MOBILEIPR FINAL REPORT

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December 31, 2003

According to several writers, among them professor Scott Lash, Intellectual Property Rights are now in the same way crucial for trade and industry as property in real estate used to be during the heyday of industrialism. Further it has been argued the vast legal apparatus consisting of legislation and law-courts was an integral part of the new economic order from the end of the Napoleonic wars.

The critics of the prevailing situations talk of Information feudalism and point out that the development has many unwelcome side-effects, seeing that old patterns of thought are used for new kind of phenomena.

During our research we have scrutinized these very fundamental issues that seem to have basing in the work of eminent sociologists, like Anthony Giddens, Ulrich Beck and the colorful Bruno Latour.

We are aware that business issues can no more be handled in a reasonable way keeping in mind only the economic factors. First environmental or, as some phrase it, evolutionary aspects have been moved to the foreground. As everybody knows, our information society is a risk society, too. It would be very unwise to believe that the public sector is able to handle issues of physical safety. To the contrary, responsible politicians agree that threats caused by hitherto unforeseen movements may act in a most acute way in economic efficiency and have already altered business organization.

Before economic activity was largely a question of accumulating wealth. Now it is often question of circulation of goods and services, some part of them obviously from economic point of view of questionable value.

This is why this kind of study cannot be restricted solely to economic and legal issues. The rights in "Intellectual Property Rights" are real only as far they are enforceable. Many of them do not meet this criterion in practice any more.

Traditionally rights are seen as arising from legislation or legitimate and valid precedents. Original works are protected by law insofar copyright acts can be used; patents are real only if they are legally issued by competent official bodies.

One of the unforeseen developments of the last decade has been the immense expansion of "IPR-rights" that have their founding only in contracts or custom. This is true e.g. concerning sporting events and the so called formats of television programs. Without any legal founding "rights" in them are commonly respected.

Anyhow, the only reasonable means of analyzing the market of intangible goods and services is to try to trace the projection of the legal shadows and make an inventory of the practical possibilities of protecting economically, socially or culturally valuable innovations.

Therefore, with great restraint and direct criticism directed both to the concept of Digital Rights and the means of protecting it we publish the present report. We hope that the following step might be a still more thorough investigation of the topology and dynamics of these "rights", because they are anyhow central in all activities using digital goods and services either for commercial purposes or as public services.

This is a report of research. Therefore the researchers' personal misgivings and intimations about the subject-matter are of no concern. We understand our task as representing and analyzing the facts as they are and furthering recommendations about their use.

In this phase, as a pious wish, we express our belief that several traditional legal and economic institutions are crumbled and have to be changed into other, better methods.

Our report might be a step, possibly an all too cautious and faltering step, on that road.

There cannot be easy answers, because the questions themselves are so difficult and the belief in technological progress that would solve some of the central problems seems to have come to an end. Instead of brave, new world of information technology and telecommunications we have witnessed a very thoroughgoing change in the structures of traditional industries that have been able and lucky to adopt new methods from ICT.

Consistently we start from the assumption that ubiquitous, mobile digital networking will develop inside and alongside the existing structures. Organizational innovations seem to advance shoulder to should with technology. The implementation is a question of politics.

Jukka Kemppinen
Professor
Responsible Leader of MobileIPR Project

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1   BACKGROUND

MobileIPR has been a HIIT research project studying intellectual property rights (IPR), their policy and licensing issues and digital rights management (DRM) in relation to information products in mobile appliances. It has been an essential part of HIIT's Digital Economy program.

The project started in September 2000. It was, however, a follow on to a smaller project that took place in California from October 1999 till August 2000. Olli Pitkänen was the only researcher in that previous project, he was employed by Helsinki University of Technology, and he was a visiting scholar at University of California, Berkeley. The project was funded by Nokia Research Center and accomplished in cooperation with Nokia's personnel.

From September 2000 till the end of 2003, the work was continued in MobileIPR at Helsinki Institute for Information Technology HIIT. Tekes (the Finnish National Technology Agency), Elisa Communications, Nokia, Sonera, L M Ericsson and Yleisradio (the Finnish Broadcasting Company) have generously funded the project.

2   PERSONNEL

Professor **Jukka Kemppinen** has been the responsible leader of the project all the time. He is a former judge, a well-known author, columnist, critic and translator. At present he has a role in amalgamating expertise for development of the information society by integrating research from technical, economic and societal/cultural points of view having hands-on experience in artistic and literary works starting with preclassical Greek and Latin to Medieval philosophy and ending with communication in www and mobile networks.

Olli Pitkänen, Lic.Sc (Tech), LL.M, has been the project manager of Mobile IPR. In the project, his work has been related to future scenarios and their legal challenges. He completed his licentiate thesis on *"Managing Rights in Information Products on the Mobile Internet"* for the project. He was at UC Berkeley from the beginning of the project till May 2001 and three months in 2003.

Mikko Välimäki, LL.M, has been working as a researcher for the project since the beginning. He has studied especially open source licenses. His expertise and interests are on interactive media types and the economic side of Digital Rights Management technologies. He was at Berkeley in 2000-2001 and three months in 2003.

Ville Oksanen, LL.M, joined the project in 2001. He spent a year at UC Berkeley in 2001-2002. He is specialized in political and economical aspects of Digital Rights Management systems. His research has been focused on open source development and grass root movements.
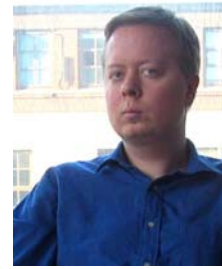
Tommo Reti, M.Sc. (Tech.), joined the project in 2001. His research combines new ways of doing business with future technology products in networked cross-cultural market. Especially in the project, he focused in issues of digital content distribution on peer-to-peer networks.

Aura Soininen, LL.M, has cooperated with the project for a couple of years by co-authoring articles and instructing project team members especially in issues related to patent law. She became a part-time member of the project team in the fall of 2003. She has been in Berkeley since August 2003.

The project has actively cooperated with several other research organizations. Especially, co-operation with University of California, Berkeley, and Lappeenranta University of Technology has been fruitful. As listed above, our researchers have stayed at Berkeley for several years in total. We have also met our colleagues from Lappeenranta many times and co-authored an article with them. Since the fall 2003, Dr. Kemppinen, the leader of the project, has acted also as a professor at Lappeenranta.

3   WORKSHOP ORGANIZATION

On the 27th and 28th of August 2003, MobileIPR team organized the *First International Mobile IPR Workshop: Rights Management of Information Products on the Mobile Internet*. The workshop took place at Dipoli conference centre located in Otaniemi, Espoo, Finland.

Professor Hal Varian (the School of Information Management & Systems, SIMS, University of California, Berkeley), and Professor Ross Anderson (Computer Laboratory, University of Cambridge) gave the keynote speeches, and some 14 scientific presentations were given. The proceedings of the workshop were published in HIIT Publications series (2003-2) both in print, on CD-ROM, and on-line.

The program committee members and the reviewers who made an effort to ensure the quality of the workshop were, Professor Jaime Delgado (Universitat Pompeu Fabra, Spain), Professor Kalevi Kyläheiko (Lappeenranta University of Technology, Finland), Professor Martti Mäntylä (Helsinki Institute for Information Technology HIIT, Finland), Professor Matti Rossi (Helsinki School of Economics and Business Administration, Finland), Professor Jon Bing (Universitat of

Oslo, Norway), Professor Bernt Hugenholtz (University of Amsterdam, Netherlands), Professor Sirkka-Liisa Järvenpää (University of Texas at Austin, United States), Dr. Jukka Kemppinen (Helsinki Institute for Information Technology HIIT, Finland), Dr. Till Jaeger (Institut für Rechtsfragen der Freien und Open Source Software, Germany), Dr. Juha Laine (Electronic Cormmerce Institute, Finland), Mr. Habtamu Abie (Norsk Regnesentral, Norway), Mr. Stamatis Karnouskos (Fraunhofer FOKUS, Gemany), Ms. Lilian Edwards (Edinburgh University, United Kingdom), Mr. Olli Pitkänen, Mr. Mikko Välimäki, Mr. Ville Oksanen, Mr. Tommo Reti, Ms. Aura Soininen and Mr. Perttu Virtanen (Helsinki Institute for Information Technology HIIT, Finland).

5   ABOUT HIIT

Helsinki Institute for Information Technology, HIIT, is a joint research institute of the University of Helsinki and Helsinki University of Technology. HIIT was founded in 1999 and has been operational since early 2000. It conducts internationally high-level strategic research in information technology and related multi-disciplinary topics, especially in areas where Finnish IT industry has or may reach a significant global role. HIIT has exceptionally strong expertise in regulatory (legal) issues concerning IT, telecommunications, broadcasting and media. HIIT works in close co-operation with Finnish universities, research institutes and industry, to improve the contents, visibility and impact of Finnish IT research to benefit the competitiveness and progress of the Finnish information society. HIIT also aims at creating a strong network of international partnerships with leading foreign research universities and institutions.

