

DigiRight: Relevance to and Potential Impact on Europe's Need to Strengthen the Science and Technology Excellence on DRM

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Abstract

In today's fast changing digital environment where global communications transcend national boundaries, and where digital products are sold on international markets, the development of digital rights management (DRM) in order to protect digital assets is becoming an increasingly important global issue, and is emerging as a formidable new challenge since the different national laws, policies and practices must interoperate and be reconciled. To address these challenges, we have therefore proposed to establish a Network of Excellence for a Framework for Policy, Privacy, Security, Trust and Risk Management for DRM, DigiRight, that will consist of teams of experts on technology and development, business, law, ethics, and societal questions who will organize on-going and future high quality research on those areas of their respective disciplines that apply to DRM. This paper describes DigiRight's relevance to and potential impact on Europe's need to strengthen and reinforce science and technology excellence on DRM.

1. Introduction

In today's digital world there is an enormous and increasing amount of digital content. In the future world of ambient intelligence, digital content will be ubiquitous and people will interact with it one way or another in all areas of their lives, a situation that presents new challenges in the area of DRM. While valuable information products need protection from theft and prying eyes, access to information and the ability to contribute to information products as well as to share information within communities are also essential to all citizens of the information society. The need for security and privacy but also lawful usage of the content sets the basis for an ambient intelligence dominated future. Therefore, it is imperative to establish a Network of Excellence (NoE) for a Policy, Privacy, Security, Trust and Risk Management for DRM. DigiRight [1] is such an NoE proposal, which

will consist of experts from various disciplines who will direct and conduct on-going visionary high quality research.

This cross-disciplinary interaction of experts on complex technical, legal, societal and business issues will determine how consumers will access content in the networked digital age and how rights holders will be compensated for and protected from unauthorized use of content, and how information will be shared between communities. In a perfect world, technology companies would be able to design their products as they thought best, copyright owners would be able to market their products as they think best, and users would be able to consume the content in their preferred way and in their preferred medium with minimal interference and cost. The economy would benefit from vitality of the content-based businesses, and indirectly the entire private sector at large. Low distribution and transaction costs would facilitate bridging the digital divide.

At the present, digital copying and redistribution have made these objectives incompatible, at least in part. The quest is for new generation of DRM technologies and related business models that best accommodate all these conflicting objectives. The first generation of DRM focused on security and encryption as a means for preventing unauthorized copying of content and limiting distribution to those who pay. The next generation of DRM should cover the description, identification, trading, protection, monitoring and tracking of all forms of rights of usage over both tangible and intangible assets, and would manage rights holders relationships [2]. In all this trust is essential. The ability of this next-generation DRM System (DRMS) to track and monitor will lead to a need for more efficient mechanisms for the protection of personal privacy, protection that the DRMS itself must ensure. Although there are those who claim that this is a red herring on the basis that such privacy is protected and guaranteed by law, it should be pointed out that unscrupulous manufacturers and individuals may be technically capable of violating privacy undetected and therefore unpunished.

DigiRight aims to create the combined understanding of these issues that will be a basis of the next-generation DRMS. This article will expand on DigiRight's relevance to and impact on the Sixth Framework Programme (FP6) [3] and Europe's need to strengthen and reinforce the Science and Technology (S&T) excellence on DRM. For the interested readers, a detailed description of DigiRight may be found in [1].

2. DigiRight: The sixth framework programme

"The current EU strategy adopted in Lisbon 2000 is focused on an accelerated transition to a competitive and dynamic knowledge economy capable of sustainable growth, with more and better jobs and a great social cohesion" [4]. The established European Information Society Technology (IST) Programme thus plays an important role towards the strengthening of European competitiveness. DigiRight is an integrated approach to address this IST vision and particularly the **trust and confidence** in building the future e/m-Europe, as well as to support innovative solution to complex problems in science, society, industry and business objectives. The social cohesion objective will also be one of the main focus areas of DigiRight since it will deal with the development of enhanced and less obtrusive communication tools. By developing innovative tools for protecting digital assets, DigiRight will contribute to a better social cohesion in Europe and beyond, by providing efficient, secure and private systems for communication, business, health, transport, risk management, environment, learning and cultural heritage. DigiRight will also contribute to the development of "codes of ethics" (guidelines) for best practice and legislative proposals which could support IST priorities, e.g., to ensure the co-evolution of technology and application, which are expected to become realizable through the research collaboration of an excellent research community like the one assembled in DigiRight.

