Digital Rights Management in Public Science

Report on the 4th INDICARE Workshop
held on 8 Dec 2005 in Brussels

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by
Carsten Orwat
Institute for Technology Assessment and Systems Analysis, Research Centre Karlsruhe

INDICARE
The Informed Dialogue about Consumer Acceptability of DRM Solutions in Europe
http://www.indicare.org

About INDICARE

INDICARE is the "Informed Dialogue about Consumer Acceptability of DRM Solutions in Europe" (http://www.indicare.org). 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 publication, the organization of 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

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1 Introduction

On 8 Dec 2005, the Institute for Technology Assessment and Systems Analysis (ITAS) of the Helmholtz Research Centre Karlsruhe held the fourth INDICARE workshop on "Digital Rights Management in Public Science". The workshop was part of a series of five workshops by the INDICARE project. Twenty-five selected experts were brought together to discuss actual and potential implementations of Digital Rights Management (DRM) systems in scientific publishing and scientific communication, their positive and negative implications and public policy issues. The scope of the workshop was the field of scientific publishing and communication in public science, mainly understood as publicly-funded science and research.

DRM systems are broadly implemented in the distribution of digital entertainment products, in particular music and increasingly video products, both as physical products like CDs and DVDs and as services of online distribution. While the initial intention of DRM systems was mainly copy-protection, it is now more and more seen as an enabler of new business models with very detailed usage models and innovative distribution concepts.

In the distribution of scientific content, digital mechanisms to control online access to content are common and wide-spread using e.g. Internet Protocol addresses or passwords. However, DRM systems go beyond access control aiming to control the usage of digital content. By this, new business models would become possible or imaginable also in scientific publishing, such as previewing, streaming, subscriptions, commercial use of peer-to-peer file sharing networks or super-distribution. They may be able to supplement or substitute traditional marketing concepts and may better suit demands by customers, i.e. by scientists or libraries.

However, DRM systems may also have their negative 'side-effects' in this sector, such as curtailing the traditional usage rights of end-users, endangering privacy of customers and the security of their systems, hindering the interoperable use of digital content, enlarging the complexity and non-transparency of contract terms, or raising barriers for long-term preservation, to name but a few (see INDICARE State-of-the-Art Reports 2004 and 2005).

According to the main fields of recent DRM applications, intensive public debates mainly focus on the music industry and address the many implications of DRM systems and recent changes in copyright legislation. However, DRM implementations in scientific publishing and communication are largely neglected by public attention and debates, although DRM systems can increasingly be found in this sector in manifold facets:

- DRM systems are implemented in scholarly e-books mainly as textbooks and reference books (more in the USA than in Europe);
- They can be found in B2B distribution relations (e.g. scientific publisher Elsevier uses the DRM system 'Rapidrights' by Cadmus for reprint distributions to companies);
- Electronic document delivery services often need to apply DRM systems for their services, such as in the cases of the document delivery service of the British Library in the United Kingdom, Subito and Vascoda in Germany, or Infotrieve and CISTI in North America.
- DRM systems are also applied in redistribution activities by authors in the sense of 'protecting' the final version in disseminating articles to the scien-

tific community (e.g. the 'Authors Care System' by Sage enabled by a DRM system)
- First instances of new DRM-based business models in B2C relations can be found (e.g. pay-per-use or streaming) and many more are thinkable (e.g. re-distribution).
- It is also discussed how DRM systems can be introduced for open access journals to assure the integrity and authenticity of articles.

The lack of attention is insofar surprising as a high societal importance is normally ascribed to science and research regarding their fundamental function for innovation, growth and creativity, fair and equal access to information and knowledge, democratic level, or cultural endowment. The workshop attempted to fill this gap and to raise some concerns in this respect. This report summarises the workshop's presentations and discussions. The report follows a logical structure, and does not necessarily represent the structure of the workshop or the ordering of presentations.

2 Developments in Scientific Publishing

Presentations and discussions of the workshop frequently addressed past and recent developments in scientific publishing providing the context of the DRM topic.

Andreas Degkwitz (Information, Communication and Media Centre, University of Cottbus) briefly sketched the role of commercial publishers from a historical perspective. Since Alexandria, libraries – as part of the scientific community – fulfil the role to keep scientific information available by short-term and long-term archiving. Since the invention of the printing press by Gutenberg, publishers – as partners of the scientific community – provide services of producing and distributing scientific information at their own risk. Nowadays, a few large publishers – as shareholder owned companies – would dominate (monopolise) the market of scientific information. Large commercial publishers would be more responsible to shareholders than to the scientific community as it was in the past. A general concern was expressed that this orientation leads to business models that are unfavourable for the scientific community and that DRM is seen as a decisive element of such business models.

It should be briefly noted, that currently many open access initiatives strive to make research material freely available to the public, especially those of publicly-funded science and research. This is achieved by either publishing in dedicated open access journals that are freely available mainly through the internet ('gold road'), or by open archiving of articles on researchers' websites, e-print archives, or institutional repositories often parallel to the publication in commercial subscription-based journals ('green road'). In some cases, authors can be asked to pay a fee for being published ('author-pays' model). Related to the latter, Gertraud Griepke (Springer) pointed to the open access programme by Springer that is labelled 'Open Choice' in which authors or their institutions prepay for publication of the then freely accessible article.

In the workshop discussions a distinction was drawn between publicly-funded scientific research, which is normally published in journal articles, and scientific books that are in many cases a private business activity of authors.

Thus, demand for open access is called more often for journals. In this sense *Ulrich Pöschl* (from the open access journal "Atmospheric Chemistry and Physics") frequently emphasised for the benefit of science and society – and in particular for improved scientific quality assurance – all scientific journal articles based on publicly funded research should be freely available on the internet.

In contrast, *Pieter Bolman* (International Association of Scientific, Technical and Medical Publishers) pointed to a problem of open access and 'author-pays' models: the long-term viability of articles would be in question since authors would pay once for being published, but there is no guarantee that in the future enough authors could be found who will pay the publishing fees and that the costs to maintain the journal could be covered.

In this context, however, Bolman mentioned the business model neutrality of the STM Association. Furthermore, representatives of scientific publishers declared that they are in favour of the open access approach because it would be much easier to handle and would save a lot of work especially cumbersome negotiations with libraries and other customers. However, large scientific societies that would currently profit from traditional publishing models would not easily change to new models and prevent publishers from shifting to open access.

3 Definition and Standards

3.1 No common definition of DRM

It became clear during the workshop that not all participants have the same understanding of Digital Rights Management:

- On the one hand, DRM can mean the management of digital content, including the management of rights by the many involved parties such as authors, publishers, libraries, customers, or readers. This would not necessarily involve Technical Protection Measures (TPMs). Here the core element is digital rights expression as machine-readable metadata. This understanding could also include Creative Commons or other alternative licensing schemes.
- On the other hand, DRM is often used as synonym for digital rights enforcement with TPMs such as encryption and the technically enforced access and uses options. Since it is relative easy to break (hack) TPMs, they require the legal protection against circumvention.