1 FUTURE SCENARIOS AND LEGAL CHALLENGES[1]

1.1 INTRODUCTION

Legal structures are intended–among other purposes–to facilitate business: they diminish risks, encourage trust formation and thus enable business methods. In a novel business environment existing legal structures may, however, become outdated, contradictory or difficult to apply to new and complex situations. This increases transaction costs and slows down the development of value networks and the market in general. At worst, companies become vulnerable to risks that could be avoided or contained if the legal challenges were better understood.[2] By *legal challenges* we mean difficulties in legal reasoning or somehow unsatisfying outcome of the legal process.

The poor understanding of legal challenges may also lead governments or standards bodies to regulate markets in an unsatisfactory way and even to create obstacles to services that might be important and useful both for users and the society at large.

The legal challenges related to information products and services on the Mobile Internet and Web in the future were the focal research topic of the MobileIPR project. In this context we identified and studied some of the most likely legal challenges. Instead of formal completeness based on a well-formed theory, we had a more pragmatic goal in mind: identifying challenges which both companies and policy makers should concentrate on in order to avoid too high legal barriers. Moreover, we hope that our analysis exposes candidate solutions to these challenges by legal, technical or economical means.

1.2 RESEARCH METHOD

In the study of future legal challenges, we identified legal challenges that arise in conditions that largely do not yet exist. Mainstream jurisprudence uses court cases, statutes, and their preparatory works as its sources and derives theories by analyzing them. Thus it is hardly possible to predict the future by using these conventional jurisprudential methods.

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[1] The outcome of this research area has previously been reported in a more detailed manner in the following publications and presentations:

- Pitkänen, O.; Mäntylä, M.; Välimäki, M. and Kemppinen, J., *Assessing Legal Challenges on the Mobile Internet*, International Journal of Electronic Commerce, Fall 2003, Vol. 8, No. 1, 2003.

- Pitkänen, O., *Managing Rights in Information Products on the Mobile Internet*, Licentiate's thesis at Helsinki University of Technology, Department of Computer Science and Engineering, HIIT Publications 2002-4, Helsinki Institute for Information Technology HIIT, 2002.

- Pitkänen, O.; Soininen, A.; Laaksonen, P. and Hurmelinna, P., *Legal Constraints in Readiness to Exploit Mobile Technologies in B2B*, International Workshop on Wireless Strategy in the Enterprise, October 2002.

- Pitkänen, O.; Välimäki, M.; Kemppinen, J. and Mäntylä, M., *Assessing Legal Challenges on the Mobile Web*, in the proceedings of the First International Conference of Mobile Business, Athens, Greece, July 2002.

- Pitkänen, O., *Scenario Based Method in Futures Information Technology Studies*, speech presented at International Seminar on Research Methods, Las Vegas, 2002.

[2] Pitkänen, O.; Soininen, A.; Laaksonen, P. and Hurmelinna, P., *Legal Constraints in Readiness to Exploit Mobile Technologies in B2B*, International Workshop on Wireless Strategy in the Enterprise, October 2002.

Compared to traditional legalistic research methods, futures research provides us with more suitable means. Especially scenarios are useful when we want to describe what the world may be like and what kinds of legal challenges may occur in the future. Scenario-based methods offer a scientific basis for describing the future and evaluating it from the present day perspective. Scenarios used in other fields of science are typically quite broad. In this study, scenarios are relatively narrow: they merely describe a possible service or a use-case.[3]

We do not claim that any of our scenarios would actually be realized as such. Instead, scenarios are intended to form a holistic picture of possibilities and concerns that may exist in the future. Scientifically we are facing serious concerns since–in terms of POPPER–we are making conjectures without immediate possibility to refutation.[4] Yet, we believe that it will be possible to test the validity of the scenarios in later research with true use-cases or prototypes further derived from the scenarios.[5]

The major problem we face is how we should create our scenarios to cover possible situations adequately. If we create them randomly, we will not be able to claim that they embody important issues to a sufficient breadth and depth. To avoid such biasing, we should be able to create the scenarios in some systematic way. In order to do that, we need to understand those underlying *factors* and their *attributes* that influence the legal challenges on the Mobile Internet.

We believe that specific factors and their attributes can be identified and by interacting those with the existing law, legal challenges are implied. Based on the literature referred below and the discussions with domain experts, we suggest that the most important factors of the deployment and use of emerging Mobile Internet services from this project's viewpoint are *technology*, *economy*, and *society and individuals*. We also summarize based on the existing literature, which *attributes* of each factor mostly seem to relate to the Mobile Internet. In the terms of futures research our attributes include also weak signals and trends.

After identifying factors and their attributes, we create *scenarios* so that each of those attributes occurs at least in one scenario. Next, we detect legal challenges involved in those scenarios. We also check the attribute list in order to identify legal challenges directly from them. The legal challenges are then classified by legal areas, assessed, and prioritized. In conclusion we are able to form a list of legal areas that will hold significant challenges. Moreover, we can indicate a plausible rationale and mechanism of why and how these challenges emerge. This suggests further work including structural innovations and changes to value networks and their legal rules.[6]

The method has some noteworthy threats to *validity*. We may make mistakes in defining the factors, choose wrong attributes, create scenarios that do not represent adequately the future situations, analyze the scenarios to insufficient depth, make erroneous conclusions, identify legal challenges incorrectly or insufficiently, and finally assess and therefore prioritize some issues erroneously. Based on the careful design of the study, however, we are quite confident that these threats to validity are limited. Our confidence is further strengthened by continuous discussions about the relevance of the scenarios with technology experts in leading technology companies

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[3] Godet, M., *Futures Studies: a Tool-box for Problem Solving*, UNESCO; Futuribles, Paris, 1991.

- Tsoukas, H., *The Validity of Idiographic Research Explanations,* The Academy Of Management Review, Briarcliff Manor, Oct 1989.

[4] Popper, K., *Conjectures and Refutations. The Growth of Scientific Knowledge*, 5th edition, Routledge & Kegan Paul, 2000.

[5] Hess, D. J., *Science Studies – an Advanced Introduction*, New York University Press, 1997.

[6] Pitkänen, O., *Scenario Based Method in Futures Information Technology Studies*, speech presented at International Seminar on Research Methods, Las Vegas, 2002.

and research institutions of the field. We have presented the work to them already in its early phases and they have commented it and helped us to improve the scenarios and the analysis.[7]

On the other hand, we can also argue that the question is not so much about the validity as it is about the *relevance* of our research. Indeed, from an interpretivist/critical perspective it is not possible to create an accurate model of reality in the first place. Instead, the reality is interpreted and reinterpreted in various social contexts, aiming at exposing relevant aspects and viewpoints of the reality for a particular discourse in a particular context. Therefore, instead of formal validity, what matters is the pragmatic and operational relevance of the results to the stakeholders and the context.[8]

1.3 THE MOBILE INTERNET

The sense of *mobility* depends on one's viewpoint. On a protocol level, a significant characteristic of mobility is that the access point of a user's terminal is not fixed. Therefore packet routing to the terminal must be dynamic and may change during a communication session. This perspective does not necessarily imply that the terminal should be wireless or portable.

On a service level, however, the word *mobile* refers to users' ability to move. Therefore, to be mobile in practice, terminal devices must be wireless and portable. Our focus in this project is mainly related to the service level and we emphasize the wireless and portable properties of terminal devices. Some of the issues will relate to the protocol levels.

The *Mobile Internet,* in this project, refers to a computer network to which the end-users connect largely using mobile, wireless appliances. The *Mobile Web,* on the other hand, is the universe of information that the users are able to access through the Mobile Internet[9]. Then again an *information product* is a set of valuable information, which is technically delineated in a form that can be controlled and transferred between entities. It may include content, metadata and computer programs.

When considering our work, mobility has a number of fundamental qualitative consequences. First and foremost, unlike its wired predecessor, the Mobile Internet and its services have the potential of penetrating the whole kaleidoscopic richness of the everyday life of its end users. No matter where we go, what we do or what time it is, the services will be available.

The relationship between a user and the services she/he uses is likely to be intimate and personal. Therefore the services should respect the infinitely varying use contexts and roles played by the user. Moreover, the users are likely to consider their terminals and services as parts of their life-style, even as expressions of how they perceive themselves (or wish to be perceived by their peers). Users are also willing to invest in their personalization.

