



The Critical Role of Digital Rights Management Processes in the Context of the Digital Media Management Value Chain

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ABSTRACT

This paper set out to analyze the impact generated by the adoption of Digital Rights Management (DRM) processes on the typical Digital Media Management Value Chain activities and try to analyze the processes in the context of the business model.

Given the early stage of the theory development in the field of DRM the study follows the logic of grounded theory (Glaser and Strauss, 1967) by building the research on a multiple-case study methodology (Eisenhardt, 1989). The companies selected are successful players which have adopted DRM processes. These companies are Endemol, Digital Island, Adobe Systems, Intertrust, and the Motion Picture Association. In this paper we provide in-depth longitudinal data on these five players to show how companies implement DRM processes. Twelve DRM solution vendors are also analyzed in order to compare the strategies adopted.

After giving a definition of Intellectual Property and Digital Rights Management (section 1) the paper provides a description of the typical Digital Media Management Value Chain Activities and players involved along the different phases examined (section 2).

An in-depth description of Digital Rights Management processes is discussed in section 3.

Digital Rights Management processes are considered in the context of business model and they are distinguished into content processes, finance processes and Rights Management processes.

We conclude with a discussion of the model and main benefits generated by the integration of digital rights management and propose the most interesting directions for future research (section 4).

1. INTRODUCTION

The burgeoning market for information and entertainment over TV, PC and mobile devices is forcing media operators and content providers to develop their businesses in order to remain competitive. With the availability of more sophisticated content, and the increasingly popular trend of peer-to-peer distribution, the requirement for Digital Rights Management (DRM) is becoming essential and the early movers in the operator community are aware of the opportunities they will miss if their DRM solutions are not in place.

Digital Rights Management poses one of the greatest challenges for multimedia content providers and interactive media companies in the digital age in order to make profitable their interactive products and service catalogues and to face information security management issues.

The importance of protecting digital contents is crucial for content and media rights holders looking to distribute and re-distribute their digital contents over more and more digital channels (TV, radio, Internet).

The definition of Digital Rights Management (DRM) adopted in this study covers the description, identification, trading, protection, monitoring

and tracking of all forms of rights uses over both tangible and intangible assets including management of rights holders relationships. DRM technologies enable secure management of digital processes and information.

The purpose of the study is to analyze the impact generated by the adoption of Digital Rights Management (DRM) processes on the typical Digital Media Management Value Chain activities trying to analyze the processes in the context of the business model.

Given the early stage of the theory development in the field of DRM we followed the logic of grounded theory (Glaser and Strauss, 1967) by building the research on a multiple-case study methodology (Eisenhardt, 1989). The companies selected are successful players which have adopted DRM processes. These companies are Endemol, Digital Island, Adobe Systems, Intertrust, and the Motion Picture Association. In this paper we provide in-depth longitudinal data on these five players to show how they implement DRM processes. Twelve DRM solution vendors are also analyzed in order to compare the strategies adopted.

After giving a definition of Intellectual Property and Digital Rights Management (section 1) the paper provides a description of the typical Digital Media Management Value Chain Activities and players involved along the different phases examined (section 2).

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We conclude with a discussion of the model and main benefits generated by the integration of Digital Rights Management and propose the most interesting directions for future research (section 4).

2. INTELLECTUAL PROPERTY: DEFINITION

Intellectual Property refers to all moral and property rights on intellectual works. Intellectual Property Rights (IPRs) are bestowed on owners of ideas, inventions, and creative expressions that have the status of property¹. Just like tangible property, IPRs give owners the right to exclude others from access to or use of their property.

The first international treaties covering Intellectual Property Rights were created in the 1880s and they are administered by the World Intellectual Property Organisation (WIPO), established in 1967.

The newly revealed physics of information transfer on the Net has changed the economics and ultimately the laws governing the creation and dissemination of Intellectual Property.

The Net poses challenges both for owners, creators, sellers and users of Intellectual Property, as it allows for essentially cost-less copying of content. The development of Internet dramatically changes the economics of content, and content providers operate in an increasingly competitive marketplace where much content is distributed free (see the Napster phenomenon).