Instead of the publicly perceived definition of DRM – mainly as a measure used by publishers to restrict access and control usages – *Mark Bide* (Rightscom) pleaded for an understanding of DRM as an essential element of a trustworthy network computing environment. He also suggested talking about "Digital Policy Management" instead of Digital Rights Management, since not all digital policies are based on intellectual property rights.

In his view, Digital Policy Management is about defining, describing, communicating and enforcing policies, which control access to and use of networked resources. This would be needed unless one would believe that all networked resources should be available for anyone to do anything they want. Thus, Digital Policy Management will be fundamental for the trusted identity of resources, people and organisations, and for the certainty in defining ways in which re-

sources may be used. He saw this necessity for the future management of the network even in an era of "open everything" including open access, open archives etc.

For scientific publishing he provided a differentiated picture, in which relationships between publishers and content users such as a subscribing university are often made up by a trust relationship that ensures that policies are enforced ('organisational trust model'). However, by and large this trust relationship has been supported by technologies, mainly by the "AAA technologies" of authentication, authorisation and audit. For instance, only members of a university are allowed to use subscribed resources. In this case, the university manages the identity of users on behalf of the publishers. Also open access publishing would depend on AAA technologies, for example, when it is managed who is allowed to make comments. In some cases, DRM or TPMs can have also a supportive role in these trust relationships.

3.2 Need for standards

Bide also stressed the need for *standards* in enabling digital policy management, especially communication standards to communicate unambiguously about policies and to ensure predictability. For instance, the term "copy" has to clearly describe which attributes are allowed to be changed when copying a file. Otherwise the involved actors would interpret 'copying' in their many own interests. He reported about current standardisation developments that are relevant for scientific publishing:

- The Coral Consortium strives for specifications that should allow interoperability of DRM at the device or systems level to enable a "seamless consumer experiences". The consortium is acting in view of converging computing, consumer electronics, broadcasting, mobile, and other network technologies. The consortium would have had recognised that an all-embracing DRM systems is not possible due to the many conflicting requirements on it. Thus the work addresses an 'interoperability layer' or interoperability framework respectively. Bide appraised that if the Coral Consortium would work successfully, its standards would be ubiquitous and would determine also the conditions for the publishing industries.
- Rights expression languages, such as the eXtensible rights Markup Language (XrML) and Open Digital Rights Language initiative (ODRL), would be more than simple communication formats. They would be computer languages that are designed to control the behaviour of DRM systems. Actually, they are tightly bound to specific digital instances (or digital files respectively) and are not regarded by Bide as generic approaches to communicate rights and expressions.
- The 'ONIX for Licensing Terms', which is currently under development, is in its first application a measure to communicate licence terms from publishers to libraries, but it is designed to be fully extensible to allow the communication of any license term. While the respective 'ONIX for Licensing Terms' will be about permissions that are communicated between publishers and user institutions, the proposed ONIX standard for rights will address the definition of possession rights or rights to make decisions (e.g. when changes of rights should be made).

- Also the Creative Commons licensing scheme is seen by Bide as another mechanism for expressing licensing terms.
- Other standard developments are going on in the music industry, such as the 'MI3P' standard for licensing and reporting, and may have some implications for scientific publishing.

Also *Pieter Bolman* stressed the need for international standards since scientific publishing is a global business and interoperability of applications has to be ensured. A special need is seen for the standardised expression of usage rights and permissions by a common rights expression language (REL) and for the development of a rights data dictionary (RDD) of all licensing terms. Furthermore, during workshop discussions the importance of a common rights metadata scheme was stressed. While standards for developing and using metadata in general exists, such as METS (Metadata Encoding and Transmission Standard), the lack of standardised rights metadata is criticised.

4 Reasons for DRM applications (or no reason at all?)

4.1 Publishers and DRM

From a publisher perspective, *Pieter Bolman* described the rationale behind implementing DRM in scientific publishing, in particular in journal publishing. Since 1996, scientific publishers have made available their journals on the internet. For this, they adopted the 'consortium site licensing' business model (sometimes referred to as 'big deal') in order to prevent financial shocks for both libraries and publishers that could result from the costly 'paper-to-electronic' transition. From the beginning of this transition it would have been understood that the 'consortium site licensing' model would not meet all needs of users and customers. For instance, the individual article supply or the large scale distribution of individual articles is missing. Since that time, publishers had already thought about DRM as an enabler of other business models and, thus, have engaged in DRM-related standardisation efforts.

At the moment, he saw no urgent need for technical protection mechanisms since the contractual relation between publishers and libraries is based on trust of institutional compliance. On the other hand, some applications, where DRM can help to meet hitherto 'unmet' user needs, were seen:

- The DRM-based individual article supply includes 'pay-per-view' models (or better 'pay-per-document' models) for (institutional) customers who are interested in single articles out of a large range of journals and who are not interested in subscriptions.
- Further fields of DRM implementation were seen for the electronic distribution within organisations (but with different locations), the use of digital material in electronic course packs, the authors' distributions of electronic reprints, and for the commercial distribution for advertising purposes (e.g. articles as gifts by pharmaceutical companies to their clients).
- DRM is also suitable to make modules of e-books available, especially for 'look-up books' such as dictionaries, reference works etc., and for electronic

textbooks. Here the customers could buy single book chapters they are interested in and do not need to buy the entire book.
- He also saw a supportive function of DRM to open access (OA) publishing, if authors or their funding agencies can choose to pay for different services (e.g. review process and prestige of a journal, linking, updating, or electronic archiving).

Bolman evaluated the 'pay-per-document' model based on DRM systems in detail. While this can open the market of scientific publications for private persons, it is not expected that individual researchers pay for articles since they are normally member of an organisation that pays for literature. Other parties and services, especially libraries, interlibrary lending or specialised online services, can provide these services to private persons. Publishers normally refrain from the market of individual private persons due to a disadvantageous ratio of low item prices and high systems costs.

From the perspective of a DRM technology provider, *Roswitha Nottebaum* (ARIES Systems Corporation) described the 'DocuRights' DRM system for PDF documents, which is increasingly used by scientific publishers to enable new business models in the marketing of journals (e.g. by the publishers Thieme, de Gryter, or Karger). In these cases, the DRM system would enable new functionality, such as the preview option, the DRM-controlled dissemination of articles to colleagues, the control of various copies on different machines, and the control of the print-out of article (e.g. five times).

