Berlin Heidelberg New York 2003, pp. 178 – 20

Mann, David: Digital rights management and people with sight loss, *INDICARE Monitor*, Vol. 2, No. 11, January 2006, http://www.indicare.org/tiki-read_article.php?articleId=170

Microsoft: *The Windows media digital rights management system may not work if your computer hardware changes*, last review 6 January 2005, http://support.microsoft.com/kb/891664/EN-US/

Open Mobile Alliance: *Digital Rights Management, OMA Short Paper*, December 2003, http://www.openmobilealliance.org

Pew Internet & American Life Project: *Teen content creators and producers*, Washington D.C., November 2005, http://www.pewinternet.org/pdfs/PIP_Teens_Content_Creation.pdf

Rosenblatt, Bill; Trippe, Bill; Mooney, Stephen: *Digital Rights Management – Business and Technology*, New York Cleveland Indianapolis 2002

Rosenblatt, Bill: Coral Consortium aims to make DRM interoperable, *DRM Watch*, 7 October 2004, http://www.drmwatch.com/standards/print.php/3418741

Russinovich, Mark: Sony, rootkits and digital rights management gone too far, *Sysinternals*, 31 October 2005, http://www.sysinternals.com/blog/2005/10/sony-rootkits-and-digital-rights.html

Steinke, Tobias: National libraries, preservation and digital rights management, Interview with Knud Böhle, *INDICARE Monitor*, Vol. 2, No. 3, May 2005, http://www.indicare.org/tiki-read_article.php?articleId=107

Tyrväinen, Pasi: Fair use licensing in library context, *INDICARE Monitor*, Vol. 2, No. 2, April 2005, http://www.indicare.org/tiki-read_article.php?articleId=94.

Vance, Ashlee: Is Google DRM crippling culture as great as it seems?, *The Register*, 8 January 2005, http://www.theregister.co.uk/2006/01/08/google_drm_question/print.html

Ward, Mark: Sony BMG repents over CD debacle, *BBC News*, 9 December 2005, http://news.bbc.co.uk/2/hi/technology/4514678.stm