A second consequence is that many Mobile Internet services are likely to relate to shared cognition, socialization, entertainment and plain fun. Indeed, service designers should focus on the total *user experience* of the services. Apart from utility and usability, this term also includes the emotional tone of service used in a certain social, situational and physical context. Contextual

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[7] Wendell, B., *Foundations of Futures Studies*, Vol. I-II, Transaction Publishers, 1997.

[8] Checkland, P. and Scholes, J., *Soft Systems Methodology in Action*, John Wiley & Sons, 1991.

- Tsoukas, H., *The Validity of Idiographic Research Explanations,* The Academy Of Management Review, Briarcliff Manor, October 1989.

[9] World Wide Web Consortium (W3C), Available online: http://www.w3.org/.

awareness, gained perhaps from some form of adaptive machine learning, is a key characteristic of such services.

These qualitative characteristics have a direct and deep influence on the topic of our work. To see how one must recall that the wired Internet is largely based on the *end-to-end principle*: The network itself is neutral to the content of the packages it delivers, and whatever "intelligence" resides in the endpoints. Effectively, the Internet is a bit pipe that is agnostic to their meaning.

We conjecture that the mobile Internet will necessarily depart from this long-honored and very successful architectural principle. Indeed, the combination of characteristics such as service adaptation, context-awareness and deep (automatic) profiling and personalization seems to require an overall architecture where the service platform and the underlying network are aware of the transferred content. Otherwise it is not possible to facilitate service delivery and to respect the quality-of-service commitments. Even worse, we believe that the required "intelligence" cannot be localized in some distinct protocol or middleware level, but it must penetrate all levels of the architecture.

We seem to have a smoking bomb in our hands: On the one hand, we are expected to create services that infiltrate even the most private and emotionally loaded realms of their users' lives; on the other hand, the delivery of these services seems to require the involvement of the entire contributing value network. It goes without saying that this combination is loaded with ethical, societal and legal challenges.

To us, it seems that the resolution of the previously mentioned dilemma is to build the mobile Internet from ground up while observing and enforcing some yet-to-be-formulated rules of conduct. They should encourage, facilitate and provide incentives for honoring what we regard as fundamental principles. These principles include privacy, security and trustworthiness on the mobile Internet. At the same time, these rules should balance the contradictory interests of the end users and the various stakeholders in service creation and provision. This big picture motivates also the research reported in this project.

1.4 FACTORS AND THEIR ATTRIBUTES

To be pragmatically useful, the fairly abstract concerns expressed in the previous section must be mapped into more concrete terms. In this research, we achieve this by considering three *factors* that interact with legal challenges of the Mobile Internet: technology, economy, and society. Each of these factors is characterized in terms of what we consider its most significant *attributes*.

The factors and their attributes are derived from the current literature and from the discussions with experts. The list is not intended to be exhaustive, but to represent the most significant factors and attributes of the deployment and use of emerging mobile services from the project's viewpoint.

We have created future scenarios. Our focus has been roughly on the next decade. However, the factors are not unfamiliar or non-existing even today. They do exist already, but their importance is increasing. The ones that are picked up here seem to have most significance in this field in the future.

It should be stressed again that we make no claims to the completeness of this analysis. We do not suggest any simple causal relations between the factors and the issues we aim to discover either. Instead, we aim to establish a framework for discourse that can potentially facilitate the resolution of the issues.

1.4.1 TECHNOLOGY

Many interesting and important fields of technology that are related to computer networks are under rapid development. Many of the technologies are still hidden in the laboratories of universities and in the R&D departments of companies. Yet, some of the major attributes of the Mobile Internet oriented to the future technologies and their use are already visible.

The first attribute is the concept of *mobility*. Wireless and portable devices make it possible for the users to move around while having access to the Internet. This includes both the ability to access the Web in different places (*nomadic usage*) and the ability to use the Web while moving. Generally, this requires the capability of fluent *handoff* between various access networks and their access nodes. A related but distinct concept is *roaming*. It means the capability of maintaining uninterrupted service sessions independently of the present point of network access. This generally requires the maintenance and mobility of some session state information as a result of handoff.

The second attribute is *context-awareness*. Context includes all the circumstances and facts that surround a particular situation or event. If a system is aware of the context, it may adapt its behaviour accordingly. Typically, context includes facts like location and proximity, user and device identity, time, history and activity.[10] It seems that location information will be one of the most important pieces of context information. While computer networks in general have significantly released people from the boundaries of the physical world, the Mobile Internet can in turn make use of locations and gain added value of their inherent characteristics and constraints.

The third attribute is *content adaptation*. It is necessary to manipulate content information based on several reasons. They will include device features, user profiles, context information, and content's own characteristics as well as service properties. In particular, the characteristics of the wireless link between the wireless terminal and the access node should be taken into account in content adaptation.

The fourth attribute is *ubiquitous* or *ambient* computing. This concept extends the reach of computation and information beyond the traditional framework of a computer application running on a fixed set of hosts. The extension may be physical, breaking the ties of the wired desktop computer. Alternatively, the extension may be in scope, providing information services to the public in a form that does not require technical expertise.[11] Ultimately, this attribute may lead to the disappearance of computing into the fixed infrastructure and environment, or into the users themselves in the form of computing-enhanced clothes or ornaments.

1.4.2 ECONOMY

The fast pace of technological progress makes people often forget that the laws of economics do not change easily.[12] We try to map the key economic attributes. First we separate them in two: those describing entities and those describing their economic environment. Then we identify three major attributes in both groups.

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[10] Hong, J. and Landay, J.A., *A Context/Communication Information Age,* Personal Technologies Special Issue on Situated Interaction and Context-Aware Computing, 2001.

[11] Institute for Software Research International, Available online: http://www.isri.cs.cmu.edu/.

[12] Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

In our view the *dynamic capabilities* of an organization become increasingly important in the future.[13] This means that there will be a change in firms' culture towards more specialized scope and focus on innovative niche products and markets; indeed, on the mobile Internet, the niches are likely to become ever more fragmented and transitory. TEECE has described dynamic capabilities as the ability to sense and seize new opportunities and manage intellectual assets.[14] In contrast, static capabilities focus on the efficiencies of existing procedures.

The *resources* are also becoming more *intangible*. Intangibles may be turned into value not only through traditional income from licensing and sales but also from strategic positioning. Entities use more efficient licensing strategies based on detailed product differentiation.[15]

Organizational entities and internal processes become more integrated with *low hierarchy*. The lifetime of a low hierarchy may be very short as new kinds of ad-hoc hierarchies emerge for specific purposes, such as providing a contextual service for a unique event.[16]

On the environmental level, mainly on the markets, *network economics* and *network effects* are perhaps the most determinant attributes. Firms tie alliances and partnerships for strong external relations. Products and services that rely on demand side economies of scale turn out to be winning.[17]

Also *lock-in* has become a key term in describing information economy. Most profitable products are those that can be turned into long-term services. Lock-in situations are self-feeding since the information exchange can be further tailored according to the needs of the parties.[18] On the Mobile Internet, the intimate relationship between a user and her personalized terminal and services may strengthen the lock-in effect.

The networked economy strengthens the importance of *branding*. Holder of a strong brand may also franchise or license it to enable growth in new markets. Brands break ground in the society at large. Sports, music and movies are already commodified into brands. On the other hand, existing brands do not automatically guarantee success in the digital environment.[19] Brands also contribute to trust formation and maintenance.

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[13] Pitkänen, O.; Soininen, A.; Laaksonen, P. and Hurmelinna, P., *Legal Constraints in Readiness to Exploit Mobile Technologies in B2B*, International Workshop on Wireless Strategy in the Enterprise, October 2002.

[14] Teece, D., *Managing Intellectual Capital. Organizational, Strategic and Policy Dimensions.* Oxford University Press, 2000.

[15] Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

- Sullivan, P., *Value-Driven Intellectual Capital*, John Wiley & Sons, 2000.

[16] Castells, M., *The Rise of the Network Society*, Blackwell Publishers, 1996.

- Malone, T. W. and Lauerbach, R. J., *The Dawn of the E-Lance Economy*, Harvard Business Review, September-October 1998.

[17] Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

[18] Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

[19] Seabrook, J. *Nobrow. The Culture of Marketing, The Marketing of Culture*, Vintage Books, 2000.

- Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

1.4.3   SOCIETY AND INDIVIDUALS

Globalization is one of the most discussed attributes describing the fundamental societal change in the information age. Vaguely defined globalization is a complex set of economic, technical, cultural and political processes taking place all over the world. Global capitalism is taking over nation states and local political systems. The global institutional infrastructure lags way behind the power and movements of financial capital. According to SOROS, this creates a fundamental instability, which may lead to financial crises shaking societies at large. On the other hand, globalization has strengthened cultural and fundamentalist local communities that reject common values and build their own, contributing to value fragmentation. Globalization also influences everyday life of individuals where we, following GIDDENS, have anything between cosmopolitans and fundamentals trying to live together.[20]

By the attribute *market culture* we aim to convey how all kinds of social interactions are being commodified increasingly broadly and deeply. At the level of individuals, clear monetary incentives result in building networks for every imaginable individual interest. Digital computer technology and computing networks lower the entry barriers for new products and services. Meanwhile at the firm level, producers of cultural products rely more on market analysis than artistic taste. Individuals in the information society seem to consume faster and get easily tired.[21]

At the level of individuals, the changing concept of *work* is affecting daily life. Concepts such as networkers and flextimers[22] or e-lancers[23] illustrate this change. Flexibility in the working arrangements is bringing about new work-life policies that allow employees to have more control on their jobs and personal life. Also many traditional work environments will change: more virtual offices will emerge, more employees will telecommute and non-traditional work schedules will be the norm. Described by HIMANEN, a *hacker ethic* contests what was before the basis of individuals' "protestant" obligation to work.[24]

Information technology may introduce severe *challenges to political* systems. According to CASTELLS, the collapse of Soviet Union was largely due to the incapability of assimilating informationalism.[25] HIMANEN illustrates the role of information technology in the Kosovo crisis of 1999.[26] Several countries are currently trying to limit their citizen's access to the Internet for political reasons. Mobile technologies make the future even more challenging for any political system based on people's limited access to information.

As information technology affects people's lives in many ways there can be significant changes in their *minds and behaviour*. At worst this can appear as an addiction but there are also many other possible phenomena. It will be seen how people react to increasing telecommuting and virtual working communities. Restructured social identities can affect how people feel about themselves.

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[20] Castells, M., *The Rise of the Network Society*, Blackwell Publishers, 1996.

- Giddens, A., *Runaway World*, Routledge, 1999.

- Soros, G., *Open Society. Reforming Global Capitalism*, PublicAffairs, 2000.

[21] Seabrook, J., *Nobrow. The Culture of Marketing, The Marketing of Culture*, Vintage Books, 2000.

[22] Castells, M., *The Rise of the Network Society*, Blackwell Publishers, 1996.

[23] Malone, T. W. and Lauerbach, R. J., *The Dawn of the E-Lance Economy*. Harvard Business Review, September-October 1998.

[24] Himanen, P., *The Hacker Ethic and the Spirit of the Information Age*, Random House, 2001.

[25] Castells, M., *End of Millenium,* Blackwell Publishers, 1999.

[26] Himanen, P., *The Hacker Ethic and the Spirit of the Information Age*, Random House, 2001.

Ever increasing surveillance and ubiquitous computing change people's notion of privacy. In general, there are many important issues on the individual level yet to be researched.

1.5 SCENARIOS

1.5.1 GENERAL

We have created several scenarios and analyzed them carefully. To keep this report focused, we have chosen three scenarios that best illustrate the factors and attributes discussed above. The scenarios that were left out do not affect qualitatively the results. Abandoning any one of these three scenarios would leave some attributes uncovered; hence they constitute a minimal cover of the attribute space.

All the three scenarios are quite positive in tone and they give an attractive view of the future that the Mobile Internet will enable. We have also considered the dark side of the mobile technologies and discussed the problems related to them in some other scenarios, hence trying to avoid the lure of techno-optimism.

1.5.2 WEATHER SERVICE

In this scenario, the user has a service agreement with a Mobile Internet Service Provider (MISP) including a weather service that is actually provided by a Weather Service Provider (WSP). The user moves beyond the geographical area covered by the MISP and connects to a local Access Operator. The service should adapt to the local context and give information about local weather.

Where does the adaptation take place? From the technical viewpoint, it might make most sense to adapt the weather service as near the user as possible, *i.e.*, by the Access Operator. In addition to the users themselves, only the Access Operators know for sure their location. However, the Access Operator does not necessarily know enough about the service to make the adaptation. Therefore it may be necessary to move the adaptation of the service up to the Weather Service Provider, which on the other hand probably does not have information about the user's location.

Contracts. Who is authorized to adapt the content? It is possible that the Access Operator does not have an agreement with the user or with the MISP or WSP. It is also possible that the context information is transferred from the Access Operator to either the MISP or WSP and they are adapting the content.

If the Access Operator does not have an agreement with the user, it is questionable whether it is permitted to disclose the end-user's location and other information. If the end-user's mobile device has information about its location, it is possible to make the end-user disclose position info directly to MISP or WSP. In that case, user's privacy is smaller issue. However, technically it is still not optimal to adapt content that far from the terminal.

The problem could be at least partially solved by using metadata. For example, WSP could first send to Access Operator only metadata on what kind of information is available. Based on the metadata, the Access Operator requests information that is appropriate for the context. WSP could also send metadata describing how the information can be adapted. Legally however, it still remains questionable how the parties make sure that all the rights are respected if appropriate contracts do not exist.

In general, it is not quite deterministic in what way information flows from a sender to a recipient on the Mobile Internet. It is not possible to precisely predict which parties will take part in the chain and therefore making agreements in advance can be difficult.

Intellectual Property Rights. Though the basic weather data is hardly subject to copyright it might be covered by database protection in some countries. The service itself and especially certain edited parts of information it embodies can be copyrighted. The more original information is included in the service, the better legal protection can be achieved. The service can also be trademarked so that adaptation is not allowed with a claim that it came from the original source. Some parts of the service could be patentable as well.

International Law. It can be difficult to predict which jurisdictions are involved in a transaction on the Mobile Internet although the legal interpretation of the transaction depends on the jurisdictions involved.

1.5.3 SHARED PICTURES

The second scenario is about sharing pictures between users. When we first introduced this scenario there were no camera-phones available. Thus the scenario was quite futuristic. Since then, camera-phones have become common and many aspects of the scenario are commonplace. However, there are still features described in the scenario that are not available today. Especially, cameras are not yet able to share pictures by themselves and typically they are not directly connected to open Internet.

Imagine digital cameras with wireless Internet connection or indirect connection via a proximity network such as Bluetooth technology. A user can allow others to access pictures inside her camera. This is done without any other services but the file sharing software in the camera and the basic network infrastructure. Let's take a look at few examples of possible use situations.

Jaakko takes a trip to Mexico. He can immediately publish in his camera some of the pictures he has taken. His friends can access those pictures instantly. Some of his pictures may also spread quickly on the Internet in a peer-to-peer-fashion (P2P).

It is also possible to create value-adding third party Internet services in addition to basic picture sharing possibilities. For example, a user could order paper copies of the pictures by sending them to a printing service on the Internet or, since cameras include only limited picture editing capabilities due to the lack of computing power and sophisticated applications, editing capabilities could be accessed through the Internet using the camera as a user interface. Business opportunities seem endless. This suggests that the kind of mixed P2P and B2C (business-to-consumer) model may become common.

Also professional photographers may find P2P models changing their ways to work. Imagine José who is a professional photographer. He started his job as a hobby, but soon he started to commodify the pictures and now makes his living by travelling after crises around the world to take demanded news-pictures in distant locations. Occasionally he is also taking pictures on events or famous people. The Mobile Internet will change his work in many ways. He will not need a large organization or a back-office. He will be able to sell his pictures directly from his camera to the public. He may join other photographers and form a loose peer group to coordinate their work and especially to build a brand for marketing purposes. The group could harmonize their infrastructure and offer the customers access to a larger number of photos using the same systems.

If José is not only a good photographer but also an idealist, he might shake the political systems. His pictures on injustices could make people to realize how poorly they are treated. The borderless Mobile Internet will be a difficult challenge for autocratic governments willing to censor the information.

Legal analysis brings forth a few issues. First, depending on the content of the pictures there can be identified several kinds of legal challenges.

Fine art. A picture as such can be valuable. It may be creative and original, or it may include important information in itself. If it is original it can be copyrighted. Some jurisdictions also provide specific rights to photographers (*e.g.*, Finnish Copyright Act 49 a §). The photographer may decide who can copy and distribute the pictures and on what conditions. Yet, sharing pictures on the Internet makes it difficult to enforce these rights.

Event. It is common to restrict photographing and televising in some events, like concerts or sports competitions. That is because organizers want to get revenues by selling rights to photograph and televise to media companies. Interestingly those rights are based on contracts, not intellectual property law. Yet, if a consumer goes to an event and takes pictures, it may be difficult to show that a binding contract forbids photographing. On the other hand, if a person is able to share the pictures on the Mobile Internet directly in the event, it can be troublesome to find out who the photographer is. The legal challenge here is to manage photographing and televising rights in a new situation.