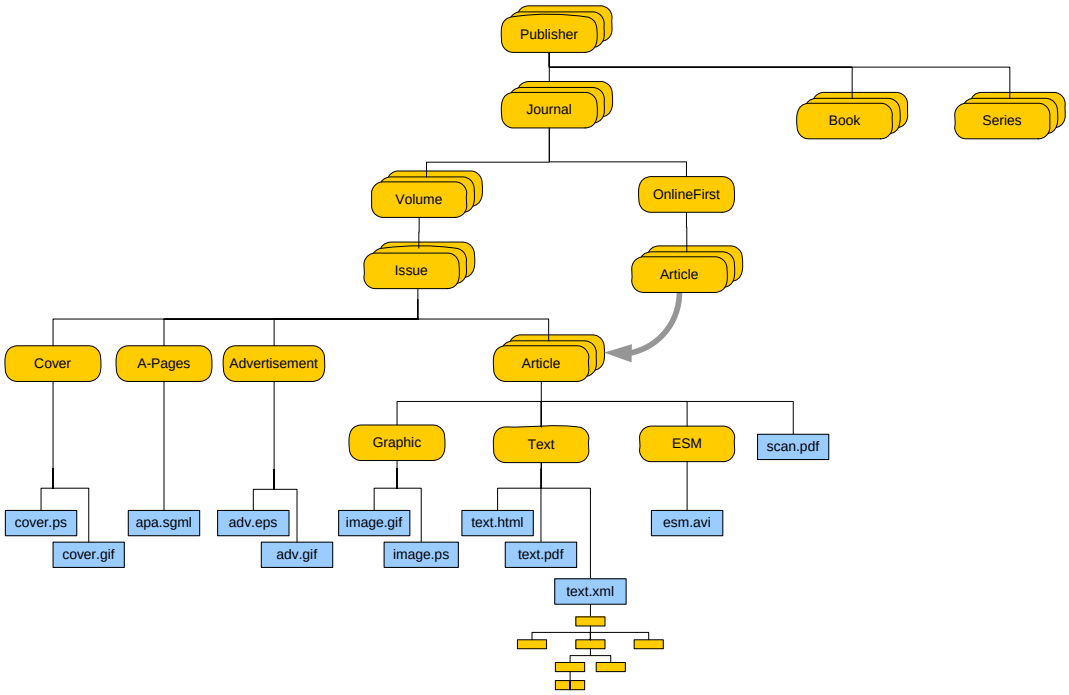
She reported that while the DRM-based 'pay-per-view' model as well as the DRM-enabled electronic reprint dissemination model (e.g. used by pharmaceutical companies) is recently working, the intended DRM-based subscription model is not, mainly due to concerns by libraries. In her view, there are currently some general barriers for a broad DRM implementation:
- There is no standard technology and in different media industries (music, film, literature, etc.) various DRM definitions and policies exist.
- Libraries are the core customer of scientific publishers and they have concerns that DRM might not work technically.
- There would be a delay in market reactions and in the meantime consumers would get used to the free consumption of digital content on the internet.
- Also publishers have reservations against DRM systems, in particular, technical concerns about the easiness of use, the stability of systems, or if customers are bothered.

She concluded that DRM systems should therefore provide additional benefits, i.e. more than just the article. DRM would have the potential to make articles more 'intelligent' by attaching several services and extra information to articles, such as table-of-content information services, news alerts based on users profiles, or recommendation services about similar articles. Readers could opt-in to such services at the time of first opening of a document. In general, DRM would enable better profile orientation from which publishers could learn more about the readers.

Gertraud Griepke, responsible for the management of the online service 'SpringerLink' by the scientific publisher Springer, reported about measures and requirements to prepare several involved publisher's activities for the use of digital rights management. Here, DRM is mainly understood as managing rights

metadata applied to all Springer's products, i.e. journals, books and books series. The same structure of rights metadata (see Figure 1) is used for all product items (e.g. at the level of the article) in order to enhance the fit to each other (see also excerpts in Box 1). Currently, Springer is using and testing systems from ARIES, e.g. the manuscript manager.

Figure 1: Metadata Structure for Books and Journals at Springer



Source: Workshop presentation slides by Gertraud Griepke

Box 1: Excerpts from a Metadata Structure

```
...
<ArticleCopyright>
  <CopyrightHolderName>Springer-Verlag</CopyrightHolderName>
  <CopyrightYear>2003</CopyrightYear>
</ArticleCopyright>
...
<ArticleGrants Type="Regular">
  <MetadataGrant Grant="OpenAccess" />
  <AbstractGrant Grant="OpenAccess" />
  <BodyPDFGrant Grant="Restricted" />
  <BodyHTMLGrant Grant="Restricted" />
  <BibliographyGrant Grant="Restricted">
  <ESMGrant Grant="Restricted">
</ArticleGrants>
...
```

Source: Workshop presentation slides by Gertraud Griepke

At first, more or less similar rules of article submission by authors for ca. 1.200 journals by Springer has to be enabled (books and reference works additionally). This means the automated management of rights on digital content such as the clarification of who is the owner of an article or a journal. Such ownership

information has to be maintained by the system and shared among involved parties in a long-term perspective.

Second, at the stage of manuscript preparation the multitude of articles should have similar formats and designs or should respect necessary differences, but should be operable with similar systems. In any case, it has to be ensured that during manuscript preparation the copyright information is appropriately attached to documents, e.g. statements about the author's initial copyright, the transfer of copyright to the publisher, or that the option of open access is chosen (called 'Open Choice' at Springer). For instance, there is a need for the digital (automated) management of copyright transfer agreements, which are at the moment done in paper version for each of the thousands of articles.

Third, at the stage of online publication, several issues require the use of rights metadata.

- Rights metadata is used to assure the appropriate publication of Electronic Supplementary Material (ESM) to articles (e.g. graphics, charts, tables). It should be sustained in the future, especially regarding the long-term usability of such material and its management of rights.
- For realising the 'Online First' publishing model a Digital Object Identifier (DOI) is needed to authenticate the document.
- Online distribution uses not only the publisher's own brand 'SpringerLink' but at the same time a wide variety of external distribution channels in many countries (e.g. OhioLink in the United States). For the secondary distribution channels, DRM would be a measure to obtain a certain level of control about the actual distribution habits.
- Besides the main distribution to institutional costumers (i.e. libraries or consortia), Springer also has a pay-per-document service.

4.2 Libraries and DRM

Kristin Eschenfelder from the University of Wisconsin-Madison reported about current DRM-related activities in the USA, making clear that DRM can have different functions for libraries. DRM can mean a structured and machine-readable language to license expression of rights. From the library side, standardisation work is mainly done in the US by the Digital Library Federation (DLF).[1]

However, machine-readable rights expressions disallow ambiguities that are often helpful in the work of libraries (the so-called 'inscribed certainty' problem). For instance, while normally a usage that is not specified in a licence is considered as permitted, with machine-readable digitally expressed licences only the usages that are explicitly defined as permitted can actually be executed. It is doubted that a greater specificity will lead to greater legal scrutiny. Furthermore, rights have to be spelled out. Since stricter licenses are shorter and more generous licences have to be longer and are more difficult to define, there

[1] Activities of the Electronic Resource Management Initiative (ERMI), including the License Expression Working Group and the NISO Digital Expression Workshop, and work on Shibboleth for Internet2 were also mentioned.

is an incentive to write stricter licences (the so-called 'restriction incentive' problem).[2]

DRM systems are used by libraries to manage licensed material by publishers. A lot of DRM-related activities (mostly funded by the DLF) are directed to the library-internal managing of licenses and rights of materials in order to facilitate or improve:

- to keep track of license use rights and constrains,
- to report license use rights to interlibrary loan staff or to users of library resources,
- to compare access and use rights across products or vendors during product evaluation, or
- to track access and use rights during negotiations.

