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Rights Expression Languages: DRM vs. Creative Commons

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Preliminary considerations

Technological tool characterizes cultural progress, constituting not an end, but a means through which to pursue man's objectives. The relationships between technology and society are complex and multiple. Some describe technology as the element which defines the relationship between man and the environment in which he lives; others assume neutrality, considering technology to be a tool in man's hands, not able to influence his behavior and freedom.

In cyberspace, the development of DRM demonstrates[1] – not

[1]Two key elements of DRM systems, namely technological protection measures (TPM) and rights management information (RMI), are subject to a further legislative protection than copyright on the work to which they are applied, under the implementation of the "Internet Treaties" of the World Intellectual Property Organization (WIPO) and, for Italy and other EU Member States, of the directive 2001/29/EC. The literature on the subject matter is vast. For a full collection of writings inherent to technical, legal and economic issues related to the DRM systems use, see. e.g. E. Becker (*Digital Rights Management*). See also W. Rosemblatt, B.Trippe, S.Mooney (*Digital rights management: business and technology*); C.J.A. Chen, A. Burstain ("Foreword to Symposium, The Law & Technology of Digital Rights Management"). In Italian literature see R. Caso (*Digital Rights Management. Il commercio delle informazioni digitali tra contratto e diritto d'autore*; Digital Rights Management. Problemi teorici e prospettive applicative).

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only in the area of copyright – the central role of the technology designed to strengthen and sometimes to replace legal regulation. Just as physical barriers restrict behavior in "real" space, technical standards condition behavior in cyberspace (Lessig). An IT system, for example, can be programmed to deny access to those not provided with a password, prohibit simultaneous "login" from two terminals or prohibit the modification of a file for which consent has been granted to users to "read only". In an informational environment, every progress in technology can improve access to knowledge and individual communication, but can also, at the same time, determine a maximum control over individual behavior.

As some scholars have observed (on the argument, among others see Reidenberg; Dommering), it is obvious that in cyberspace the prevailing regulatory tool is not identified in the rule of law, but in what is defined as "architecture": the commands are incorporated into internet protocols of communication and software applications. A technical standard, under the control of whomever has planned it, confers to that person the power to "govern" users' behavior, becoming thus a source of rules. The digital technology "revolution", accordingly, is not comparable to the technological developments which preceded it. In fact, it entered into the system of sources of law. The regulation of digital information control finds its sources not only in the State law, but also in contract and technology (as well as in practice) (on the subject, see also Caso, *Digital Rights Management. Il commercio delle informazioni digitali tra contratto e diritto d'autore*). State law sees its centrality partially crumble, while the importance of private ordering increases. In this context, given that between IT and legal rules there is a substantial difference both in terms of democratic legitimacy and in structure, the law is invited to assert its supremacy, governing technology and, at the same time, using it to pursue its goals, achieving thus the creation of new rules, that

do not merely react against the changes induced by technology, but will help to determine any guidelines on use ("Forme di controllo dell'informazione digitale").

In order to understand and govern complex situations, such as those resulting from technological changes, a constant dialogue between knowledge and interdisciplinary analysis offers a starting point not to be ignored. In the information society, human – man-made – events have specific social effectiveness when represented as data within information systems. It's through digital representation – the most widespread form of expression – that most activities endowed with legal, economic, administrative and political implications are carried out. With regard to knowledge production and diffusion, cyberspace changes profoundly the scenarios which characterized traditional copyright, triggering new issues. IT technologies and especially the progressive use of the Internet have transformed the mechanism of knowledge transmission and its reproduction. In particular, the old dynamic of closing and opening knowledge is again put forward according to new technological features. A rigid and centralized control of information contrasts with a flexible and decentralized control.