There are many issues that organisations need to address to fully realise the potential in their Intellectual Property. They can be summarised in the following:

- **Ownership:** clear definition of who owns the specific rights and under what circumstances;
- **Distribution:** definition of the distribution strategy (small trusted group or the mass market);
- **Protection:** definition of the content the organisations need to protect and the level of protection required;
- **Globalisation:** because of the slow harmonisation across countries regarding protection of Intellectual Property Rights what is acceptable in one country may have legal implications in another;
- **Standards:** understanding what standards are in development and how these may affect system development.

3. DIGITAL RIGHTS MANAGEMENT: FUNCTIONAL ARCHITECTURE

Digital Rights Management (DRM) covers the description, identification, trading, protection, monitoring and tracking of all forms of rights uses over both tangible and intangible assets, including management of rights holders relationships.

At the heart of any DRM technology is the notion of a rights model.

Rights models are schemes for specifying rights to a piece of content that a user can obtain in return for some consideration, such as registering, payment, or allowing her usage to be tracked.

Digital Rights Management (DRM) can be defined as the secure exchange of Intellectual Property, such as copyright-protected music, video, or text, in digital form over channels such as the Web, digital television, digital radio, the much talked 3G (third-generation) mobile or other electronic media, such as CDs and removable disks.

The technology protects content against unauthorised access, monitors the use of content, or enforces restrictions on what users can do with content².

Digital Rights Management (DRM) allows organisations that own or distribute content to manage the rights to their valuable Intellectual Property and package it securely as protected products for digital distribution to a potentially paying, global audience.

DRM technologies provide the basic infrastructure necessary for protecting and managing digital media, enterprise-trusted computing, and next generation distributed computing platforms, and they allow content owners to distribute digital products quickly, safely, and securely to authorised recipients.

The Digital Media Management Value Chain can be described by the following main areas which play a key role in building digital rights-enabled systems:

1. **Intellectual Property (IP) Asset Creation and Acquisition:** This area manages the creation and acquisition of content so it can be easily traded. This includes asserting rights when content is first created (or reused and extended with appropriate rights to do so) by various content creators/providers. This area supports:
 - **rights validation:** to ensure that content being created from existing content includes the rights to do so;
 - **rights creation:** to allow rights to be assigned to new content, such as specifying the rights owners and allowable usage permissions;
 - **rights workflow:** to allow for content to be processed through a series of workflow steps for review and/or approval of rights (and content).
2. **Intellectual Property Media Asset Management:** After the finished content is bought, this area manages and enables the trade of content. The digitalisation of the television signal and the storage of the materials that have been purchased need to manage the descriptive metadata and rights metadata (e.g., parties, uses, payments, etc.). This area supports:
 - **repository functions:** to enable the access/retrieval of content in potentially distributed databases and the access/retrieval of metadata;
 - **trading functions:** to enable the assignment of licenses to parties who have traded agreements for rights over content, including payments from licensees to rights holders (e.g., royalty payments).

3. **Intellectual Property Asset Delivery Management:** This area manages the distribution and usage of content through different platforms (TV, radio, Web, 3G mobile) once it has been traded. This includes supporting constraints over traded content in specific desktop systems/software. This area supports:

- **permissions management:** to enable the usage environment to honor the rights associated with the content (e.g. if the user only has the right to view the document, then printing will not be allowed);
- **tracking management:** to enable the monitoring of the usage of content where such tracking is part of the agreed to license conditions (e.g., the user has a license to play a video 10 times).

4. DIGITAL RIGHTS MANAGEMENT: VALUE CHAIN ACTIVITIES

After defining the functional architecture, we can describe at a first level the DRM Value Chain identifying the activities supported by each segment and the players involved. At a second level we try to understand the DRM processes in the context of the Digital Content Management Value Chain and the impact of these processes on the business model.

The data provided refer to an in-depth longitudinal survey on five players (Endemol, Digital Island, Adobe Systems, Intertrust, and the Motion Picture Association) trying to understand how they implement DRM processes.