Besides the management of licensed material, DRM systems are also increasingly used for 'home-grown' cultural resources that are produced by libraries themselves, such as scanned-in documents, photographs or scholarly materials (e.g. audiotapes of lectures). Here, activities are in search for 'best practices' of access and use control that would be justified for certain kinds of materials or circumstances. For instance, in view of shrinking state budgets for libraries, libraries increasingly tend to create revenue streams by distributing cultural resources, e.g. by selling high-resolution copies of photographs that are freely available only in low resolutions.

If libraries act as distributors of digital material, systems are needed that enable the management of allowed usages such as permissions e.g. to sell the item, and also the management of the limits of use, the obligations required to exercise the permissions, as well as the exceptions that disable the permissions. Also certain private actors (e.g. churches) would like to make materials online available only to a limited target group. Libraries often manage the rights and permissions of depositors when managing donations or gifts to the library (e.g. when the depositor changes granted rights).

The major intention behind such kind of activities is to enable more specified access and usage control than is currently provided by libraries. This can, among other things, expand the group of users, for instance, beyond the group of users who have a university ID, or it can restrict the online use of digital material to more finely defined groups of users, for example only certain enrolled student groups or classes, or for material that contains private information such as medical images. In any case, the effects on scholarship, learning and teaching would be largely unclear and research in this respect would be necessary. Also the question of how the need to manage controls shapes the library as an institution is unanswered.

4.3 DRM and/or Open Access

In public debates the terms 'DRM' and 'open access' are often treated as opposite models of scientific publishing. In the following, however, the question is raised what role DRM can play in Open Access publishing models.

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[2] Eschenfelder referred to work by Coyle (2004) and Jewell et al. (2004).

One opinion on the careful and limited use of DRM in Open Access models was brought in by *Ulrich Pöschl* from the Max-Planck Institute for Chemistry and from the Open Access journal 'Atmospheric Chemistry and Physics'. From his perspective (mainly as a researcher), DRM for scientific publications especially from publicly-funded research can be desirable and acceptable only to a very limited extent, for instance, to assure authenticity as well as correct referencing of documents and sources of information. He warned that, by no means, the successful and future development of Open Access should be inhibited by DRM.

He described the features of the Open Access journal 'Atmospheric Chemistry and Physics' which were deliberately chosen to overcome failures of the recent system of scientific communication and peer-review. The serials and budget crisis at university and research libraries are addressed by the applied 'author-pays' model that enables the free availability of publications. In all publication stages the journal applies a Creative Commons license. The journal would also seek to solve more severe problems of quality assurance and failures of peer-review processes like the limited competences and conflicting interests of editors and referees, retardation and loss of information of a closed peer-review, as well as delays in publication:

- The rapid publication of pre-selected discussion papers submitted to the journal avoids delays in publication of scientific results. The early publication for a public discussion also helps to prevent that papers with low quality were submitted causing considerable workload for editors and referees to improve them (termed the 'cleaning effect of transparency').
- The public peer review process, i.e. comments by referees and colleagues[3] are published too, not only make valuable discussions available for the public but also helps to overcome superficial or prejudiced reviews as well as hidden obstruction and plagiarism.[4] In the interactive discussion the authors can answer to the comments publicly.[5]
- At the publication stage of the final paper it has passed a thorough review and discussion and ensures the maximum quality assurance and information density.

Although the limited use of DRM in Open Access publishing was demanded by Pöschl, the application of watermarking on 'discussion paper' versions could be thinkable for him to lead readers to the final version.

Furthermore, in discussions of the workshop another DRM application in open access was mentioned: in 'green road' models of open access authors can choose the open access condition for single articles. Thus, it is no longer possible to use common licensing agreements for the whole journal, but the licensing and use rights has to be specified for individual articles. Therefore, there could be a need to attach rights information to single documents, what is understood here as digital rights management.

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3 Meaning everyone who needs not to be nominated as a reviewer but who is registered at the system.

4 During the workshop discussions it turned out that also for commercial publishers of traditional journals such an open interactive peer-review process is thinkable but its implementation would mainly depend on decisions of editorial boards or scientific associations.

5 Discussion papers rejected in the discussion process are also archived at the journal website. In some cases, they gain a large number of citations.

4.4 Science Commons licensing scheme

Jordan Hatcher (EFF-Austin) reported about the Science Commons licensing scheme, which was introduced in 2005 with the goal of exploring how the alternative Creative Commons licensing scheme and its philosophies can be applied to the scientific community. One of the goals of the initiative, which is currently focused on the US research community, is to streamline the licensing process used by research institutions, which are based around a wide variety of 'materials transfer agreements' (MTAs). These MTAs can be quite complicated for research institutions to comply with, and Science Commons is looking for a way to standardize the process. The Science Commons scheme examines licensing model for data, articles about data, and metadata and it applies the key elements of the Creative Commons scheme to them.

The Creative Commons licensing scheme grants users a set of baseline rights to use the work, i.e. to copy the work, to distribute it, to display and perform it publicly, to make digital public performances of it (e.g. web-casting), and to shift the work into another format as a verbatim copy (media shifting). The scheme includes four license elements that researchers can combine for a total of six available licenses:

- Attribution: in any case the author should receive proper credit,
- Non-Commercial: the work can be used only for non-commercial purposes,
- No derivate works: the author can not allow derivate work to be created from the original, and
- Share-Alike: the author can allow the creation and distribution of derivative works, but only if the same type of license is used.

Through the iCommons programme, these licenses have been adapted to the laws of many different countries throughout the world. Hatcher reported that several open access publishers have chosen the 'attribution' Creative Commons license (CC-BY), while others often use the 'attribution', 'non-commercial' and 'share-alike' variant (CC-BY-NC-SA). While the Berlin open access declaration specifically includes licenses that allow derivative works, many authors wish to use the 'non-derivative' restriction in their licence.

Regarding the relation of the Creative Commons licence and the use of DRM, he described that the use of DRM only in the sense of using Digital Rights Expression with metadata is compatible with Creative Commons licenses. The Creative Commons organisation, as a philosophy, is against stricter TPMs since it is believed that it is too difficult to have technical restrictions on the one hand and still allow all the freedoms granted in the license on the other hand. The terms of all of the basic Creative Commons licenses allow the use of DRM, but only in a manner that does not take away the set of baseline rights granted in the license. These baseline rights do not allow restrictions on printing, restrictions on copying, restrictions on number of times the work can be used, the encryption of files, and some types of access control systems such as protecting the individual files with a password. However, the licenses do allow for placing Creative Commons licensed works in authenticated environments (e.g. online learning environments such as those provided by educational institutions).

DRM in the broadest sense is mainly understood so as to include Digital Rights Expression (DRE), which could aid in maintaining some elements of the

Creative Commons licence with various technologies.[6] For example, digital watermarking could aid in maintaining the author's identity in conjunction with a work and thus help compliance with the attribution element. Watermarking also can aid in identifying objects used in violation of the non-commercial element. Preventing the misuse of the material in derivative works seems to be another potential application for DRM, in particular to prevent 'cut and paste', such as by using "fragile" watermarks that show tampering of the content. However, such DRM would have to preserve all user rights granted by the CC licence, which may prevent this application of DRM. It was emphasised that the Creative Commons scheme supports metadata for Digital Rights Expression (instead of the restrictive type of DRM).