On the one hand, we find a model of knowledge circulation based on contract self-enforcement (for thorough analyses on the Italian doctrine, see Pascuzzi, *Il diritto dell'era digitale. Tecnologie informatiche e regole privatistiche*; *Diritto e tecnologie evolute del commercio elettronico*; Caso, *Digital Rights Management. Il commercio delle informazioni digitali tra contratto e diritto d'autore*; Digital Rights Management. Problemi teorici e prospettive applicative; Montagnani and Borghi; in the international panorama see also Mulligan, Han, and Burstein; Felten; Grondal; Mayer-Schonberger; Samuelson, "DRM {and, or. vs.} the Law"; "Embedding Technical Self-Help in Licensed Software"; "Intellectual Property and Contract Law for the Information Age";

"Technological Protection for Copyrighted Works"), through technological protection measures (TPM). This kind of control is identified in DRM, whose goal is to make the license terms for access and use of information recognizable by the software and equipment made for the use of information. DRM, in fact, is based on the idea of self technological protection rather than State protection (Madison).[2] Through DRM systems – composed of both information management technologies on the rules for the use of the contents (metadata and Rights Expression Languages or RELs) and technologies able to allow their implementation (TPM), preventing, for example, copying where that is not allowed – an automatic application (in personal computers, mobile phones, televisions, etc.) of contractual rules used for the distribution of digital contents (for a general framework of the issues related to software licenses topic in Italian literature, see Caso, "Le licenze software") is possible.

On the diametrically opposite side stands the idea of "open content" which in scientific research environment, for instance, gave birth to the international revolutionary Open Access movement. Aiming to increase the range of patterns of production and commercialization of scientific information, it starts from the need to contrast the risk that a rigid and centralized control might colonize scientific knowledge and above all to enhance the use of information technologies, Network, Web and new intermediaries (institutional archives, Internet search engines such as Google Books Search and Google Scholar, etc.). This latter aspect presents features of particular interest and is worthy of attention in this paper. The circulation of information on the Web becomes a key issue also for the distribution of information according to the open model. In an attempt to overcome barriers to access and to promote maximum visibil-

[2] The author outlines the historical evolution of contractual patterns of the software user license, a contractual model spread over the time not only for the software market, but also for all digital contents.

ity of contents, many initiatives have been born, not only at the infrastructural, political, institutional and cultural levels, but also at the technological level, for interoperability and reuse of digital content.[3] Indeed, if the main purpose of the movement is to ensure maximum diffusion and reuse of information and if the main space for the circulation of content is represented by the web, the studies on cataloguing techniques, classification of information and the relevant rights in virtual spaces deserve special care. The scientific interest both in policy and its application is demonstrated not only by various initiatives aimed at creating standards for the representation of digital information and rights related to digital resources,[4] but also by the mobilization of international organizations such as WIPO (World Intellectual Property Organization)[5] and the European Commission.[6]

All projects referring to the open logic demonstrate important similarities and intersect with the ideology underlying to Creative Common licenses (CCLs), where the development and evaluation of

[3]See, for instance, project RoMEO (Rights Metadata for Open Archiving) which develops an interoperable set of metadata elements and methods of incorporating the rights elements into document metadata processed by the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), in order to protect research papers and other digital resources in an open-access environment (Lagoze et al.; Gadd, Oppenheim, and Probets).

[4]DL.org Policy Working Group, for example, investigates approaches and strategies related manual vs. automated policies (how to encode those policies for machine discovery, and which languages can be used to represent policies and make them functional, with particular attention to semantic web technologies). The Policy Working Group is further investigated the lack of formalised languages through a survey of relevant international digital libraries. For some initial suggestion see https://workinggroups.wiki.dlorg.eu/index.php/Policy_enforcement.

[5]See section devoted to the WIPO seminar Information Seminar on Rights Management Information: Accessing Creativity in a Network Environment available at URL http://www.wipo.int/meetings/en/2007/sem_cr_ge.

[6]Think of the European project Digital Library i2010: http://ec.europa.eu/information_society/eeurope/i2010/index_en.html.

knowledge are based on the collaboration of an open community of persons. The CC licenses for digital content represent new models for the distribution of knowledge, in which the authors, through the adoption of a contract, grant their consent to the public to exploit their work. The CC movement – which also resulted in the Science Commons project[7] focused on scientific knowledge – represents therefore a landmark, not only from an ideological and contractual point of view, but also from a technological one: CC licenses, using some system technologies similar to those of DRM, appear to the user in a readable form and, also, in a machine-readable form. The technologies which allow DRM systems to exercise strict control over information are developed by CC to facilitate the diffusion and the use of content, aiming at a flexible and decentralized control. Since 2002, CC is indeed working on a project to incorporate the rules of IT code leveraging on semantic web basic technologies first in this field, with the intention of making the works distributed on the Network, as much as possible, traceable and reusable.