Intimacy. People are willing to pay for candid photographs on celebrities. Legal challenges in this area are not different from those with current paparazzi, but they will become more serious. Extremely demanded pictures, such as pornography, form a special case. Their economic value means that commercial publishers have an interest to manage rights in them. In the scenario however, the photographers are not likely to sell porn pictures. Instead, sometimes pictures may be on private occasions or they can include private information, for example, on places where somebody has been or on someone's habits. The legal challenge is to make sure that no-one's privacy is infringed.

Hobbies. A number of pictures are documentary and related to hobbies in a way that they do not represent a great monetary value. Instead they can be important in a certain social context. For example, a picture on a rare bird can prove to ornithology community that the photographer actually saw the bird. The legal challenge is related to moral rights: the photographer should have a right to be recognized as the one who took the picture.

Pictures on other works. A picture can also be a copy of another copyrighted work. Digital cameras make it very easy to copy and distribute any works of visual arts or literary works.

Second, legal challenges in this scenario can be grouped according to legal areas. In each area we further analyze the challenges from the viewpoint of different actors.

Copyright issues at large are important especially to those who want to get return from information. In this scenario, the professional photographer is the most interested in copyright. It includes particularly photographers' exclusive right to make copies of pictures and the right to distribute them. Also, moral rights can be important in particular for an art photographer. Intermediaries are careful not to be liable for copyright infringements. Other actors, like device manufacturers and service providers, can find business opportunities by enabling copyright protection.

Privacy is very important for private persons. In this scenario, it concerns mostly amateur photographers.

Labor law affects professional photographers and their employers. In many countries, labor laws are badly outdated in respect to this kind of scenario. They are hard to apply in situations where

working hours, company or group formation and other conditions are extremely flexible. Also, international issues will be significant.

Tax laws face similar challenges to labor law. Traditional tax laws are hard to apply in new kind of transactions on mobile networks. It is also unclear which fiscal entity has jurisdiction to tax certain transaction.

Contracts affect everybody in this scenario. As laws are in general outdated and cannot be revised quickly enough, most legal problems must be solved in contracts. However, all actors do not know each other on the Mobile Internet. It can be even impossible to predict who will be the other party in a certain transaction. People are moving and the connections are changing. Therefore challenges in contract law will affect everyone on the Mobile Internet.

Criminal law is the ultimate legal protection system. Typically photographers do not face criminal law in their everyday life, but it remains the eventual legal solution.

1.5.4   HEALTH MONITORING SERVICE

People who want to be aware of their health condition will be able to buy a Health Monitoring Service. The basic service includes a set of wearable sensors that send information about person's vital functions through the Mobile Internet to a control center. Optionally some of the sensors can be installed inside customer's body. To customers the service sends reports and instructions how to improve their health. In the case of emergency, the service can also call an ambulance, a doctor or other help provided it gets customer's location information. The customer could even be equipped with a dosage device so that a physician in the control center can remotely give for example insulin, vitamins and micronutrients or heart medicine when needed.

The capabilities of the service are heavily based on information. First, a lot of information is extracted from the users and stored in the service. Second, a large computerized knowledge base is used to help the doctors to make decisions and even to automate some choices. Third, the doctors and other professionals within the service obviously use their own knowledge to help the customers. All this information can be very valuable and therefore the service operator can be interested to sell it further. Perhaps it is possible to fund the service by selling such information to other entities.

Health services have traditionally been very local. However, the service described in this scenario is not geographically limited.

This scenario represents a sample application of ubiquitous computing. New business models are also involved. Some important psychological aspects should be considered, like how the users feel if some unknown person in a control center, "a big brother", even with their permission, is always monitoring them and knowing better than them how they are doing.

This might be also an example of changing work. A doctor can be sunbathing on a beach while on duty. In an emergency, the doctor gets all the information on the patient, including the medical history and the current condition and is able to interview the patient using a mobile terminal while still lying by the sea.[27]

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[27] E.g. Davie, B.; Florance, V.; Friede, A.; Sheehan, J. and Sisk, J.E*., Bringing Health-Care Application to the Internet*, IEEE Internet Computing, May/June 2001.

International Law. If the service is provided globally or if a customer travels abroad while using the service, international aspects become vital. Laws concerning health services are quite different around the world.

Intellectual Property Rights. In this scenario, intellectual property rights do not protect remarkable portion of information. Data on a customer, a single advice from a physician, or a control message from the control center are very important, but hardly protected by intellectual property rights. Intellectual property rights will be more important if the service is developed towards a more mature system that not only transfers data, but also stores and distributes refined information.

Privacy. Large part of the information managed in this scenario is private by its nature. People do not want to see information on their health spreading around. Therefore the system must support privacy and confidentiality extremely well. On the other hand, many companies and public agencies would be very interested in accessing that data. For example, a commercial company would be able to direct marketing quite accurately to right individuals if it knew that much about their habits and health as this system knows. Some customers might, hoever, be willing to benefit from the situation while others are so concerned about their privacy that they would not dream of letting this service to sell the information.

In the European Union, the data protection directive has set quite strict rules for applications such as this scenario, but in the U.S, for example, the discussion about privacy protection has not led to comparable statutes so far. It remains to be seen which approach ultimately proves to be more attractive: although privacy is extremely important and must be protected, too strict privacy protection may lead to the unintended result that some useful services are simply not developed in the first place.

Professional Negligence and Torts. The scenario presents a situation where physicians and other experts have a remarkable liability on people's health and life. It is extremely difficult to make this kind of a system completely reliable. In some countries, the potential damages based on medical malpractice or products liability could be enormous. In general, entities that offer expert services through the Internet may be accused of professional negligence. It is possible that the legal risks prevent this kind of services even if both the customers and potential service providers want them. In addition, many countries have strictly limited who is allowed to give medical services in their jurisdictions. A service like the one described here would conceivably conflict with these rules.

1.6 CONCLUSIONS AND FUTURE WORK

It depends profoundly on the viewpoint, which legal challenges are considered the most important. We have focused on four viewpoints, those of content provider, operator, device vendor and the user. These four viewpoints represent satisfactorily different entities on the Mobile Internet. Based on the three scenarios, we conclude that the legal areas including most challenges on the Mobile web will be *intellectual property rights*, *privacy*, and *contracts*.

It seems that intellectual property rights, particularly copyright, will be the legal area where most of the challenges come up. That is not surprising considering that the focus of the project is information products and intellectual property rights often protect them. The interesting point, however, is that new kinds of challenges seem to be emerging. Especially issues related to content adaptation will be significantly more challenging on the Mobile Internet than before.

In addition to legal protection, the future information products will be increasingly protected by digital rights management (DRM) systems and other technical measures. On the other hand, to

provide high quality service, it should be possible to flexibly distribute content and adapt it on the basis of context. There will be remarkable challenges to fit these different aspects together.

Another very important legal area will be privacy. Mobility, context-awareness and ubiquity will bring computer networks even into the most intimate places and walks of life. Context-awareness becomes most beneficial if context-information can be used on the fixed network side of the wireless link. However, the user does not necessarily trust the access provider and does not want to disclose context information that may impart private matters. Challenges to privacy are much greater on the Mobile Internet than ever before.

There will be major challenges related to contracts. First, on the Mobile Internet, it is not always easy to find out who the contracting parties are. Second, it will be sometimes difficult to state what the subject of a contract is. It can also be complicated to determine when the parties have committed to the contract. Moreover, on a mobile network it can be troublesome to decide which the governing law is and which authorities have jurisdiction over disputes. A fundamental reason for the contractual challenges is the structure of the Mobile Internet that will supposedly be quite fragmented.

There will be noteworthy challenges in other legal areas too. For example, international law in general will be important because of globalization and moving users. Labor law will face challenges because of changing work. Tax laws meet challenges because of new kinds of transactions, resources and incomes as well as moving users, globalization and changing work. Criminal law will be challenged not only by new kind of international and computerized criminals but also because it will be very difficult to decide whether some objectionable act in the new environment is punishable according to the existing law. Constitutions can face challenges as political systems are challenged. Nevertheless, based on the scenario analysis, those other areas do not seem to bring forth as crucial challenges as the first three.

The work presented in the project is clearly incomplete and several avenues of further work are open to us. First, our research method is still immature and should be extended both in scope and in depth through inclusion of further attributes and analysis viewpoints. Obviously, its unorthodox character also raises issues that remain to be fully addressed. At a more pragmatic level, we should investigate further how external experts could be more fully integrated in the analysis and discourse that forms an essential aspect of our method. We also contemplate extending our research in constructive direction through some form of business method prototyping.

Finally, we plan to export findings to our work to a related research effort recently begun at our institute that aims to study horizontal service management on the Mobile Internet. In this work, we plan to focus in the creation of value networks and in particular in automatically created and enforced contracts between the nodes of a network. The longer-term aim of this work is to understand how and to what extent a service infrastructure can embed the legal rules related to the provision of a particular service.