Another issue that is considered essential for the DigiRight NoE is the participation of so-called "Small and Medium-sized Enterprises (SME)". The number of SMEs associated with the DigiRight network is expected to increase by time but at the beginning the SMEs represent 40% of the consortium's industrial partners. Their reaction time is incredibly faster when compared with large entities and provide an invaluable test bed for emerging applications.

DigiRight is also expected to address issues relevant to the eEurope 2005 Initiative: an information society for all plan and especially the development of a 'Virtual Campus for all students' that every EU member state should be able to offer to its students by the end of 2005. As a network connecting more than 16 universities, DigiRight is aware of the needs to connect students through an efficient network in order to maximize the quality and efficiency of the learning

processes and activities. That is one of the main reasons why DigiRight is articulated around a strong virtual organizational network, a new paradigm for "Internet plus security and privacy". The idea is to use the results of research and development in DRM issues within DigiRight and incorporate them as soon as possible in the tools used for supporting communication within the NoE.

DRM aims to protect Intellectual Property Rights (IPR) over digital assets, and increases security, trust and privacy when information is exchanged over open networks throughout the entire value chain from producer to distributor to consumer, and potentially to consumer to consumer. Society in general and the IT in particular would thus greatly benefit from DRM.

DigiRight will be organized as a collaborative organizational network with various access levels (ranging from highly restricted access to unrestricted public access) in order to harness the management of research resources across Europe and bring the generated innovative results within the NoE to interested researchers in the DRM area. This is completely in line with IST priorities by supporting complex problem solving in science, society, industry and business. All work in DigiRight produces scientific results and publications. Various levels of IPR protections will be involved but in many cases, software will be produced with access for every researcher or citizen. The DigiRight NoE encourages the use and development of open standards and open source software in order to ensure interoperability of solutions and to foster integration and innovation. This will be mostly visible in the DigiRight software platforms to be accessed through the public side of the DigiRight web portal. It is expected that DigiRight will focus also on the exploitation of the acquired know-how within the NoE examining and evaluating various business models (e.g. creation of spin-offs, and co-operation with associated SMEs).

3. DigiRight: Relevance

DigiRight's integration goals address the scientific, technical, socio-economic and policy objectives of the EU IST Thematic Priority, "Towards a global dependability and security framework" [3].

In the near future, DRM will be an integral part of the end-user experience of consuming digital services. Thus, DRM will have a great influence not only on the **trust and confidence** relation among, and between, users and service providers, but also on any other stakeholder in content creation, distribution and management. The basic security and dependability challenges related to DRM are a major topic of research and integration between the different partners in the NoE. Therefore understanding user's concerns has a key role in the work of DigiRight. In addition, DigiRight will engage in standard setting operations,

which help to define a DRM architecture that meets these requirements.

Different security and privacy approaches will be taken into account in the NoE, integrating and sharing the experience of the different partners from the different application domains aiming at achieving a holistic framework for DRM. All domains relevant for the information society will be represented by the domain experts among the partners reflecting specific challenges, needs and solutions. Domains represented include e/m-Health, e/m-Commerce, e/m-Education, e/m-Entertainment and e/m-Government with different security objects and subjects. As said, DigiRight will attempt to address any stakeholder in any business chain including healthcare and governmental business with their specific stakeholders such as patients and citizens, but especially the domain professionals.

The different approaches of the research and experience of the partners in the NoE will be integrated, comprising architecture and technologies for security, virtual identity management, and privacy both at application and at infrastructure levels, always centered on the DRM framework.

Legal and regulatory, private and public policies, centered on the content policies will be investigated and collaboration between the partners will be done from the different DRM viewpoint aspects. Additionally, socio-economic issues will also be targeted in the research for innovative business models as well as in the content-related questions. Security and mobility should be achieved by way of integrating technical and regulatory instruments. Finally studying and integrating the end-user's experience of DRM enabled services is also vital as the user demand is usually driving the development.