The feasibility of such a project presupposes the elaboration of metadata bearing legal content intended to be globally circulated; the enterprise would requires a major effort in the conceptualization and representation of legal categories, highlighting issues connected to translation and the incorporation of the rights into IT architecture. The analysis of REL's technological progress reveals evident limitations of new forms of "communication" intended for machines. These are consistent limitations especially because digital languages are not able to support the complexity of legal concepts, which always involve interpretation and specific case by case application. Therefore, legal science and informatics are nowadays in the posi-

[7]Science Commons project proposes a protocol, i. e. a set of best practices which should guide and standardize the choice of the license, a tool which depends on the licensee's discretion and through which he grants his e-print. As reference, see http://sciencecommons.org.

tion of facing a challenge of great complexity: that is to consent the circulation and use of information on the web, integrating the right rules into IT architecture. The following paragraphs are intended to first provide a brief description of the IT technologies developed in DRM systems and by Creative Commons and then, for the translation of rules into IT code, to highlight the differences and, especially, the various achieved purposes. While dealing with such issues the necessity emerges of scaling interdisciplinary processes, the only ones able to provide the jurist with the tools for him to play his role even within what is defined as "cyberspace".[8]

Digital rights in "closed" systems: DRM and Rights Expression Languages

The development of digital technologies has facilitated the access to and the use of creative works by allowing no cost high-quality copy. This has led to important changes in the market and in the behavior of information users, increasing the risks for illegal use of intellectual property. The same digital technologies have, on the other hand, also put digital content providers in the position of exercising a strict control over access to and use of information delivered in digital form, thanks to the development of DRM technologies. DRM, which represents a tool, or rather a set of tools aimed for digital rights management, has no a widely agreed upon definition. The model, as was described in the introduction, is based on strengthening the contract (license of use) through which information is distributed on the Network and which can be translated into digital language, making the rules for the use of a given digital

[8]The reference to cyberspace concept is, obviously, a metaphor intended to arouse critical views (Cohen).

object "compressible" to the machines. This is made possible thanks to RELs: contracts, or better still licenses, which describe in detail which actions can be performed by the user with digital resources, are expressed in a formal mark-up language which allows the content provider to outline in detail the options offered to the user. REL is a rigid, precise and inflexible language. As opposed to natural languages, because it is aimed to be machine-readable, the rules that it can define must be computer-manageable and may, therefore, include quantitative controls, over time, related to payment, etc.

A REL able to express the user's relationship with a file (in the interest, at least up to now, of the rights holder) represents a language of communication devoid of enforcement tools, the latter guaranteed only thanks to technological measures of protection, such as digital cryptography, watermarking or fingerprinting. RELs, to that effect, constitute a measure to prevent an unauthorized use of digital contents only in a "safe" IT environment.[9] If placed in a "trusted" system, they can ex ante ensure the protection of contractual rules, leading to a radical shift of the paradigm: whereas in a legal system "everything not prohibited is permitted" in an IT trusted system "everything not permitted is prohibited [!]".

The idea behind RELs, whose early development is to be attributed to Mark Stefik in the early nineties,[10] is that each digital

[9]Trusted System expression (hereafter, TS) derives from the military terminology, originally referred to IT systems which provided access to secret information for military or national interests and is approximately translatable into trusted system, that is a trustworthy system. Recently it has assumes a wide significance in relation to all systems which, primarily for commercial purposes, protect and govern the use of digital contents. The greatest interest towards this kind of IT systems has been manifested in the copyright area. The theory of TS is achievable from a technical point of view, first of all through RELs processing (Stefik; on the legal implications of the trusted systems idea developed by Stefik see Weinberg).

[10]The first REL was developed by Mark Stefik at Xerox PARC in the early nineties. Such language continued to be developed and in 2001 was licensed at Content Guard

resource may be accompanied by a description not only of the content, but also of the rules governing its use. Today, twenty years later, there are many projects designed to implement rights expression languages: the concept is gaining importance in all the initiatives which develop metadata for digital resources (ONIX, OAI, METS, Dublin Core, MARC, etc.).[11]

Despite the diversity, all RELs standards can be said to share a similar conceptual basis: common aims are included in the management of the consumption of digital goods, such as the authentication of the user of a digital object, the verification of the user's rights on the basis of his role or identity, the provision of a guarantee or protection of access; also communications to the content provider related to the consumption of the goods may be provided of a system of revenue calculation for the content provider or other activities. These are the reasons why the language supports the articulation of roles and the creation of standards identification systems (for example, the Digital Object Identifier, or DOI);[12] the definition of permissions

as eXtensible Right Markup Language (XrML), today, one of the most widely used REL standards.