2   RECENT IPR DEVELOPMENTS[28]

Before discussing the more specific findings concerning intellectual property rights in relation to information products in mobile appliances–digital rights management in particular–we paint a wider picture of the recent developments in the intellectual property rights arena. Although copyright protection will probably be the legal area where most challenges come up in the future, especially two types of IPRs are presented in this chapter: patents and database protection. Copyright protection is discussed to a large extent later in this report.

We also cover the basics concerning strategic use of IPRs, especially patent strategy, in this chapter. Open source licensing, which is an essential part of IPR strategy and is becoming more and more important all the time, is explained more in detail in Chapter 5. Digital rights management in organizational as well as product levels is then again discussed in Chapter 3. In the MobileIPR project the term Digital Rights Management has been interpreted widely and it consists of managing *digitally* all the rights a company has as well as every way of managing the rights involved in *information products* that are distributed digitally.

This chapter is to some extent based on articles published during the MobileIPR project. It also leans heavily on Aura Soininen's ongoing work in the Digital Economy core project.

2.1 INTRODUCTION

In order to promote the progress of arts and science, exclusive rights to artistic works like music, writings and software, as well as inventions are guaranteed by *national* patent and copyright laws. Also *international treaties* like the Bern Convention, the Paris Convention, WIPO Copyright Treaty (WCT), WIPO Performances and Phonograms Treaty (WPPT) Patent Cooperation Treaty (PCT), European Patent Convention (EPC) and the WTO governed Trade-related Aspects of Intellectual Property Rights (TRIPS) agreement have their role in harmonizing the internationally shattered IPR field. Nevertheless, intellectual property rights available vary from country to country. For example database protection and petty patents are not available in the U.S. at all.

The rights available vary also from time to time. The challenge is to maintain a supportive policy framework and infrastructure that let's innovators innovate and entrepreneurs create jobs, start new companies and ultimately generate wealth at all times.

Compared to the old, *industrial economy* that was to a large extent driven by the economies of scale[29], the new, *information economy*, is more knowledge based. Consequently, the importance of *intangible assets* compared to *tangible assets*, like plants and manufacturing capabilities, has risen.[30] Hence, the possibility to stop others from stealing and imitating these companies' key assets has become more and more important. When taking into account the presumptions presented some

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[28] The outcome of this research area has to some extent been reported in the following publications:

- Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

- Välimäki, M., *Strategic Use of Intellectual Property Rights in Digital Economy –Case of Software Markets*, working paper, version published in the proceedings of the 4th International Conference on the Management of Intellectual Capital and Electronic Commerce, Hamilton, Canada 2000.

[29] Shapiro, C. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

[30] Teece, D., *Managing Intellectual Capital. Organizational, Strategic and Policy Dimensions.* Oxford University Press, 2000.

years ago about the digital economy and the Internet as a market place, IPRs seem to have gained even more importance. Actually, this explains to some degree the need for criminalizing the circumvention of digital rights management systems and the need for obtaining patent protection for methods of doing business on the Internet. Protection offers companies the possibility to maintain their distinctiveness and to control the further distribution of their products.

To give an example of the discussion about the Internet as a market place, PORTER has claimed that it diminishes many traditional sources of competitive advantage. Just to mention a few, the Internet makes it possible that buyers have easy access to information about products and suppliers. This bolsters *buyer's bargaining power* intensifying the competition over price. Also, the need for sales forces and access to established distribution channels is not that important. Consequently, the Internet reduces *the barriers to entry*. Then again the *rivalry among competitors* is intensified because the Internet is an open system where companies have difficulties in maintaining proprietary offers. The Internet is also a wide, international market place, which brings more companies into competition with each other.[31]

According to PORTER, the new sources of competitive advantage like the potential increase in *switching costs* creating strong *network effects* and benefiting the first to capture the biggest market share did not turn out to be very valuable although it was first anticipated otherwise. Actually, it is easier to switch from one supplier to another on the Internet and the openness of the Internet makes it difficult for one company to capture the benefits of network effects. *Cooperation* is needed. This, however, reduces the variety and intensifies rivalry.[32] As a consequence, in addition to new ways of gaining and maintaining competitive advantage, traditional ways that were still available became more interesting.

New innovations are essential in order to guarantee the positive development of the entire society. To maintain the incentive to finance the development and commercialization of new products and services, *efficient* protection is one thing that is needed. The political challenge has been to determine what is the optimal protection level in the current economical situation.

Although efficient protection is not the same as *strong* protection and what is efficient varies from one field of technology to another, strong rights have for a long time been thought to be crucial for securing the continuous flow of innovations and creativity in *all* fields of technology. This assumption complemented with various industry groups' lobby has led to changes in legislation concerning intellectual property rights. Digital Millennium Copyright Act in the U.S. and the EU Copyright directive are examples of this type of legislation. Database protection can be mentioned as a relatively new protection type altogether.

In addition, the existing rules have in many cases been interpreted in a way that favors the rights holder. To give an example, a change towards pro-patent era occurred in the U.S. in the mid-80s when the Court of Appeals for the Federal Circuit was established. This namely unified and strengthened the treatment of patent rights.[33] Also the scope of patentable subject matter has become wider and wider both in the U.S. and Europe. That resulted in practical difficulties in assessing he patentability of these new types of inventions and raised huge critique from both academics and business side. Especially small and medium sized software companies have raised their voices in this discussion.

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[31] Porter, M., *Strategy and the Internet,* Harvard Business Review, March 2001.

[32] Porter, M*., Strategy and the Internet*, Harvard Business Review, March 2001.

[33] Hall, B. and Ham Ziedonis, R., *The patent paradox revisited: an empirical study of patenting in the U.S. semiconductor industry, 1979-1995*, RAND Journal of Economics, Vol 32, No 1, Spring 2001.

In practise, it has turned out to be simply impossible to stop others from copying and sharing products like music and software, which are distributed digitally on the Internet.[34]. Of course, this has not stopped companies or the governments from trying. Instead of creating new ways of guaranteeing the revenue stream, some companies have tried to control the use of their products even after distribution. Record companies in the U.S. are for instance attacking individuals, who share files on the Internet. When it comes to governments, one of the political agendas of George W. Bush, the president of the United States, has been to increase efforts to combat intellectual property piracy through enhanced enforcement and international trade agreements. According to this High Tech Agenda 2001 America loses $11 billion each year to international software piracy alone. Copyright piracy and pharmaceutical piracy is claimed to cost the U.S. billions more.[35]

In reality, it may be true that strong protection is needed especially in those fields of technology where research and development costs and risks are high and the end-results are easy to copy. However, in areas where early investments are low, the industry develops fast and product cycles are short, stopping others from manufacturing the same or comparable product or using a process without investing the same amount of money in R&D, is not that critical. For example lead-time may very well be enough in order to make profit.[36]

Also, in those fields of technology where innovation is *cumulative* in nature and technology *complex*, strong rights may do more harm than good. For example BESSEN and HUNT claim that software patents have substituted firm R&D rather than complemented it. This is because it has been rather easy to obtain patents in that field and especially large companies have started to employ aggressive patent portfolio strategies creating patent thickets. Since multiple patented inventions may be involved in one innovation, companies willing to manufacture that product may be forced to license or cross-license patents from other companies. Patents are one way to get access to other companies' R&D pool, which may diminish the need for investing in their own R&D.[37] This does not mean of course that there is no need for protection at all.

It seems that the trend towards stronger and stronger intellectual property rights is slowly changing its course. Especially in the U.S., the criticism about overprotection and its negative influences on e-commerce and the development of Information Technology sector in general have been taken into consideration. Also, the low effectiveness of the used measures, the treats DRM systems creates to privacy[38] as well as the practical concerns about the patent validity for instance are slowly realized. This can be seen for example from the Federal Trade Commission's recently published report *"To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy"*. One thing that is suggested in that report is that courts should be allowed to find patents invalid based on the *preponderance of the evidence*. Courts should not have to find clear and convincing evidence that compels that result. The current standard of *clear and convincing evidence* weakens courts' ability to extract questionable patents.[39]

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[34] Bessen, J. and Maskin, E., *Intellectual Property on the Internet: What's wrong with Conventional Wisdom*, Working Paper, 1997, Available online: www.researchoninnovation.org/iippap2.pdf.

[35] Mehlman, K.,*The Bush Administration's High Tech Agenda*, 2001.

[36] See e.g. Cohen, W.; Nelson, R. and Walsh, J., *Protecting their intellectual assets: appropriability conditions and why U.S. manufacturing firms patent (or not),* 2000.

[37] Bessen, J. and Hunt, R., *An Empirical look at Software Patents*, Working paper, May 2003, Available online: www.researchoninnovation.org/swpat.pdf.