Different interdisciplinary concepts need to be integrated under a common umbrella that will host all affected areas e.g., legal and regulatory, private and public policies, social, ethical and societal questions, business processes and models, and technology aspects.

Research and modeling will be done in all fields related to Digital Policy Management (DPM) as well to ensure the protection of user privacy, and enable users to control at a fine-grained level how and when personally identifying information is given to third parties and is exploited by them. The research and collaboration between partners will also be extended in the field of a specialized and improved risk management containing a risk management process, and risk analysis and assessment methodologies.

DigiRight aims at the development of some novel approaches that fully take advantage of existing standardized cryptographic approaches with regard to embedded security features and access to them, e.g. the ISO work on Privilege Management and Access Control [5]. Multimedia digital content needs embedded security mechanisms such as signatures, seals, timestamps, fingerprinting watermarks, etc., that will help enhancing the level of security for a wider

spectrum of both existing and next generation applications.

DigiRight aims at concentrating the research and collaboration between the partners in all research fields related to DRM. Therefore, the development, testing and verification of technologies related to the protection, security and trust in the distribution of digital assets, combining the expertise and research of all the partners, is also one of the main objectives of the NoE.

Contribution to standardization activities is foreseen as a clear objective of the NoE, which is backed up by the great number of the partners that have long experience in the standardization process. The plan is to contribute to formal and informal cross industry standardization bodies at international level, as well as the European ones.

Biometrics is one of the major methods towards strong authentication systems. In DRM context, biometrics should play a key role with the consideration of social and operational issues that arise from such usage. Along with smart cards and other personal trusted devices, the NoE intends to investigate and develop mechanisms for the storage and processing of user's profile in a variety of heterogeneous devices (ranging from PCs and PDAs to mobile phones, smart cards and other tokens) that form a context of user's capabilities.

"Cyber-crime" could also be an issue from the risk management point of view. DRM focuses on the aspect of reducing the risk of illegal copying, viewing and processing of multimedia content. The use of digital seals and watermarks is one first step towards this direction. However, what is needed is a DRM framework that will integrate these technologies in a simple and efficient way and that will adapt to the requirements of each business model and use-case, and that will contribute to deterring cyber-crime.

As already mentioned, DRM is a key part of the future platform development that will ease the deployment of next generation applications and services. A DRM architecture that balances the interests of the various stakeholders will be a key enabler while an unbalanced architecture will only add to the existing hype and confusion. DigiRight intends to address the IPR of all digital assets, and especially the new opportunities and challenges that mobile technology offers to content providers, businesses and network operators for the development of value-added services and generation of new revenue streams.

Europe has a rich content base, technical strengths, long publishing tradition, and world ranking technology player but it is lagging in e-publishing and content-bound commerce. Therefore richer, multilingual digital assets that will kick-start a new mCommerce wave are needed. A DRM infrastructure that facilitates the entry of such assets to the market by balancing the needs of the various stakeholders, and that can fuel the

development of mobile applications, is clearly in a vital interest of the mobile Europe vision.

4. Europe's need to strengthen and reinforce S&T excellence on DRM

At present DRM in Europe has to operate and be administered across national borders, in a dynamic unpredictable heterogeneous environment, characterized by a lack of common standards at technical level, with several competing emerging technologies, uncertain business usage and cases, a plethora of different and possibly conflicting legal practices and regulatory frameworks, and an immense pressure from American content companies aiming at structuring the content business landscape according to their interests. The laws pertaining to the protection of intellectual property vary widely between countries, and are likely to remain different, despite both the European Commission's efforts to harmonize them [6] and other coordinated efforts. A general problem of European S&T is caused by the fact that, contrary to the U.S., there are national research policies operating only at national level. Currently, the EU does provide a very generic common umbrella, but most of the work is still done from a national perspective while a homogeneous approach is still a vision. This is especially true for high-level research activities. The former European Framework Programmes have tried to overcome this weakness by promoting pan-European collaboration via research and demonstration projects. Most of these projects, however, still suffered from strong national parts and rather weak "political" and "legal" interoperability in terms of a common (harmonized) European approach right from the beginning. This situation affects directly the management of rights in a digital environment, and poses challenging obstacles to overcome.