[11]Metadata (literally "data about data") began to be developed in the mid-nineties in order to improve informational resources retrieval, allowing their elaboration, management and control (Rosenblatt, Trippe, and Mooney). About metadata in Italian literature see Bassi (*La catalogazione delle risorse informative in internet*) and Gambari and Guerrini (*Definire e catalogare le risorse elettroniche*).

[12]DOI an emerging standard for metadata management, was founded in 1994 as part of a broader initiative of copyright management on the Net, an initiative promoted by the Association of American Publishers (AAP). DOI helps to identify, within a digital network, any object of intellectual property and to associate it with the referring metadata. The identifier can be imagined as a sort of bar code for intellectual property: just like the bar code of physical products, the DOI constitutes an added value and allows the saving of resources throughout the whole productive and commercial chain. The system which relies on this standard allows the identification of reliable and persistent resources, content management and their connected information; it facilitates commercial transactions and then makes possible an automatic management of the media (Paskin; de Kroon). For the moment, this technical

for the use and the relative restrictions (or prerequisites); the expression of remuneration conditions and payment details, information on safety and other technical information.

REL standards are based on different approaches (from the point of view of standardization, this makes the selection of the most appropriate ones difficult). However, it's possible to identify some common elements on which we will focus in the following part, in particular having a look at those which, currently, can be considered as the three main projects:[13] XrML (MPEG-21 REL),[14] ODRL[15] and

standard – managed by the International DOI Foundation, an organization which includes commercial and non-commercial partners – has scored some successes in the e-books field and is used by companies like Microsoft and Hewlett-Packard (ref. the web site http://www.doi.org). DOI is currently being standardised through the International Standards Organisation, ISO.

[13]There are many other projects including, for example, Portable Document Rights Language and OMA DRM, http://www.openmobilealliance.org.

[14]MPEG 21 is a suite of standards related to multimedia resources, consisting of sixteen parts, two of which are devoted to rights management. The numbers 5 and 6 are respectively identified in REL and RDD (Rights Data Dictionary). Part 5 defines REL basic terms and how they are organized (syntax and language); part 6, RDD, defines the terms used in REL, in other words, formalizes the semantics of the language. The terms used in REL are defined by semantic relationships which can be used to facilitate multimedia content management. For the time being, both REL and RDD MPEG-21 are not fully integrated, RDD is not formalized. MPEG-21 language is essentially designed to the "translation" of user licenses and has been developed using the basic eXstensible Rights Markup Language (XrML), elaborated by Content Guard, recognized as ISO standard. This is a standard viewed to be machine-actionable, to interact with software and hardware which allow the execution of (DRM) licenses in a Trusted System field (Rosenblatt, Trippe, and Mooney p. 114).

[15]Open Digital Rights Language is a REL developed within the Open Source movement (licensed under Creative Commons) to express licenses for the distribution of digital objects in machine-readable form. ODRL was developed by Renato Iannella, of IPR Labs in the year 2000. Today it's an open and cooperative project in which many organizations participate. ODRL was born as machine-actionable: the promoters' purpose is to realize a language able to support digital rights enforcement, therefore can be defined as a so-called control-oriented REL (Guth; Guth and Strembeck).

Creative Commons REL (ccREL).[16] Each of the languages mentioned, even with necessary developments and changes, is potentially a candidate for the basis for a standard language.

ODRL and MPEG-21 / 5, in particular, are characterized by a rich vocabulary, which can be shortened or extended creating a language able to include parts of or entire licenses of use based on copyright. These languages are expressive of the rules on the use of the contents protected by copyright, even if they contain few references related to them. In fact, the approach on which they are based, at least up to now, has not taken into account copyright principles and rules which, therefore, are not supported by RELs as currently structured.[17] As the distribution of digital works is based on license-regulated permissions, both MPEG-21 REL and ODRL concentrate on the parts and on contractual conditions. The distinctive feature of these languages, the result of the fact that they were born as tools aimed to control the information, concerns the way in which the rules are expressed, that must ensure an effective control and en-

[16]For a technical reconstruction, see www.creativecommons.org (Abelson).