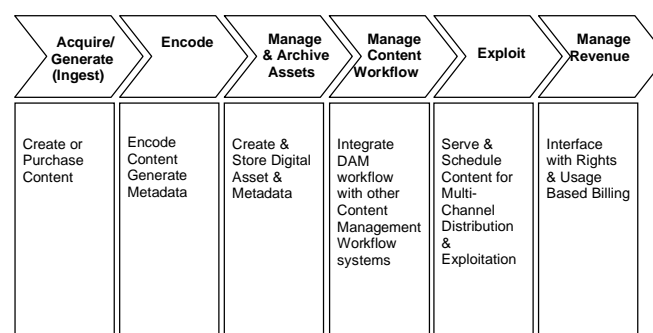
The Digital Rights Management Value Chain can be described by six main segments: contract & rights management, rights information storage, licence management, persistent content protection, clearing house services, billing services.

Each segment along the Value Chain is characterised by specific activities:

1. **Contract and Rights Management:** the registration of contract terms and rights, tracking of usage, and payment of royalties (residuals);
2. **Rights Information Storage:** the storage of rights information (e.g., play track five times) and usage rules (e.g., if they have a UK domain and have paid) as well as rights segmentation and pricing structures;
3. **Licence Management:** the management and issuing of licences in line with the Rights and Conditions. Without a licence the consumer can't use the content;
4. **Persistent Content Protection:** the use of encryption, keys, and digital watermarking to securely package digital content;
5. **Clearing House Services:** managing and tracking the distribution of the packaged content and the license in line with the defined Rights Information;
6. **Billing Services:** charging consumers for purchased content and payment to parties within the Value Chain.

Various players in the market are affected by Digital Rights Management, in particular all those operators involved with ideation, creation, realization, enabling and handling of contents. The role of these operators is to provide contents successively broadcast on the networks channels, radio, the Internet and other media. The different players involved along the Value Chain can be summarised in the following (see p. 963):

Figure 1. Typical Digital Media Management Value Chain Activities



- *Content Author/Creator* (e.g., Canal+, Reuters) or any other media or non-media company that produces content for internal or external use;
- *Content Publisher/Aggregator* (e.g., IPC Magazines, Flextech Television, BskyB) it buys various content and aggregate it into channels aimed at a particular lifestyle or niche;
- *Content Distributor*, e.g. W.H. Smith News, BskyB, NordeaTV;
- *Service Provider/eTailer*, e.g., T-Online.com, Yahoo.com.

In the first phase of the DRM Value Chain (*Contract&Rights Management*) after the author has created the content, the aggregator packages it in a container which provides persistent protection, enforcing the rights which the author has granted. This may be written as an applet that travels with the content which will be encrypted.

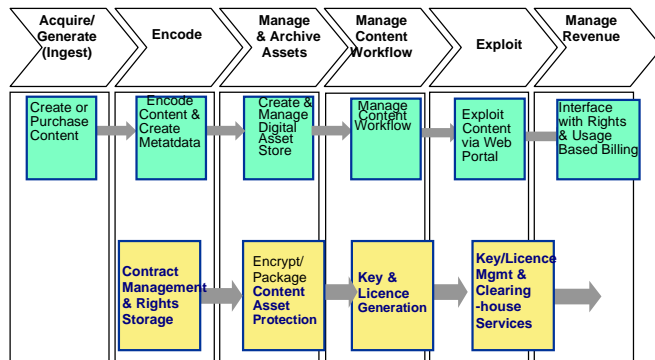
In the second phase (*Rights Information Storage*) the aggregator specifies the rights which apply to the content using products such as IBM, EMMS or Microsoft which encode the rights using an XML-based standard such as XrML or XMCL.

In the third phase (*Licence Management*) the consumer purchases the rights to use the content, the eTailer obtains the content from the distributor and requests a license from the content clearing house. The license may well be written in XML and may travel with the packaged content or separately.

The fourth phase is *Digital Asset Protection*. The consumer cannot access the content without the license. The Media Player, e.g., Real Video Player, interprets the license and enforces the rights granted to the consumer. That may include how many times or for how long time they can access the asset, whether they can duplicate it or 'rip' CDs from it.

With reference to the Digital Content Management Value Chain described above, DRM processes play an important role in the encode activity (Contract Management& Rights Storage), management and archive assets (Encrypt / PackageContent Asset Protection), management workflow (Key & License Generation) and exploit (Key/Licence Management & Clearing-houseServices) (Figure 2).