Today technical DRM solutions, models of human interaction, legislation and business models are produced by technology providers, social scientists, legislators and economists who co-exist without fully considering the side-effects on other domains. There is lack of communication between the domains, and practitioners are frequently totally ignorant of the S&T activities in another domain. We understand that maintaining the overview over different domains is an extremely challenging task that can only be done in a long time process with experts willing to accept new ideas and approaches. The non-existence of multiple domain overview by most of the researchers, often leads to production of exciting concepts and results that do not make the milestone to overcome the area that they were created for, and see if the same principle and expertise can be applied in a totally different context in another domain. The last leads not rarely into reinvention of the same things again and again, while the integration and applicability of knowledge of one domain to another has often led to true innovation,

something valuable for the future. An everyday example is that of PKI. Banks established certain PKI-like services rather early. When eGovernment started to become effective, the involved partners – among them are both companies, public organizations, administration, and government ministries, etc. – tried to identify the needs and requirements of eGovernment to design and develop a stand-alone solution. Did they take the solutions of other sectors, like that of the banking industry, into consideration? No, they did not.

DigiRight aims at making easier the process of multi-domain communication, sharing and understanding of results and concepts, keeping researchers informed on cutting edge research and finally easing the task of keeping the overview that leads into production of innovative research.

What Europe really needs in terms of the existing pre-requisite to strengthen and to reinforce S&T excellence is an inter-domain, multidisciplinary approach that can be achieved by a specific restructuring of all existing research capacities and the way research is carried out. Technical problems and challenges in all major domains are often of nearly the same nature. Technical solutions from one can easily be adopted by, and adapted to the specific requirements of, other domains. It is a question of interacting and exchanging knowledge. Several companies in Europe are able to provide high-level solutions to their own customers, in their own application domain. This expertise and the results of research must be shared across the borders of sectors and domains if S&T including DRM is to be developed, enhanced, strengthened, and reinforced.

Although better co-operation between organizations involved in different aspects of systems for the management of rights in a digital environment will be very important, and the deployment of such systems seems, at the moment, important to create an international market especially for services based on material protected by copyright and related rights (especially videograms and phonograms, but also text documents, computer programs, interactive games etc), this is not only a question of technical development and the development of adequate legal instruments (legislative and contractual), but will for a large part have to be based on consensus. Such consensus presupposes an international and interdisciplinary dialogue, involving the research community, policy makers and – most importantly – the industries themselves. A Network of Excellence [7] would be a platform on which to stage such a dialogue, and would in itself at least contribute towards consensus.

DRM will boost content delivery networks (CDN) and with the infrastructure in place several business actors will be affected:

- Network operators can enhance their services and thus quickly convert the content service provisioning into profitable revenue streams. Time to market is reduced and interoperability is

promoted, thus lowering the threshold of market entry of new services.

- Content providers gain additional channels to sell their content and generate more revenue.
- Content distributors are able to offer new digital content services to their customers and implicitly make revenues by forcing the rights transaction.
- End-users gain richer content and transparent access to individual usage rights on high value content previously unavailable, without the need for proprietary flow specific plug-ins on the client-side.
- Enterprises have access to a variety of tools to create, monitor and control their assets.

Dormant content now residing unused in archives and closed, proprietary systems can be vitalized to create new markets and economic activity, thus promoting the dynamics of the economy.

5. DigiRight: Potential impact on restructuring and spreading excellence

DRM aspects play an important role in virtually any application domain. On the other hand, the related expertise and experience are closely related to a few domain experts. To a large extent, this specific knowledge never leaves the boundaries of national or application domains. What DigiRight aims at is the establishment of collaboration and information exchange between countries and domains.

5.1. Restructuring existing capacities and research methods

Drawing conclusions from what has been said earlier, in principle the S&T potential in Europe is in place already. There is no need for additional S&T work before the chances of adopting and adapting existing solutions are checked and verified. From that particular point of view - and regardless of the domain(s) concerned - the existing S&T capacities in Europe must be restructured in a way that allows enhanced information exchange, not only across the borders of countries, but also across the borders of domains and disciplines. The pre-requisite for doing so is that this expertise is available, and that the experts of the requesting domain are aware of the existence of the information. A network of experts in a certain technology must be established to solve the problems of many application domains by serving as "knowledge provider" for these application domains. This is the most important aspect of restructuring.