[17]The two faces of copyright are, on the one hand, the author's exclusive right to authorize or prohibit a series of usage (publication, reproduction, communication to the public, commercialization etc) and, on the other hand, the recognition of a series of restrictions on this author's exclusive prerogative. These restrictions, while ensuring public domain protection (broadly defined), aim to promote new works and therefore the circulation of information and knowledge, free expression of thought, preservation of competition and technological innovation. These are internal and external limits to the copyright discipline; among the first, there is certainly free use (exceptions and limitations) or fair use. The limited nature of protection, which has resisted throughout the time, constitutes a feature – although with significant differences – that can be found both in the Anglo-Saxon and continental copyright. Despite recent legislative trends, designed to extend the proportionality and the duration of the protection of the intellectual property, the limits still remain (Caso, *Digital Rights Management. Il commercio delle informazioni digitali tra contratto e diritto d'autore* p. 78 ss. Guibault, *Copyright limitations and contract. An Analysis of the Contractual Overridability of Limitations on Copyright* p. 7 ss.).

forceability by the machine: to be defined as self-executing, a REL must be very precise. The more broad and generic the language is, the higher in fact will the probability of unauthorized use of the content be. In other words, for a REL aimed at a self-enforcing license, there is no distinction, as would be the case in the legal order, between contract and "control": the function of contract and control tend to overlap, because they are both represented in terms of licensing, be it for access control or for use or both. Since there is a mechanism for an automatic execution, the parts do not have the possibility to disregard the rules drawn up by the provider, even if they could do it under legal provisions.

The fundamental conceptual features of a REL concern the names of the parts and the characteristics of access and use. Although the definition may vary depending on the language, such notions are commonly recognized as: "resources", "agents" and "rights". The first ("resources") are represented by digital objects or services for which the rights are applied and are described through unambiguous identification systems (such as DOI); the "rights" expressly permits for the access or use of digital goods or services and they refer to the ultimate user's possible action (such as printing, listening, viewing, copying, etc.). The list of permitted activities may vary depending on the type of language, however all kinds of actions can be connected to four main categories: "manage", "re-use", "transfer", "use". The "rights" are the REL heart and they can be specified in a more detailed way and be subordinated to conditions or constraints. The conditions describe terms and provisions to be applied before a "right" be granted; constraints import, in fact, "rights" restrictions, related, for example, to the time, the place of use. Each REL may use different terms to refer to the same concept. The goals, however, are the same: to express a set of actions which may be effected on resources. Finally, the "parts" (agents), which are both individuals

and entities which have a relationship with a digital object, are represented as the rights holder, author, creator, content provider, consumer and so on. Compared to the model made by small indicated elements, each REL may then contain further concepts, designed to express more detailed reports: each language includes a vocabulary which defines the terms used and their meanings to express, for example, the faculty permitting use, imposing restrictions or giving the payment conditions. Since the RELs are placed within a system, language efficacy depends on the characteristics of the latter. In general, we can identify three kinds of architecture: "off-line system", in which controls remain within proprietary software and the rights are included in the "package" that may be used offline without any connection to the Network (in this case, think about Adobe PDF files). The licenses attached to these digital files, once acquired, do not change and the control on the use is made by software or hardware, or by the combination of both. ODRL and MPEG 21 REL could be used for this kind of systems. The second hypothesis is represented by an "on-line interactive system", which represents the most complex and "powerful" of the three systems. In this case, indeed, a content transfer requires interaction with a system which verifies the transaction and transfers the rights, allowing also the possibility to modify the license for further accesses or services. This is the system which responds more to "Trusted System" characteristics, bringing to the lawyer's attention the thorniest issues of digital rights management. In fact, such model presupposes not only an automatic execution of the license, but also a unilateral modification of the contractual terms. There are many examples of such systems; the most well known is certainly Apple's FairPlay iTunes. The third hypothesis is represented by so called "no system", in which there is the mere expression of rights, without any kind of enforcement. This is the case, as we shall discuss in the following paragraph, with

Creative Commons REL, which, although being machine-readable, operates on the web but not within a DRM system.