In the following workshop discussion a concern was raised by Andreas Degkwitz that the implementation of Creative Commons licensing and similar licensing schemes would lead to multiple parallel copyright licensing systems causing more complexity and additional burden in the daily work of libraries or scientists. Instead, a unified copyright law or licensing scheme should be adapted to the changed requirements of scientific communication and it should provide general rules by specific copyright limitations and exceptions. However, Creative Commons or similar licensing schemes were seen as valuable interim solutions to fill recent lacks of copyright law, for instance, in respect of handling rights in open access publishing.

5 Issues and Concerns of DRM Use

5.1 Usage concerns

In view of the impacts of recent revisions of the German copyright law on functions of libraries (see also below), *Andreas Degkwitz* brought in some concerns regarding the widespread use of DRM systems. In his opinion DRM is facilitating the licensing and use of digital material by individuals or individual groups to the disadvantage of the general and interdisciplinary interests of broader communities. They would push the further commercialisation of publicly funded knowledge and scientific information without any guarantee to improve diversity and quality. DRM systems will bring additional expenditures and restrictions to already installed access systems and access options to scientific information. In general, DRM systems would be in the commercial interest of the 'big ten' publishers and not at all in the interest of small and medium-sized publishers. Especially the latter ones would stimulate competition for quality and interdisciplinary variety.

From a librarian's perspective, Degkwitz described the needs of users, i.e. the broad availability and transferability of scientific information and knowledge, fair access and usage conditions, no further access restrictions, and realising the provision of information and knowledge according to the patterns of culture and aims of the scientific community (and not according to commercial interests). In order to prevent negative impacts of the widespread application of DRM systems and to match the needs of users he suggested developing best practice

6 Hatcher referred to work by Fitzgerald and Reid (2005).

agreements about the fair conditions for access and use of knowledge and scientific information.

Additionally, an exemplification of changed usage options was provided in the above described DocuRights System. There, the options for using downloaded material (e.g. the number of possible prints) is defined by the system, in this case it is called "fair use" by the system provider. The customers of the DRM system, i.e. the publishers, are adjusting the usage options managed by the system in their interest.

Mark Bide also reflected the risks and opportunities that can be created by an effective digital rights management (what he likes to call 'digital policy management'). In his view, DRM would reduce uncertainty in making things unambiguous what is currently ambiguous. Matters, which are currently unenforceable, are becoming enforceable, however also those which are undesirable like restricting the de facto operation of copyright exceptions or the problem of 'locking up access'. Furthermore, DRM would cause several technical failures like the security threat in the 'Sony BMG rootkit' case. In the short term, DRM will lead to risks in the customer relationship and in the long term preservation is endangered. Bide pleaded that digital files for preservation should be completely free from any technical protection measures.

Another failure is the lack of standardisation or even worse inappropriate standardisation. Without a infrastructure of standards a greater centralisation of power would be likely with the massive use of DRM, not within the scientific publishing industry directly, but at the side of technology providers and the 'big players' in the media industry.

On the other hand, Bide saw DRM as essential element of an "orderly" network, not only for the protection of intellectual property rights, but also for the protection of rights of consumers including issues like privacy, confidentiality and protection against fraud. DRM would support the expression of such rights. Additionally, since publishing (in the sense of making things public) becomes ever easier, the need for some control over how and where things are published as well as over authenticity and version control by DRM will become an issue for everyone.

5.2 Copyright issues and library implications

Since Digital Rights Management systems are in general breakable in their technical protection elements, the legal protection of the technical protection measures (TPMs) was introduced. In Europe it was introduced by the European Copyright Directive 2001/29/EC, also often called EC InfoSoc Directive or EUCD. Traditionally, copyright includes certain limitations and exceptions in order to facilitate activities in favour of societal goals, such as making content accessible for people with disabilities or enabling quoting for criticism or free speech.

Lucie Guibault, Institute for Information Law (IViR) of the University of Amsterdam, reported about the limitations and exceptions of the EUCD for science, research and libraries. Article 5(2) EUCD provides limitations of copyright protection for reproduction activities made by publicly accessible libraries to enable preservation, restoration and porting from one support to another. However, Guibault criticised that the electronic interlibrary loan is not an exception

of copyright protection in the EUCD. Article 5(3) EUCD also grants some usage rights for scientific research like the right for quotations for purposes such as criticism and review (Art. 5(3)d EUCD) or the right to communicate or make available such material (Art. 5(3)n EUCD). The latter right is, however, very restrictive. Digital material can only be made available at dedicated terminals on the premises of publicly accessible libraries, educational establishment, museums or archives.

Further critique is directed to provisions of the Article 6 EUCD regarding the prohibition of circumventing TPMs. The Article provides the possibility that Member States should adopt appropriate measures that allow the exercise of the abovementioned rights of Article 5(2) and 5(3). However, this provision is only facultative for Member States and not an obligation to implement appropriate measures. Thus, if and how such rights are implemented in Member States is uncertain.

In order to make the EUCD's implications for the work and functioning of libraries more transparent, *Andreas Degkwitz* reported about the negative effects of the EUCD implementation in the recent revision of the German copyright law and, with it, the legal requirements for the use of DRM systems:

- With the implementation of paragraph 52a the 'traditional' distribution and presentation of digital materials for the closer purpose of education and research is heavily threatened.
- Paragraph 52b limits the use of digital material to 'on the spot consultations' only to (single) work stations within libraries depending on the number of subscriptions.
- Paragraph 53 prohibits delivering digital copies of journal articles for interlibrary loan purposes when publishers offer downloads from their servers.
- Furthermore, paragraph 31 supports the general transfer of author rights to the publisher for distributing materials by media channels and platforms. This situation is unknown today, but may occur in the future.

5.3 DRM and document delivery services

Andrew Braid from the British Library spoke about the use of a DRM system for the electronic document delivery service of the British Library. Besides the service of the British Library also similar services like those of the Canadian Institute for Scientific and Technical Information (CISTI), Subito in Germany or Infotrieve in the United States apply DRM systems.

While libraries in general would be in favour of electronic document delivery in order to serve their patrons directly to their desktop almost instantly, publishers would be suspicious about the potential that customers may cancel their subscriptions and change to individual article demand.

Under the UK law, the British Library could not electronically submit documents to their users without the agreement of rights holders. In order to establish some control about the distribution by the British Library as a third party, publishers require the library to use a DRM system. In Braid's opinion, this is somehow irrational since publishers now make their articles available online without any form of technical protection. The British library is currently using the proprietary ARIEL system that effectively functions like 'faxing over the internet', meaning that the DRM-wrapped PDF document can not be stored at

the receiver's computer and can only be printed out there. DRM-based electronic document delivery has now a share of around 25% of all document delivery by the British Library and during its three years existence the service transmitted around a million documents.