[38] E.g. Cohen, J., *DRM and Privacy*, Berkeley Technology Law Journal, 2003.

[39] Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,* October 2003, Available online: http://www.ftc.gov/opa/2003/10/cpreport.htm.

In addition, there appears to be a continuous balancing between antitrust laws and IPR regulation going on. It has been recognized especially in the U.S. that the purpose of antitrust as well as the IPR regulation is to stimulate innovation and competition benefiting the consumers in the end. Only the means to achieve this goal are different: Antitrust regulation is based on ensuring free competition. IPRs give the rights holder the possibility to exclude others from taking advantage of the protected creation, invention, trademark, database or a trade secret. Hence, for example a patent holder may sometimes be in a monopoly position. However, the fact that someone has a patent and is using his rights accordingly does not mean by itself that the patent holder aims at monopolizing the industry and that without patent protection guaranteed by law his conduct would raise antitrust concerns.[40]

If the patent holder does use his patent/patents in an anticompetitive way monopolizing or attempting to monopolize the relevant market *and* does this by exceeding his legal rights, his conduct may violate the U.S. antitrust laws. For instance enforcing patents the patent holder knows to be invalid (sham litigation) may constitute an antitrust violation in the U.S. Antitrust concerns also come up when competitors get together in a form of standardization, patent pools and/or cross-licensing.

Of course, the legislation and its interpretation only set the limits to companies' behavior. The business environment: how competitors behave and what the culture is like in that particular country/market have a huge impact on how companies exploit the rights available. In the U.S. the environment in this respect is somewhat different from the one in Europe. Companies' function is to gain as much profit as possible to their shareholder's, not to balance their own and society's interests. That is basically legislator's job.

2.2 PATENT PROTECTION IN EUROPE AND THE U.S.

The scope of patentable subject matter has become wider during the last two decades. In this respect Europe has followed the development in the U.S. There is namely a great concern about Europe's capabilities to compete in international markets and sufficient patent protection is seen as one element of gaining that success. This can clearly be perceived in EU's innovation policy and EU's initiatives for new legislation.[41] Usually, Europe does not directly plagiarize the U.S. model, but the trends in the U.S. do have their influence. On the other hand, when it comes to international treaties, the U.S. pressure can be extremely straightforward.

Since information products have been in the focus of MobileIPR project, we will now concentrate on *software* and *business method* patents: Functionalities of software products can nowadays be wholly or partly patented. Also novel and non-obvious methods for pricing, distributing and/or marketing software or other information products on the Internet can be patented in the U.S.

Patent protection is largely based on national legislation. To gain international patent protection, patents must be granted and enforced separately in every country. The European Patent Convention (EPC) was drafted in order to make it easier to file patents in Europe. To put it simply, the European Patent Office has the power to grant patents to many EPC member countries at the same time. After the grant, these patents are treated the same way as patents granted by national patent offices. Also "European patents" must be enforced separately in every country.

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[40] Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy,* October 2003, Available online: http://www.ftc.gov/opa/2003/10/cpreport.htm.

[41] E.g. CORDIS, Green paper on innovation, 1995, Available online: http://www.cordis.lu/innovation/src/resumefi.htm.

The national legislation varies within Europe. Therefore, we will now concentrate on the European Patent Convention (EPC) and the European Patent Office (EPO) practice. It must be remembered, however, that this agreement has nothing to do with the European Union.

The European Commission (EC) published its directive proposal on the patentability of computer-implemented inventions in February 2002. The proposal's objective was to harmonize EC member states' national patent laws concerning computer program related inventions.[42] The proposal was grounded on EPO's practice, but it did take opposite views on certain issues. Also, compared to the EPC it definitely was more detailed in relation to the patentability of computer programs.[43]

The most noticeable difference between the Directive Proposal and EPO practice, is the form of claims accepted for computer-implemented inventions. EPO accepts claims to a computer programs by itself or to a computer program on a carrier, as long as potential technical effect can be found.[44] The Directive Proposal explicitly refused this type of claims.[45]

The directive proposal and its current status are discussed more in detail in the grass roots section of this report. Also the development concerning the community patent is discussed in that chapter.

2.2.1 SOFTWARE AND BUSINESS METHOD PATENTS IN EUROPE

In Europe the discussion about software and business method patents has been to a large extent limited to their patentability. In this context, inventions' technical character, or the lack of it, has been the main topic of research papers. This is because in Europe the patentability requirements are novelty, inventive step and that an invention is susceptible of industrial application. In addition, an invention must have *technical character*. It has to be remembered that as a patentability requirement, technicality is not nearly as important as novelty and inventive step. Less than 1% of patent applications are denied due to the lack of technical character[46].

Technical Character. The technicality requirement is not explicitly stated in the European Patent Convention (EPC) but Article 52 is regarded as a reflection of this requirement.[47] The article contains a list of subject matter that is not patentable *as such*. Programs for computers as well as methods for doing business belong to this category of inventions. Also discoveries, scientific theories and mathematical methods, aesthetic creations, schemes, rules and methods for performing mental acts and playing games as well as presentations of information belong to this category.

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[42] Commission of the European Communities, *Proposal for a Directive of the European Parliament and the Counsil on the Patentability of the Computer-implemented Inventions*, COM (2002) 92 Final, Brussels, February 2002.

[43] Sarvas, R. and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

[44] EPO, *Guidelines for Examination*, October 2001.

[45] Sarvas, R. and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

[46] Liesegang, E., *Software Patents in Europe*, Computer and Telecommunications Law Review, 5(2), 1999.

[47] EPO, *Guidelines for Examination*, October 2001.

The list in EPC Article 52 (2) is not meant to be exclusive. It only gives some examples of material that was thought to be non-technical and abstract in nature and thus not patentable at the time EPC was introduced in 1978.

There are many reasons why computer programs were originally placed in the category of non-patentable subject matter. According to VAN DEN BERG software seemed to be out of the real world of engineering. The fear was that examining software applications would entail going through program listing written in programming languages. Since this would require examiners knowledge of these languages, examination process was thought to become time-consuming and uneconomical. One of the most important aspects is, however, that it was not generally recognized how technically and economically important software would become. At the same time there was an ongoing discussion whether computer programs should be allowed copyright protection.[48]

Information technology has evolved a lot since 1978. Therefore, the interpretation of the patentability of computer programs has changed during the last twenty years. Typically these changes have taken place first in the U.S. The European Patent Office (EPO) and the national patent offices in Europe as well as in Japan have followed couple of years behind. It must be remembered, though, that the argumentation in the U.S. has been somewhat different. This is because there is no requirement for technicality in the U.S.: an invention must be of patentable subject matter; that is a process, machine, manufacture or composition of matter (35 U.S.C § 101), it must be novel, inventive and useful.

The problem with software patents in Europe is that it is extremely difficult to draw the line between *technical* computer programs and *non-technical* computer programs, that is, computer programs *as such*. One reason for this problem is that computer programs are already at different abstraction level than for example scientific theories or mathematical methods, which are also mentioned in the EPC Art. 52(2). Consequently, it is not easy to determine when a computer program is "applied" in a way that the invention can be regarded as technical, *i.e.* not a computer program as such. Many explanations have been presented during the last two decades, and it can be said without hesitation that the issue of technical character is extremely complex.[49] Next, we present the main points of this development and the situation at the moment.

The EPO Practise. In its early years the European Patent Office developed an interpretation concerning computer program based inventions that if an invention does not differ from the prior art by at least one hardware feature, it is not patentable. Official change to this interpretation occurred in 1985 when EPO reformed its Guidelines for examination. At that time, it adopted the approach presented earlier in the Board of Appeal's VICOM (T 208/84) decision: if an invention is be patentable according to conventional criteria it should not be excluded from patentability merely because software is used for its implementation. It is decisive what kind of *technical contribution* the invention *considered as a whole* makes to the known art.[50]

[48] van den Berg, P.*, Patentability of Computer-Software-Related Inventions,* The Law and Practice of the Enlarged Board of Appeal of the European Patent Office during its first ten years, Köln – Berlin – Bonn – München, 1996.

[49] Sarvas, R. and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

[50] van den Berg, P.*, Patentability of Computer-Software-Related Inventions,* The Law and Practice of the Enlarged Board of Appeal of the European Patent Office during its first ten years, Köln – Berlin – Bonn – München, 1996.

- Soininen, A. Tietokoneohjelmien patentointi erityisesti Suomen patenttilain ja Euroopan patenttisopimuksen perusteella, Master's Thesis, University of Helsinki, November 2001.