Creative Commons Rights Expression Language project (ccREL), an "open" model of digital rights

The growth of existing tensions between the request for a free use of creative material on the Internet and instances of major protection for intellectual property by companies led to the foundation, in 2001, of the Creative Commons project, a movement which echoes, in a wide field that includes all kinds of digital content, the ideas carried out by Free Software Foundation in the software sector.[18] The latter had been promoting, for long time, the use and the diffusion of GNU General Public License (GPL). These are general conditions of public contract, which, relying on copyright, intend to assure anyone who agrees with them o the right to copy (CD copyleft), modify and distribute software endowed with open source code. The mechanism of protection is entirely based on the clause declaring the licensed software to be protected by copyright and, in the meantime, requires GPL users to apply GPL itself to the (successive) licensees, in case of the distribution of the software or derivative software. Of course, many types of licenses are inspired by GNU GPL; among these we find the Creative Commons Licenses (CCLs), contractual arrangements which transplant GNU GPL archetype into the broader field of digital content and intellectual works. Creative Commons was founded in the United States thanks to some lawyers' efforts (Lawrence Lessig, James Boyle and Michael Carroll) as a non-profit association to carry out activities of cultural and sci-

[18] http://www.fsf.org.

entific promotion, particularly through the development of models of license. According to the idea of the founders of the movement, Creative Commons licenses are in the centre of a creativity conception in which knowledge and content sharing represent at the same time the resource and the incentive for the production of intellectual works (Hess, Ostrom, and Ferri; Boyle). From this perspective, the virtuous circle at the base of the movement should lead, in the long term, to a massive base of shared content, to the benefit of research, allowing the adaptation of different materials through modifications and transpositions of genres and works. CCLs consist of a series of public standard contracts deriving from the settlement of some basic options, which allow the author to choose which rights to reserve for himself and which will not to be exercised against other users of his work.

Creative Commons licenses are widespread worldwide and coordinated through necessary translations and adaptations in every country of adoption, thanks to national organizations affiliated to the movement, the so-called "affiliate Institutions".[19] The rights granted by the licenses vary – while the authorship recognition of the work, called "attribution", is a constant – according to available basic options the licensor may choose: a) to operate (or not) the prohibition on the use of the work for commercial purposes, denominated "non commercial", b) to operate (or not) the prohibition to modify or to create derivative works, designated as "no derivative", c) to include the obligation to apply (or not) to derivative works the same type of license provided for the original one, denoted by the term "share-

[19]The translation into Italian and necessary adaptation to the national legislation is performed by Dipartimento di scienze giuridiche – Department of Legal Sciences – of the University of Turin and by Istituto di elettronica e di ingegneria dell'informazione e delle telecomunicazioni – Institute of electronics and information engineering and telecommunications- (IEIIT-CNR) of the same University.

alike".[20] CC licenses have some key features: each of them provides the user with a perpetual, non-exclusive, "royalty-free" right to reproduce, to copy and to distribute copies of the work. Depending on the type of the selected license, according to the options just mentioned above, the right to create derivative works or to use them for commercial purposes may also be guaranteed. In any case, all rights not expressly granted to the licensee are to be considered as reserved (except limitations guaranteed by copyright, which are in no way affected by the license). The licensee must attach a copy of the license to each copy of the work that he is distributing, keep intact all the information and exempt-clauses from any responsibility attached to the license; he must always credit the author's original work and any subsequent one; he must not impose additional terms to the license and, finally, he must not apply DRM systems which alter or restrict the terms of the license or other successive licensees' rights. The most peculiar aspect of CC licenses, which make them so interesting for the present paper, concerns the three forms in which they appear. The first consists of the pure contract with all detailed contractual terms that may therefore be subject to legal enforcement. The second, which is termed "human-readable", is the one with which the author and the users of CC licensed works are first confronted, a synthetic and symbolic document which explains the contract's salient points, i.e. the constraints and freedoms that the license conferred on the user. Finally, the license, as anticipated in the previous paragraph, appears in a so-called machine-readable

[20]More specifically, an author who wants to license a work using a CC license has the possibility of choosing from among six different licenses: 1) Attribution License; 2) Attribution Share Alike License; 3) Attribution Non Commercial License; 4) Attribution Non Commercial Share Alike License; 5) Attribution No Derivative Works License; 6) Attribution Non Commercial No Derivative Works License. Moreover, Creative Commons has gradually developed other specific licenses for particular kind of works. The licenses are freely available at http//www.creativecommons.org or at affiliate institutions addresses (for Italy http//www.creative.commons.it).