Earlier experiences with testing different DRM systems had shown that some systems were too expensive, too complicated or did not work as expected. Especially systems that are plug-ins were not accepted by corporate users due to difficulties in handling them in corporate networks. The installed system was developed in cooperation with Elsevier. It was based on the Adobe Content Server and Adobe eBook Reader and after the withdrawal of the Adobe eBook Reader it is now based on newer versions of Adobe Acrobat Reader that incorporates DRM features.

The employed technical protection measures allow only one single copy printed on a single machine with a limited viewing time and disables copying and forwarding. Instead of a 'push approach' by sending the document to the user, the library prefers a 'pull approach' that necessitates that users download the document from the library's website. This overcomes technical problems with firewalls or other security measures. Most of the library's content, which is not online (i.e. not stored electronically at the library's servers), has to be scanned first and has to be printed out by the user in order to use it. Only 25% of the requests can be served by forwarding original PDF files of the publishers. Braid remarked that the service of the British Library encompasses around 20,000 journals by roughly 6,000 publishers. The problem is to acquire the necessary rights since negotiation with one publisher takes around one week.

In general, the digital content is stored at the servers and encrypted 'on the fly' when delivered to the customer. If librarians forward and deliver the electronic document, they normally check the entire document, but opening and checking before forwarding is in this case disabled by the DRM system. Additionally, some customers have licenses for legitimate uses that are now disabled by DRM, for instance a pharmaceutical company could not longer submit their articles in electronic version to drug registration that requires the electronic version.

A further problem is the demise of the Adobe Content Server as the basis of the DRM system. Thus, the British Library has to look for an alternative system. Against the background of experiences with the very restrictive system that is disproportionate in terms of systems costs and restrictions relative to the low value of the content deliveries, the British library was looking for an alternative system, e.g. one based on watermarks.[7] The library also intends to support the legitimate use and forwarding of acquired documents within organisations and corporations.

In the related workshop discussion a discussant highlighted that this example of a complex and expensive DRM implementation would demonstrate that the costs of implementing DRM systems and the efforts of continuously solving technical problems increase the costs of making scientific results available for scientists. Such costs are shifted to the customers, i.e. libraries or scientists respectively. Thus, public funding not only has to finance the research itself and the costs of journal subscriptions, but also the costs of the DRM infrastructure and the handling of DRM systems as well as the costs of handling DRM-

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7 It should be added that recently the British Library has chosen the 'RapidRights' DRM solution by Cadmus Communications Corporations for its multiple copies delivery service.

protected content for the long-term preservation. And the outcome is a restrictive access. Such additional costs for taxpayers have to be set into comparison with open access.

Furthermore, this example would have shown that content providers get more dependable on policies of DRM technology providers regarding conceptual and technology changes of their proprietary systems causing problems such as version control or changes to other systems.

5.4 Archiving and preservation

Tobias Steinke from 'Die Deutsche Bibliothek' (German National Library) spoke about DRM and long-term preservation (LTP), having DRM mainly as technical restriction management in mind. Long-term preservation means not only the preservation of the bit streams (i.e. the pure binary data) by continuously renewing the storage, but also preserving the access to content.[8] The latter problem is the more difficult one because libraries face many different file formats (e.g. PDF, XML, TIFF, MPEG etc.) and different categories (e.g. multimedia, text, sounds, images etc.). Hardware and software are constantly changing, therefore no existing system or file format will be accessible forever. In order to fulfil their responsibility to give access over hundreds of years, national libraries and archives adopt two strategies: Migration and emulation.

Migration means the conversion of a file to an accessible format just in time before the source format will become obsolete. Migration could cause the loss of some elements of the file, but it would be better than the loss of the complete file. It is especially suitable for static file formats like images or text. In contrast, emulation is the recreation of an old system on a new one (e.g. the C64 emulation on a PC). It would be suitable for dynamic file categories, such as multimedia files or programmes.

DRM in the sense of technical restrictions does allow neither the conversion of files, which is necessary for migration, nor the use of files in a not intended environment that is not covered by the license, what is necessary for emulation. Thus, both techniques essential for the long-term preservation of digital content are not allowed by DRM. Steinke pointed to a dilemma: While DRM is always based on current technologies and existing environments, long-term preservation needs constant changes and has to deal with unpredictable technologies.

Currently the German National Library receives digital content in unprotected formats from the publishers. There is also a private agreement between the library and the publishing industry to be allowed to remove the copy protection of collected units, but not yet by a general right constituted by law. Such an agreement may not be applicable to other libraries with similar preservation tasks.

In the related discussions, further digital preservation initiatives were mentioned such as the Portico electronic archiving service and the LOCKSS initiative. Furthermore, Meri Rantala from the European Commission pointed to the European Commission's 'i2010 Digital Libraries' initiative. Besides the online

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8 Steinke referred to research projects for the long-term preservation of digital objects, e.g. KOPAL on building an archival system, nestor on establishing a network of expertise, or reUSE on collecting, preserving and making available digital masters of printed publications.

accessibility and the digitisation of analogue content, the preservation and storage of digitised and 'born digital' content are the key areas of activities. Recently, an online-consultation on aspects of cultural heritage was conducted and a second Communication on digital libraries for scientific information can be expected end of the year 2006. In general, the European Commission is aware about impacts or potential roles DRM/TPM can have for digital preservation.

6 Proposals for Solutions

6.1 Regulation of DRM

Manon Rees from the non-governmental organisation 'Consumer Project on Technology' (CPTech) spoke about how to regulate DRM and TPMs effectively in order to ensure that the public interest in access to knowledge is protected. DRM system in its strongest implementation – and especially those that employ technical protection measures (TPMs) – can eliminate also legal unauthorised uses, which are uses for which authorisation by the rights holder is normally not required like uses by libraries or by scientists or uses in the sense of freedom of speech. Furthermore, DRM systems can be permanent and, thus, beyond copyright terms, and they can eliminate fair use or the first sale doctrine.

In her view, rights holders are now trying to shape the expectation of customers regarding the legal unauthorised uses of works. However, there is a strong public interest in (legal) unauthorised uses of works such as the public interest in expanding the access to knowledge goods. Normally, copyright law has tried to strike a balance between private and public interests, but technological developments force to re-evaluate the balance. In her view, copyright legislation would not differentiate enough between different types of information goods including scientific results. This is especially problematic since DRM systems are 'automatically' protected by copyright law from circumvention (independent whether the work is protected by copyright or not) and only limited exceptions for the circumventions are provided.

To mitigate the problem, CPTech proposes the registration of DRM systems and TPMs before their implementation in practice. Within registration it should be checked if DRMs meet with public standards such as regarding to the exhaustion of copyright protection, enabling private copying or archiving. DRMs should not be protected by law from circumvention unless they meet public standards. This would avoid that the rules for access are defined by private parties and not by general laws. DRMs would be only protected to the extent that is needed to protect the core interest of the copyright owner (providing incentives to create), but to an extent that is consistent with public interest in access. Vendors would have to explain how they will respond to legitimate uses of works under public rather than private standards. For instance, if a content provider would like to implement strong DRM in public science the content provider has to explain how legitimate uses are enabled, and not the other way around, that the content user has to proof his legitimate interest in access to knowledge. Rees

regarded public science as an important application field for the registration approach due to the importance of an unfettered access to knowledge.[9]

6.2 Technical approaches

Pasi Tyrväinen (Department of Computer Science and Information Systems at the University of Jyväskylä) presented technical approaches that may solve some of the problems mentioned above. He sees scientific publishing between the claims of commercial publishing and open access. Therefore flexible business policies have to be implemented that should technically realise, for instance, fair use exemptions or peer-to-peer marketing among scientific peers. DRM, which is here widely understood as any digital means to manage rights including digital rights expression, can provide some functions in these concepts.