Figure 2. DCM Value Chain Activities & DRM processes

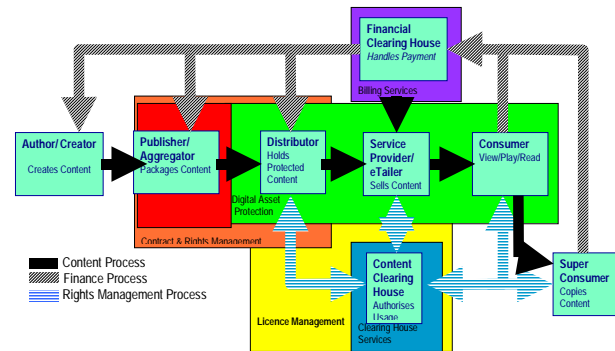


At a second level of analysis, we try to understand Digital Rights Management processes, described above, in the context of the business model.

All the processes analysed can be grouped in three broad categories (Figure 3):

1. **Content Processes:** include all systems and processes that enable the creation/capture, formatting, packaging, protection and storage of trusted channel content, control of when and how content is released, where and when it gets used and how long it remains there;
2. **Finance Processes:** include all systems and processes (payments) between the Financial Clearing House and the other players along the Value Chain (author/creator, publisher, distributor, consumer);
3. **Rights Management Processes:** include all Content Clearing House services which authorise the usage of rights to distributors, service providers, and consumers.

Figure 3. The Processes in the Context of the Business Model



5. DIGITAL RIGHTS MANAGEMENT BENEFITS

There are many benefits generated by Digital Right Management.

The survey has been carried out through questionnaires on a sample of successful players which have adopted DRM processes. These companies are Endemol, Digital Island, Adobe Systems, Intertrust, and the Motion Picture Association. Twelve DRM solution vendors are also analyzed in order to compare the strategies adopted.

The first main area concerns all benefits related to Contract & Rights Management.

Digital Rights Management allows a better management of bought-in content rights to maximise return on investment, and it avoids potentially expensive misuse.

A better management of content is allowed also by means of the creation of what-if scenarios for potential new revenue streams on the basis of the cost and ownership of content rights³. New contents can no longer be constrained to budget on a cost basis but they can now budget on the basis of forecast rights revenue.

Digital Rights Management generates benefits also with reference to the sale of rights, allowing a retained control of the sale of content rights and the conditions of sale in mass or niche distribution environments.

DRM allows the establishment of flexible business models for digital content sales (e.g., rental or purchase, play or edit, burn to CD, or just play on-line).

Segmentation of content allows to create different versions with different rights and conditions for different markets.

Information that has previously been stored in a vast number of separate databases can now be merged, sorted, and analysed, resulting in the creation of a personal profile or data image of a subject based on his or her electronic data composite⁴.

Consumer acceptance will determine the success of the market. The critical factor for vendors is to address the right market (publishing, audio, video and software).

6. CONCLUSIONS

Digital Rights Management allows organisations to manage the rights to their valuable Intellectual Property and package it securely as protected products for digital distribution.

It's not solely about technology; Digital Rights Management works across the people, processes and technology boundaries.

The key issues include:

- handling of complex sets of rights within each asset;
- rights licensing and management, and digital rights protection;
- understanding and design of revenue generation and collection models;
- standards - flexible rights languages and content formats;
- globalisation – territorial issues, both legal and commercial;
- ownership of rights.

Digital Rights Management is emerging as a formidable new challenge, and it is essential for DRM systems to provide interoperable services. Industry

and users are now demanding that standards be developed to allow interoperability so as not to force content owners and managers to encode their works in proprietary formats or systems.

The market, technology, and standards, are still maturing Digital Rights Management should be considered an integral part of company's Digital Media Management framework.