form, that is in an digital language understandable to the machine. The content distributed on the web is accompanied, in an digital rights expression language (ccREL), by some information related to the license, allowing, for example, some search engines designed for such purposes, to search the Web for CC licensed contents or to improve research related to CC specific licenses (for a general description of CC licenses, see Eechoud; Loren; Dusollier; about CC licenses see also Guibault, "Creative Commons: Struggling to 'Keep it Simple'"). In other words, in addition to a legal structure, Creative Commons provides an digital rights expression language for a system of resources exchange on the web, based on the principle of "some rights reserved".[21] The ccREL project, unlike the models described in the previous paragraph based on DRM systems, does not provide any control over the use; for this reason, the language cannot be said to be machine-actionable. Rather than rights management system, one could therefore speak of rights representation designed for machines. The ccREL project, in constant development since 2002, is based on Dublin Core metadata, structured according to the RDF schema, one of the main technological components of the semantic web.[22] In a machine-readable form, the license is composed

[21] http://www.creativecommons.it.

[22] One of the main organizations involved in metadata development is Dublin Core Metadata Initiative (DCMI), which aims to define and promote the adoption of interoperable standards. Dublin Core is a standard derived from the librarian cataloguing field, then used to organize resources not only on the network; the "identifier", in fact, may be, for example, a URI/URL, but also an ISBN code of a book. Dublin Core proposes an approach which can be described as minimalist – with few descriptors, simple interpretation and suitable for a wide range of resources. The standard vocabulary proposed to indicate the main properties of the most popular resources online, originally created for the description of bibliographical references is now generalized and, also because of its extensibility, operates for the description of heterogeneous objects. Dublin Core standard is not the only organization of its kind, but becomes particularly important because it revealed, for the first time, the need to include metadata in resources description on the Net. Dublin Core, in addition,

of two parts: the "work" and the "license" which, in RDF terminology, represent "classes": the first describes the resource to which the license is refers, using simple elements of the Dublin Core standard. The part dedicated to the license is more specific and defines, in fact, the required, permitted or prohibited "actions". Under this last profile, CC licenses are mainly concentrated on three purposes: to recognize the work ownership; to allow (or not) derivative works or any modification; to allow (or not) the commercial use of the work. The license includes also the term disallow (a less rigid expression than forbidden which is included in the other mentioned RELs) to indicate that certain uses should be negotiated with the copyright holder. Another characteristic of ccREL concerns the agent element (which helps to identify the parties involved): it does not refer to the final user. This feature is in harmony with the open nature of the Creative Commons environment; for each license-covered resource no users are determined ex ante. Specifically, because of the nature of CC licenses, ccREL defines only certain conditions for use corresponding to open source principles, among these, for example, to share, to attribute (there must always be a reference to the author); to give notice (a constant reference to the CC license which must remain intact is required); to share alike (derivative works must be licensed with the same terms as the original one); and to provide the source code. It does not, however, include "prerequisites", which characterize MPEG -21 and ODRL. The purpose of Creative Commons REL is not to ensure the enforcement of license terms, but to facilitate the description of the information online to enable the machine to search and read automatically the license terms for

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has formed the basis for the successive organizations which have worked and are still working on metadata. Its simplicity, however, continues to be a referring point for many initiatives for the creation of more rich and complex metadata schemes. The DCME 1.1 version has been acknowledged by ISO as official standard (ISO 15836-2003) ref. Dublin Core web site: http://dublincore.org.

the distribution of the content. CcREL language is based on the assumption that, the machine neither now nor in the future (when we actually can talk about semantic web[23]) will be able to "comprehend" the meaning of the terms expressed in a machine language, replacing the interpreter. According to CC, through the use of metadata, it is possible to inform the user about the content of the license, but the choice to comply with the conditions therein or not still depends on the user. CC is working on a project for the incorporation of rules in IT code, with the view that in a future not so far away there may be programmes able to answer simple questions related to the work ownership and conditions for use, facilitating thereby an automatic cataloguing and traceability of works and their rules for use. In contrast to DRM, ccREL, instead of strictly protecting the content, works to promote its use; rather than aim at discouraging piracy, stimulates the use of information; rather than attempt to manage users and customers, manages informational resources. To achieve such objectives, CC levers on the most innovative research realized in informatics, whose promising borders look at the creation of a computational environment in which most of the tasks performed by human users nowadays may be "delegated" to hardware and software systems. The study and the implementation of these advanced