One DRM-enabled business model is super-distribution. Here, the content provider delivers the encrypted content through a wide range of distribution channels to customers, e.g. via satellite, WLAN/LAN, CDs or DVD etc. The customers have to pay for a licence to a clearinghouse in order to access the content. The use of DRM systems would enable that scientists can (legally) forward DRM-protected content (together with product copy ownership information) to their peers who have to request for a license at the clearinghouse and pay to it. The clearinghouse only provides the licence, not the content itself. With tracking the delivery chain a peer-to-peer marketing is made possible, which – to a certain extent – can meet the usual exchange habits of scientists.

In another model the 'fair use' case of making personal copies is addressed. The technical concept allows making personal copies if a user wants to transfer protected content from one equipment to another. The user requests a personal copy licence from a personal copy manager system without an additional payment. Also in the context of a research organisation or university the copying by students or scientists can be managed in this way by identifying its students or scientists with an attached student or scientist license template. Even the selling of content from one scientist to another could be technically implemented ensuring the rewarding for sales not only by the previous scientist but also by the research institution which starts the dissemination of the protected content.

In any of the above cases, a trusted first party, which is often an institution that has contractual relationships with content providers, verifies the identity of a second party. The second party either acquires a free licence in the fair use case or can purchase a license if the party wants to resell the content to peers. Also libraries could be rewarded for library customer purchases, or libraries could outsource content lending to media distributors. For enhancing the applicability of such models the roles and trust relationships between a complex set of actors (e.g. scientists, research organisations, learned societies, commercial publishers, libraries, document delivery services etc.) have to be further elaborated.

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9 She referred to the international HapMap Project in the field of genomic research that attempts to prevent patenting and access restriction to research data.

7 Conclusion

The workshop has shown that no common understanding of digital rights management in scientific publishing exists and that understandings range from 'digital rights expression' to 'digital rights enforcement'. Accordingly, the needs for and functions of DRM systems as well as their impacts were seen differently by the participants. In one perspective, DRM is mainly regarded as attaching and handling machine-readable rights metadata to digital objects ('digital rights expression') for the management of rights within publishing companies and along the value chain. Today's quantity of publications and the complexity of management practices would necessitate an automated processing of rights information.

In this context, the need for standardised rights metadata and file formats was often stressed during the workshop, among other things in order to enable the preservation of digital content. Standards should be developed in cooperation between publishers, libraries and other stakeholders. However, publishers consider the many (sometimes incompatible) standardisation initiatives as a cumbersome burden. Also the establishment of principles was proposed, in particular to lower the variety of file formats, like the ISO standard for PDF/A that can be regarded as a set of restrictions for more 'archive-friendly' PDF versions. Furthermore, participants expressed their concerns that with an incomplete or missing representation of all relevant actor groups, including libraries, publishers, scientists etc., in DRM-related standardisation processes, the conditions and outcomes for scientific communication will be determined by others, i.e. technology providers or large media companies.

One of the crucial questions is if beyond the 'fixation' of rights information to single products also the technically enforced definition of use options is necessary ('digital rights enforcement'). While a representative of the publishing industry stated that at the moment there would be no urgent need for technical protection mechanisms because there is a trust relationship between publishers and libraries, technical protection measures are actually applied beyond this special relation, such as between publishers and private costumers.

In this context, new DRM-enabled business models emerge in which usage options such as copying, printing, forwarding, etc. can be technically defined in a very detailed way. At the workshop, these models include for instance 'pay-per-document' models for journal articles. Individuals, who are not benefiting from institutional subscriptions, would then be better able to access scientific publications since a further possibility for buying is given. However, such models are also questioned for the usual acquisition behaviour of scientists who would normally not acquire articles by themselves but through their libraries. The workshop has also shown other application fields for DRM: They can also be utilised by libraries to manage material that is licensed by publishers, to sell 'home-grown' material or to enhance the management of access to specific digital content that stems from third parties who may have an interest to make content digitally available, but only to specific groups. This can be the case for course material or donated material.

However, at the workshop also several negative 'side effects' of DRM systems were illustrated. Additional costs of purchasing, implementing and maintaining DRM systems are produced that make, at the end, the access to scientific results more costly. Also the great dependability on the business practices of DRM

technology providers such as regarding version changes became obvious. A threat for the preservation of digital files is seen in the effective hindrance of migration and emulation of digital files when DRM systems are applied. It is also not clear how long the usage options will be technically enforced by DRM systems. This led to the conclusion that organisations with long-term preservation tasks should receive digital files without any technical protection measure.

A further negative effect for libraries is the great variety of different DRM systems used for different purposes, e.g. for managing journals, books, or cultural resources. A centralised (meta) directory for administrating different systems was purposed as a solution. Furthermore, for e-books, as an example, public libraries have to buy several versions if patrons demand specific formats. The many different DRM standards force libraries to buy different copies.

These aspects led to the question if DRM in the sense of restrictive TPMs are really necessary or if established technologies such as the 'AAA' technologies of authentication, authorisation and audit would be sufficient? It was suggested as a regulative measure that in cases when DRM systems should be implemented the implementer should be compelled to prove that the DRM solution will not harm the traditional access and usage rights.

Some critical remarks on the current copyright legislation were expressed regarding its vagueness in many respects, especially for the work of libraries and usage options for their patrons. Even law experts could not come to unambiguous interpretations. Vagueness and gaps of statutory usage rights by libraries and customers is filled by private licences. Thus, traditional usages are now more and more curbed by the licences that publishers provide for digital content. For example, licenses prevent libraries of using the digital version for interlibrary loans. A clear definition of usage rights in legal frameworks, which can not be overridden by licence contracts, would mitigate the problem.

Participants brought up also the negative side effects of recent copyright revisions, which were oriented to protect the circumvention of TPMs: the potential of digital technology and networks are not fully utilised and 'artificially made scare', e.g. when libraries are only allowed to provide their digital services 'in-house' and are not allowed to serve their patrons online outside their facilities, or when electronic interlibrary loans are blocked. Business models and their legal frameworks are not adjusted to what is technically possible, but the technology uses are adjusted to traditional models of distributing scientific publications.

The workshop had to leave several issues unaddressed, such as aspects of copyright and DRM for databases, the changing roles of collecting societies, or the roles of new actors in scientific communication like Google with its scholarly search engine and digitisation of scientific books. Here, important fields of research and further discussions were seen.

Participants

Participants are listed in alphabetical order. Speakers and moderator are indicated by asterisks.