Similarly, there is a need for interdisciplinary research and co-operation if we are to address properly those issues relevant to the promotion of the information society. The organization of a network of excellence in DRM in different vertical and horizontal

themes will contribute to the interdisciplinary understanding of the services required by the information society. Methodologies and tools used in one discipline might easily be adopted by another discipline. We thus need to integrate the methodologies and tools from technology, law, business, and social science (all of which are important operative factors in the uptake of DRM) to provide a common background and basis for combined research and an in-depth understanding of the fundamental issues and challenges of DRM systems, and to facilitate the exploitation of the synergy of the various projects, areas of expertise and stakeholders.

In sum, European S&T excellence on DRM would be much strengthened and reinforced by the integration of our existing fragmented research capacity so that research institutions can co-operate, set up liaisons, and share results.

5.2. How DigiRight will achieve this restructuring

DigiRight will guide towards restructuring of research in each organization, in order to transform from a group-based closed community approach to an open and transparent peer-to-peer approach where interaction and integration will be the driving force. The research group of an organization will be in contact with other groups involved in research in other disciplines related to DRM, exchange ideas and knowledge, and engage in joint research activities so that each group will have a holistic view of DRM. This combined expertise of the various disciplines will lead to an integration of DRM usage in all domains. Joint research activities are highly beneficial to the excellence of EU research potential. The spreading of excellence and establishment of a high-competence open group of researchers is expected to maximize the scientific outcomes and completely restructure researcher's time and organization's resource management. The multicultural constitution of the network is also expected to open new perspectives and lead to the development of best-practice approaches for the resolution of long-lasting organizational problems.

This alternative to the traditional fragmentation of our continent and research will lead to useful comparative studies which will identify the best solutions, allow for the greater exchange of views and ideas, and lead to the development of interoperable standard solutions. The network will certainly be able to achieve the goal of information exchange between different application domains by inviting experts of these domains to join the NoE. Interdisciplinary working groups with technicians, researchers, and application domain specialists (e.g. from the eHealth domain, the knowledge provider domain, the multimedia provider domain, etc.) can meet these aforementioned requirements by providing a solution that is sound, that fits and that is really applicable to the

domains in question. This solution will be based on the combined expertise of several independent domains and will thus be more generic and reliable than a solution that is solely based on domain internal knowledge of one single domain.

Because of the highly multidisciplinary nature of the DigiRight NoE, one of the tasks will be to create Special Interest Groups (SIGs), working on specific inter-related tasks. Partners involved in those SIGs will contribute to common goals and will start to establish closer links between their respective organizations. The communication tool of choice will be the DRMnet a Virtual Private Network (VPN) that will be created for this purpose. Other activities will also contribute to the fusion of the separate entities, such as meetings, workshops, summer schools, conferences, and Ph.D. 'twinning' (pairs of complementary Ph.D. on related topics from two different organizations). DRMnet will be used as a 'classical' VPN but will also connect the 'Usability Test Rooms' from the various institutions. This will allow the sharing and remote testing of various research works: shared test datasets and the common DigiRight platforms will allow remote communication, not only to help researchers in their work, but also to test new software tools either remotely or locally at the various locations in the network.

The DigiRight network is federating research centers already excellent in the domains of its interest i.e. security, privacy, trust, protection mechanisms, etc., but this excellence of laboratories is seldom used for providing holistic solutions to the DRM. The critical mass of researchers in DigiRight will make possible that kind of integration, and long term goals like the 'Secure Internet' and other grand challenges will begin to seem more attainable. The DigiRight community already has tight links with many research institutions in the security and trust fields beyond those already involved in the network, like the European Symposium on Research in Computer Security (ESORICS) (www.laas.fr/~esorics), and iTrust (www.itrust.uoc.gr), but in order to continuously reinforce links with the DRM community at large, a provision of some of the DigiRight budget would be reserved for actions like creation of a joint SIG or the joint organization of a conference. Here we consider the multimedia content providers in general and especially the music, film and art industry with their main players (among them are art directors, photographers, performers (singers, actors), composers, song writers, book authors etc.) important.