ENDNOTES

- ¹ G. Scalfi, *Manuale di Diritto Privato*, UTET 1986 p. 61
- ² Forrester, 2002
- ³ See also D.C. Burke, "Digital Rights Management: from zero to hero?" Cap Gemini Ernst & Young, speech at IBC Nordic Euroforum Conference held in Stockholm (Sweden) on 20th February 2002
- ⁴ Tapscott, D., (1999) "Privacy in the Digital Economy" in *The Digital Economy*, McGraw-Hill, p.275

REFERENCES

- Alattar, A. M. (2000), 'Smart Images' Using Digimarc's Watermarking Technology', *Proceedings of the IS&T/SPIE's 12th International Symposium on Electronic Imaging* San Jose, CA, 25th Jan, Volume 3971, Number 25
- Association of American Publishers Copyright Committee, (2000), *Contractual Licensing, Technological Measures and Copyright Law*. Washington, DC: Association of American Publishers
- Association of American Publishers Rights and Permissions Advisory Committee, (2000), *The New & Updated Copyright Primer: A Survival Guide to Copyright and the Permissions Process*.
- Burns, C. 1995, *Copyright Management and the NII: Report to the Enabling Technologies Committee of the Association of American Publishers.*, Association of American Publishers, Washington, DC
- Burke D.C., (2002) "Digital Rights Management: from zero to hero?" Cap Gemini Ernst & Young, speech at IBC Nordic Euroforum Conference held in Stockholm (Sweden).
- Chaudhuri, Abjihit K., et al. (1995), 'Copyright Protection for Electronic Publishing over Computer Networks' *IEEE Network*, Volume 9, Number 3, May-June 1995, pp. 12 -20
- Gervais, D. J. (1997), 'Electronic Rights Management and Digital Identifier Systems' *Journal of Electronic Publishing*, Volume 4 Number 3, Ann Arbor, MI: University of Michigan Press.
- Iannella R. (2001), Digital Rights Management (DRM) Architectures in D-Lib Magazine Vol. 7 N.6
- Interactive Multimedia Association (1994), ed. *Proceedings: Technological Strategies for Protecting Intellectual Property in the Networked Multimedia Environment*. Annapolis, MD: Interactive Multimedia Association.
- Kahin, B. and Kate Arms (1996), eds. *Forum on Technology-Based Intellectual Property Management: Electronic Commerce for Content*. Special issue of *Interactive Multimedia News*, Volume 2.
- Lyon, G. (2001), *The Internet Marketplace and Digital Rights Management*. National Institute for Standards and Technology.
- Risher, C. and Rosenblatt B. (1998) "The Digital Object Identifier - An Electronic Publishing Tool for the Entire Information Community." *Serials Review*, Volume 24 Number.3/4, Dec. 1998:13-21. Stamford, CT: JAI Press, Inc.
- Rosenblatt, B. (1996) "Two Sides of the Coin: Publishers' Requirements for Digital Intellectual Property Management." Inter-Industry Forum on Technology-Based Intellectual Property Management, Washington, DC.
- Rosenblatt, B. (1997) "The Digital Object Identifier: Solving the Dilemma of Copyright Protection Online." *Journal of Electronic Publishing*, Volume 3 Number 2, Ann Arbor, MI: University of Michigan Press.
- Scalfi, G., (1986) *Manuale di Diritto Privato*, UTET, Torino, p.61
- Silbert, O. et al. (1995), "DigiBox: A Self-Protecting Container for Information Commerce." Proceedings of the First USENIX Workshop on Electronic Commerce, New York, NY.
- Souzis, A. et al. (2000) *ICE Implementation Cookbook: Getting Started with Web Syndication*.
- Stefik, M. (1999) *The Internet Edge: Social, Technical, and Legal Challenges for a Networked World*. Cambridge, MA: MIT Press.
- Tapscott, D., (1999) "Privacy in the Digital Economy" in *The Digital Economy*, McGraw-Hill, p.275
- Vaidhyathan, S. (2001) Copyrights and Copywrongs: The Rise of Intellectual Property and How It Threatens Creativity. New York: NYU Press.
- Van Tassel, J. (2001) Digital Content Management: Creating and Distributing Media Assets by Broadcasters.
- Washington, DC: NAB Research and Planning Department. Available from National Association of Broadcasters at (202) 429-5373
- Vonder Haar, S. (2001) Digital Rights Management- Securing New Content Revenue Streams. Yankee Group Report.

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