Bide*, Mark, Rightscom Ltd., United Kingdom,
http://www.rightscom.com/

Böhle, Knud, Institute for Technology Assessment and Systems Analysis, Helmholtz Research Centre Karlsruhe, Germany
http://www.itas.fzk.de/

Bohn, Philipp, Berlecon Research GmbH, Germany
http://www.berlecon.de/

Bolman*, Pieter, International Association of Scientific, Technical and Medical Publishers (STM), The Netherlands
http://www.stm-assoc.org/

Boulogne, Marcel, European Commission, DG Information Society and Media, Unit A1 Audiovisual and Media Policy, Belgium
http://europa.eu.int/information_society/

Braid*, Andrew, The British Library, Licensing & Copyright Compliance, United Kingdom
http://www.bl.uk/

Cervera Navas, Leonardo, European Commission, DG Internal Market, Unit D1 Copyright and Knowledge-Based Economy, Belgium
http://europa.eu.int/comm/internal_market/index_en.htm

de Kemp*, Arnoud (moderator), Digilibri GmbH & Co. KG, Germany (former Springer marketing and sales director and deputy member of the board)
http://www.digilibri.com/

Degkwitz*, Andreas, Information, Communication and Media Centre, University of Cottbus, Germany
http://www.ikmz.tu-cottbus.de/

Dufft, Nicole, Berlecon Research GmbH, Germany
http://www.berlecon.de/

Eschenfelder*, Prof. Kristin, School of Library and Information Studies, University of Wisconsin-Madison, United States
http://slisweb.lis.wisc.edu/

Griepke*, Gertraud, Springer, Business and Customer Support - SpringerLink, Germany
http://www.springer.com/ or http://www.springerlink.com/

Groenenboom, Margreet, Institute for Information Law (IViR), University of Amsterdam, The Netherlands
http://www.ivir.nl/

Guibault*, Lucie, Institute for Information Law (IViR), University of Amsterdam, The Netherlands
http://www.ivir.nl/

Hatcher*, Jordan, EFF-Austin, United States (former member of AHRC Research Centre for Studies in Intellectual Property and Technology Law,

University of Edinburgh, Scotland)
http://www.effaustin.org/

Jeges, Ernö, Budapest University, SEARCH Laboratory, Hungary
http://www.search-lab.hu/

Kerényi, Kristóf, Budapest University, SEARCH Laboratory, Hungary
http://www.search-lab.hu/

Nottebaum*, Roswitha, ARIES GmbH & Co. KG, Germany
http://www.kfinder.de/ or http://www.docurights.de/

Orwat*, Carsten (introduction, workshop organisation), Institute for Technology Assessment and Systems Analysis (ITAS), Helmholtz Research Centre Karlsruhe, Germany
http://www.itas.fzk.de/

Pöschl*, Ulrich, Max Planck Institute for Chemistry, Germany (initiator and chief executive editor of the interactive open access journal Atmospheric Chemistry and Physics)
http://www.mpch-mainz.mpg.de/ and
http://www.atmospheric-chemistry-and-physics.net/

Rantala, Meri, European Commission, DG Information Society and Media, Unit E4 Information Market, Luxembourg
http://europa.eu.int/information_society/

Rees*, Manon, Consumer Project on Technology, Information Society Projects
http://www.cptech.org/

Schrama, Ramon, Swets Information Services, The Netherlands
http://informationservices.swets.com/

Steinke*, Tobias, Die Deutsche Bibliothek (German National Library), IT Unit, Germany
http://www.ddb.de/

Tyrväinen*, Prof. Pasi, Department of Computer Science and Information Systems at the University of Jyväskylä, Finland
http://www.jyu.fi/it/laitokset/cs/en/

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Jewell, T.D.; Anderson, I.; Chandler, A.; Farb, S.E.; Parker, K.; Riggo, A.; Robertson, N.D.M. (2004): Electronic Resource Management. Report of the DLF ERM Initiative, Washington, D.C.: Digital Library Federation; online available at: http://www.diglib.org/pubs/dlfermi0408/

Web Resources

In the following a list of web-links to organisation, institutions, or web resources mentioned in this report is provided in alphabetical order.

ARIEL system:
http://www4.infotrieve.com/products_services/ariel.asp

Atmospheric Chemistry and Physics (open access journal):
http://www.atmospheric-chemistry-and-physics.net/

British Library:
http://www.bl.uk/

CISTI – Canadian Institute for Scientific and Technical Information:
http://cisti-icist.nrc-cnrc.gc.ca/

Coral Consortium Cooperation:
http://www.coral-interop.org/

Creative Commons Licensing Scheme:
http://creativecommons.org/

Die Deutsche Bibliothek (German National Library):
http://www.ddb.de/

DLF – Digital Library Federation:
http://www.diglib.org/

DocuRights DRM System by ARIES:
http://www.docurights.de/

DOI – Digital Object Identifier:
http://www.doi.org/

HapMap Project:
http://www.hapmap.org/

i2010 Digital Libraries Initiative by the European Commission:
http://europa.eu.int/information_society/activities/digital_libraries/index_en.htm

KOPAL Project:
http://kopal.langzeitarchivierung.de/

LOCKSS Programme ("Lots of Copies Keep Stuff Safe"):
http://www.lockss.org/

METS – Metadata Encoding and Transmission Standard:
http://www.loc.gov/standards/mets/

MI3P – Music Industry Integrated Identifier Project:
http://www.mi3p-standard.org/

nestor Project:
http://www.langzeitarchivierung.de/

NISO – National Information Standards Organisation:
http://www.niso.org/

ODRL – Open Digital Rights Languages Initiative:
http://odrl.net/

OhioLink:
http://www.ohiolink.edu/

ONIX – Online Information eXchange Standards by EDItEUR:
http://www.editeur.org/

Portico Electronic Archiving Service:
http://www.portico.org/

RapidRights DRM system by Cadmus Communication:
http://www.cadmus.com/products_and_services/detail.asp?itemID=0BCCEC17-F0FC-4E91-8605-619C2961C866

reUSE Project:
http://reuse.uibk.ac.at/

Science Commons Licensing Scheme:
http://sciencecommons.org/

Shibboleth for Internet 2:
http://shibboleth.internet2.edu/

Springer Open Choice:
http://www.springer.com/sgw/cda/frontpage/0,11855,1-40359-0-0-0,00.html

SpringerLink:
http://www.springerlink.com/

XrML – eXtensible rights Markup Language:
http://www.xrml.org/

INDICARE Publications

INDICARE Monitor Articles, edited by Knud Böhle, from 25 June 2004 ongoing; online available at: http://www.indicare.org/tiki-page.php?pageName=IndicareMonitor

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INDICARE Workshop Report (2005), E-Payment and DRM for Digital Content, authored by Ernő Jeges, Kristóf Kerényi, February 2005; online available at: 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; online available at: http://www.indicare.org/tiki-download_file.php?fileId=146

INDICARE Guide (2006), Content Providers' Guide to Digital Rights Management, authored by Philipp Bohn, March 2006; online available at: http://www.indicare.org/user-guide/

INDICARE Guide (forthcoming in 2006), Consumer's guide to Digital Rights Management. Things you should know about CDs, DVDs and online text, music or video you buy, authored by Margreet Groenenboom and Natali Helberger.