Research in DRM related issues is already funded in all partners' labs through various regional, national and international funding sources, but almost all this funding is related to short or mid-term goals and standalone project specific solutions without any integration roadmap with concurrent efforts. Within the DigiRight all activities have the long-term goal of integrating the research institutions in a large and tightly knit web. The integration of industrial partners and more specifically SMEs may provide a source of

self-financing for the networking activities themselves, which will guarantee the long lasting integration of European research in the DRM field.

5.3. Continuous structuring impact on European research

DigiRight has a number of partners who are commercial enterprises, both SMEs and larger concerns. They will exploit the results of our research by implementing them in innovative products and services for several application domains. Based on the future achievements of the NoE, we intend to provide web-based technical support for users, and on a pre-agreement basis technical and scientific support (reports (e.g. state-of-the-art and case studies), design of subsystems to be integrated in their approaches, for industries and SMEs. All these activities will create revenue, and we foresee that the Network will begin to be self-sustaining after about five years from its kick-off. Being financially independent, the network will be a viable and self-perpetuating entity, that will become a permanent feature of the European research landscape, thus, by its on-going activities and the example it sets, having a durable structuring effect on European research. DigiRight intends to create a permanent virtual research organization, annual events such as conferences, workshops, and summer courses for doctoral students.

The effect of influencing the European S&T society will be a long-lasting one. The trend is towards projects of longer duration. Contrary to the Research and Technology Development (RTD) projects about 10 years ago, nowadays S&T activities focus on 10 to 15 horizon. With regard to multimedia electronic health records one can consider that today's developments will result in prototype applications in about 5 or 6 years with a general acceptance in about 10 to 12 years [8]. From that perspective, project efforts and therefore also project advisory activities and project steering efforts will last. In addition to that, some of the involved experts may decide to found their own advisory and promotion companies (spin-off companies) managed by the Steering Committee after the funding of the EC has come to an end. Several former 4th and 5th framework projects (e.g. RICHE [9]) have shown that this strategy is indeed feasible. The DigiRight NoE could easily kick-off a re-structuring of specific parts of the European S&T community from "pure" development-oriented strategies to a more business-oriented approach having a lasting effect on European research.

Nowadays the state of the art in Europe (both in DRM and related application domains) needs to be discovered by exploring the technology of DRM (done by technology experts), the current use in application domains (domain experts like physicians and health managers) and the related development and improvement strategy for the next few years to come (life time of the project) as well as for the time after.

The most important aim of DigiRight is in fact that experts who “normally” would have never met because of their “domain-and-discipline-restricted” thinking and research policy, are now brought together to discover the similarities in their problems and seek generic innovative solutions that may or may not be available in other domains. These experts can easily exchange knowledge with both their own “technical domain” colleagues - that’s what they do anyway - as well as with colleagues from “application domains” such as health, media, information providers, and art providers (that’s what they normally don’t do). From that particular point of view, this NoE is able to restructure the current research environment in Europe and beyond. The second aspect is this enhanced knowledge that can only be compiled using this cross-domain approach. And combining both approaches EU’s target of “the network will begin to be self-supporting after five years” can become a reality.

By concentrating on the tree (stand-alone solutions for isolated domains) we miss the forest (global generic concepts applicable to diverse domains). Experts on DRM can enhance existing solutions and develop new ones, but what we (the European S&T community) all need is to make this knowledge available, couple it with application knowledge, enhance both interoperability and standardization, and look for real business cases. These business cases can easily be found in virtually any application domain but need to be identified in a close co-operation and collaboration between different specialties. It is not only the regional and national boundaries that count but also the borders of domains. Ask experts from different domains about their problems to be solved, and they are going to tell you the same things. Ask them whether or not they have checked other domains’ results, and they will tell you: no, not yet. We do not know where, how to look for these results, and we do not know the experts to be asked. That is the bitter reality.

Finally, DRM is a very suitable technological area for showing the important potential of these networks of experts from different technical and application domains. Any kind of multimedia content to be protected is potentially interesting for DRM experts. Regardless whether it’s a video or audio file that is sold to a customer and should not be copied/used without permission, or a set of medical high resolution images that need to be protected against unauthorized changes, DRM is able to provide an applicable solution.