[23]The idea of the semantic web belongs to Tim Berners Lee and is to be dated from the original development of the web, but did not have immediate implementation. Only since 1999, thanks to other scholars interested in creating a "new" web, did the process designed to complete Berners Lee's initial intuition begin. From the semantic web project came to light a new research community organized around semantic web Interest Group at W3C. It is not just a new re-launch of research on artificial intelligence, but rather of a system to make the use of the web more simple and effective. Through applications, called software agents, able to solve more complex and structured operations than those carried out for hours by search engines it will be possible to filter and reorganize information automatically. Semantic web focalizes on methods of organising information to improve the availability, providing syntactic and semantic rules for documents writing, in order to allow not only people but also machines to "comprehend" the content (Berners-Lee, Hendler, and Lassila).

technologies intertwine with the development of other innovative tools: the semantic web and software-agent systems. The semantic web provides new possibilities to organize and share information, structured to be re-elaborated by the machines at a global scale, allowing collaboration and cooperation based on knowledge sharing. Creative Commons has been the first to develop a model of license including "data mining" applications, based on semantic web standards, which allow in-depth research on the contents and on the legal situation of the work. In agreement with the movement's ideology, rather than digital rights restrictions, they are designed to guarantee the permissions included in CC licenses, which, to remind the reader, do not pose serious limitations for the use of the content, but rather ensure rights to access that, otherwise, would be exclusively available to the copyright holder. Creative Commons has developed its own licensing schemes according to an approach which makes an extensive use of metadata, built on the crossroad between legal sciences and knowledge engineering. The project, which nowadays has affiliates in more than thirty national legal systems, aspires to interoperability through metadata. The goal not only aims to enable different programmes to read different metadata schemes, but also and above all, to enable vocabularies – correlated property groups – to evolve and be extended; thus the use of the expression "interoperability of meaning". The predisposition of interoperable metadata requires a precise definition of concepts and their coherent cataloguing: an IT tool is able to process human language only as specifically outlined and placed within taxonomies of concepts, according to logical and precise patterns. This is the challenge currently raised by web progress and knowledge engineering involved in developing ontology and in the legal field1.[24]

[24]The ontology is a table of categories in which each kind of entity is captured by some knot in a hierarchical tree. It represents an ideal which takes its origins

Conclusions: legal and IT tools for knowledge diffusion

Creative Commons licenses on digital contents represent new models and new incentives for the circulation of digital content and scientific knowledge as well, which are rooted in the advent of new digital technologies and the Net. These are tools aimed to improve intellectual collaboration amongst people on the basis of the principles of distributed intelligence. In scientific environment, for instance, the way in which the authors give the consent for the exploitation of their work by Open Access Archives is expressed, often, through the adoption of a Creative Commons license. Moreover, the Creative Commons project, seizing on the essential role of the Web in knowledge diffusion, promotes digital rights representation in order to improve knowledge diffusion: as demonstrated in this paper, while contrasting with the logic of strict and centralized con-

from philosophy and in particular from Aristotelian thought on categories and his medieval successors and has been incorporated into the contemporary ontologists' thought such as Roderick Chisholm (*A Realistic Theory of Categories?*). In a parallel development, the term "ontology" has acquired a value in the IT field; it has become popular especially in knowledge engineering, in the elaboration of natural language, in cooperative information systems, in intelligent integration of information and knowledge management. In this context, ontology can be defined with an explicit shared and socially acceptable definition of a portion of reality within a conceptual model; a model that can be immersed in a software or information system or in a process. In other words, it is the description of a shared domain, i.e. common conceptual descriptions among the members of a community. From the technical point of view, they represent a kind of encyclopedia which expresses the relationship between the terms used in markup language, allowing the software to elaborate the information as a computational autonomous entity. Ontologies are one of the key parts of the semantic web. Nowadays, there are several projects for the elaboration of ontologies for rights management in the intellectual property area(for an in-depth analysis, see Hoekstra et al.; Hoekstra; Sartor, "Legal concepts as inferential nodes and ontological categories"; *Corso di informatica giuridica*; Rossi; Delgado).

trol of information and DRM, it uses some technological standards to favor information traceability and reuse. In fact, Creative Commons and Science Commons are currently investigating both legal mechanisms which govern data collection online and IT projects for the transmission of information on the web, to improve and make them more useful.

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