5.4. Spreading excellence beyond DigiRight, disseminating knowledge and exploiting results

The Network will be an important contributory factor in the creation of a common European Research Area, both in our own field, DRM, and in a number of satellite fields, thus, we expect it to lead towards a permanent and stable integration of the research community on the one hand, and, on the other, the

dissemination of expertise to those who need it. The last can be achieved in conjunction with the planned international workshops and Europe-wide courses in co-operation with industry. More specifically, the dissemination mechanisms will be as follows.

The various conferences and workshops to be arranged by the NoE and their proceedings will be the main vehicle, and will be supplemented by liaisons with industry, scientific and commercial consortia, and standardization bodies, and will become a major mean of establishing contact with other application domains outside the project that have certain DRM requirements. Other aspects will be the publication of a DigiRight newsletter, journal publications, contributions to prestigious conferences, development of brochures for public awareness, kick-start of a European Forum on related technologies, and a web repository. DigiRight is going to contribute and promote its results to standardization bodies, and will effectively support the continuous exchange of ideas between universities, research centers and industry. This is achievable since the consortium is consisting of members coming from all these domains and initial contacts are already established. Last but not least, the NoE aims at the presentation of DRM technology and products at certain industrial fairs.

Experts within the network will make their experiences and collected knowledge available to the outside world. Especially the aspect of collecting knowledge is very interesting for other projects, initiatives, and activities. After having found a certain level of excellence among the experts, the network can easily become a partner providing services to other technical domains. In the context of other national or international projects, the network could act as an advisor or even supervisor securing a reasonable use of the funding by providing working solutions or services. This is a kind of re-use of existing information. The network is considered a multiplying factor for application domain dependent excellence (e.g. health, culture, and art) and application domain independent knowledge (e.g., DRM aspects).

DigiRight will push the results and findings to different consortia of regional, national, or international projects. In addition to the typical exploitation and dissemination mechanisms of the S&T community (workshops, congresses, conferences, tutorials, sessions, training courses, and fairs both technology-related and domain-related), the role of advisors, steering board members, mentors, etc. in the aforementioned activities will become important exploitation strategies that are directly linked and connected to the specific approach of the Network.

5.5. Contributions to standards

As mentioned earlier, standardization and the strict usage of standards and pre-standards is an important aim of DigiRight. Contributions aimed at the trust,

policy, privacy, security and risk management for DRM will be submitted to some of the leading standardization bodies, organizations or fora - like CEN/ISSS, ISO/IEC, OASIS, and OMA - in different fields like metadata and its interpretation, MPEG4, MPEG7, MPEG21, REL, RDD, and IPMP.

A joint CEN/ETSI Group on Network and Information security Standardization (NIS) was established in 2002, with the aim of addressing the issues raised in Communication COM (2001) 298 by the European Commission on "Network and Information Security: Proposal for a European Policy Approach". DigiRight will carefully follow the CEN/ISSS standardization on DRM issues.

With regard to the Open Mobile Alliance (OMA) we need to have a look at the new and updated MCOMM workgroups of ETSI and the network layer issues on DRM where ETSI has the lead. DRM standards within media/content industry as well as telecom industry are relevant.

6. Conclusions

In this paper we have described DigiRight's relevance to and impact on the Sixth Framework Programme and Europe's need to strengthen and reinforce the Science and Technology excellence on DRM. DigiRight is a Network of Excellence for a Framework for Policy, Privacy, Security, Trust and Risk Management for DRM that will consist of teams of experts on technology and development, business, law, ethics societal questions who will organize ongoing and future high quality research on those areas of their respective disciplines that apply to DRM.

Conducting research for the purpose of extending vertically the five horizontal fields, viz security, privacy, policy, trust and risk management, will result in the provision of specialized services for the protection of IPR. These services will need to be updated, improved and enhanced as time goes on which will require further research and development. This will contribute to the durability of research beyond the termination of the project. Additionally, the established communication links within and outside the Network will accommodate research and make it much more cost-effective relative to the benefit of an enhanced service, again contributing to its durability.

DigiRight intends to create an industrial board and to increase industrial participation in the consortium during the first five years. Through this liaison, industrial partners will provide guiding input to, and receive benefits from, the research being conducted by the research partners in DigiRight. It is also expected that the Network's day-to-day working activities will be partly integrated in the day-to-day management of the participating institutions, leading to durability of the co-operation between the partners.

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