The concept *technical contribution* was first introduced in the VICOM decision, but it has been understood in many ways since. The actual "contribution approach" that the board of appeals applied during 1980s and 1990s was presented in the decision T 38/86. In this decision the board of appeals stated that it appears to be the intention of EPC to permit patenting only in those cases in which the invention involves a contribution to the art *in a field not excluded from patentability*.[51] The fields excluded from patentability are for example *programming* and *linguistics*. For this reason it has not been possible to gain patent protection for example to word processing, tabulating programs, data encryption, authentication and time series analysis. Then again protection has been allowed to control engineering, CAD/CAM, digital signal processing, operating systems, aid programs, data compression and client management.[52]

The contribution approach has been abandoned as an indicator of *technical character* in two fairly recent Board of Appeals' decisions IBM/Computer program product (T 1173/97) and PBS Partnership/Controlling pension benefits system (T 0931/95). Nevertheless, it is still used for the purpose of examining *novelty* and *inventive step*. Pension benefits case (2000) is a good example of this new interpretation. It also clarifies EPOs position concerning *business method patents*.

In the Pension benefits case, the invention was claimed both as an *apparatus* and as a *method*. In the Board's opinion all the features of the method claim were steps of processing and producing information having purely administrative, actuarial and/or financial character. Therefore, it had no technical character. The apparatus claims, on the other hand, were viewed to have technical character. This was because a computer system suitably programmed for use in a particular field has a character of a concrete apparatus in the sense of physical entity, man-made for utilitarian purpose. However, the improvement envisaged by the invention according to the application was essentially *economic* one and lied in the field of economy. It had no technical contribution and could not be held *inventive*. To sum up, if a computer-implemented invention has technical characteristics, it can be patentable although it is *used in business*. If, however, the actual invention lies on the business side, it cannot be patented.

As explained previously, the technicality of an invention is eventually established when assessing inventive step. If there is no technical contribution the invention cannot be considered inventive. This is also clarified in the Guidelines for Examination where it is stated that if a claimed invention does not have *a prima facie* technical character, it should be rejected under Art. 52(2) and (3). However, in practice it may be more appropriate for the examiner to proceed directly to the questions of novelty and inventive step, without considering beforehand the question of technical character. If no objective technical problem that the invention solves can be found, the claimed subject-matter does not satisfy at least the requirement for inventive step.

So, when does an invention have *prima facie* technical character? According to EPO Guidelines and Board of Appeals' decisions, a computer-implemented invention is considered to have technical character if it, for example, brings about a *further technical effect* when run on a computer.[53] Further technical effect is defined to be more than the normal physical effects involved in using a computer. According to the EPO Guidelines a further technical effect can be found, for example in controlling an industrial process or processing data representing physical entities. In addition, computer-implemented inventions may have technical character if *technical considerations* are

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[51] van den Berg, P*., Patentability of Computer-Software-Related Inventions,* The Law and Practice of the Enlarged Board of Appeal of the European Patent Office during its first ten years, Köln – Berlin – Bonn – München, 1996.

[52] Blind, K.; Edler, J. and Friedewald, M., *Mikro- und makroökonomische Implikationen der Patentierbarkeit von Softwareinnovationen,* Auftrag des Bundesministeriums für Wirtschaft und Technologie, 2001, Available online: http://www.bmwi.de/textonly/Homepage/download/technologie/Softwarepatentstudie.pdf.

[53] EPO, *Guidelines for Examination*, October 2001.

required to carry out the invention. *Solving a technical problem* or that the invention contains *technical features* may result the invention patentable.[54]

The Form of the Claims. During the EPO software patent history, computer programs have been claimed both as *apparatus'* and *processes.* The claims are usually almost identical for these two categories differing only in form. Apparatus claims are interpreted as claiming the program and the underlying computer machine. The process claims are understood to cover processes implemented with a computer. The problem is that these two categories of claims, leave the actual invention, the computer program, less protected when it is not executed, *i.e.* when the program resides on a separate carrier, like a portable diskette.[55]

Patent protection for computer programs on their own becomes relevant especially when distribution of computer programs is considered. Computer programs can be very easily copied and distributed without *directly* infringing apparatus or process claims. Nevertheless, distributing computer programs on a carrier, for example, might constitute an *indirect* infringement in most European countries. This is more difficult to prove, though, and gives in practice less protection to the patent owner by making enforcement of rights uncertain.[56] It must also be recognized that there is no indirect infringement if someone does not infringe the patent directly. If the patent owner has for example licensed company A the right to use the patented invention, it cannot forbid company B selling elements of the invention to that company.

This problem was eased when Board of Appeals extended the protection for computer programs by allowing a computer program invention to be claimed by itself or as a record on a carrier. This new *"computer program product"* category was first introduced in the decision IBM/Computer program product (T 1173/97).

It must be recognized that this extension had no impact on what constitutes patentable subject-matter. Only the form of allowable claims changed. Nevertheless, many assume that the form of which computer programs are patentable defines what "computer programs as such" means. This type of argumentation can rather be seen as an implication of the U.S. style interpretation than something that draws a rational line between technical and non-technical subject matter. Technical character is one of the patentability requirements. It is not directly connected to the form of the allowed claims.[57]

Another misconception related to the software patent discussion relates to the fact that computer programs can be described and understood in various ways. For example from the user point of view the result accomplished by using a program, the function of the program, is its most important characteristics. Then again, from software engineer's viewpoint the source code is in many cases the most essential part of a software product. In patent context, the actual source

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[54] EPO, *Guidelines for Examination*, October 2001.

- Soininen, A. Tietokoneohjelmien patentointi erityisesti Suomen patenttilain ja Euroopan patenttisopimuksen perusteella, Master's Thesis, University of Helsinki, November 2001.

[55] Sarvas, R. and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

[56] Sarvas, R., and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

- Soininen, A., *Tietokoneohjelmien patentointi erityisesti Suomen patenttilain ja Euroopan patenttisopimuksen perusteella*, Master's Thesis, University of Helsinki, November 2001.

[57] Soininen, A., *Tietokoneohjelmien patentointi erityisesti Suomen patenttilain ja Euroopan patenttisopimuksen perusteella,*, Master's Thesis, University of Helsinki, November 2001.

code is, however, irrelevant. It cannot be patented in itself either in Europe or in the U.S. Computer program listings are regarded as non-functional descriptive material[58]. The functional way of describing computer programs is usually used when drafting a patent application. In the U.S. means plus function claims are for example typical.

Since the source code can be a practical implementation of the applied idea described in a patent, it is protected in practise. Hence, it can be attached to patent applications as an example of the invention reduced to practise. This is not necessary, though. Consequently, despite the patent protection, the source code can be subject of trade secret protection[59]. The source code is also subject of copyright protection.

2.2.2 SOFTWARE AND BUSINESS METHOD PATENTS IN THE U.S

The Patentability of Software. The patentability requirement that has created problems for patenting computer programs in the U.S is that an invention must belong to at least one of the statutory categories. The statutory requirement means that *any* invention that falls into *process, machine, article of manufacture*, or *composition of matter* category can be patented if the invention fulfils also the other patentability requirements (*novelty, non-obviousness, utility*) set in the Patent Act (§ 101).

The use of term "any" has been interpreted to mean that Congress did not intend to put any restrictions beyond those specifically mentioned in § 101. Congress intended § 101 to extend to *"anything under the sun made by man"[60]*. Actually, if all the classes of statutory subject matter are put together, they do include practically everything. Nevertheless, Supreme Court has identified three categories of non-patentable subject matter. These are *laws of nature, natural phenomena* and *abstract ideas.*

Mathematical algorithms were originally thought to belong to the category of non-patentable subject matter: It was ruled in the Gottchalk v. Benson case (1972) that mathematical algorithms are not patentable to the extent that they are mere abstract ideas. Practical applications of these ideas can be patentable. Nevertheless, the effect of this decision was in essence to prevent the patenting of computer software,[61] or mathematical algorithms to be more specific.

Almost a decade after the Benson decision, the Supreme Court recognized in Diamond v. Diehr case (1981) that computer programs do sometimes deserve patent protection. According to the Supreme Court the respondents did not in this case seek to patent a mathematical formula *per se* but the use of that formula in the context of a process of curing synthetic rubber. The Supreme Court explained further that a process is not non-patentable simply because it contains a law of nature or a mathematical algorithm. An application of a law of nature or mathematical formula to a known structure or process may well be worthy of patent protection.

In the In re Alappat (1994) case the invention was about means for creating a smooth waveform display in a digital oscilloscope. To be more specific, the claims were directed to a machine, a "rasterizer", and incorporated *"means for determining a vertical distance of vectors"* and *"means for normalizing the vertical distance and elevation."* The physical devices used to perform these tasks

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[58] USPTO, *Examination Guidelines for Computer-Related Inventions*, 1996.

[59] In Europe patents become public after 18 months of filing. In the U.S. patents become public after their grant unless the patent is filed internationally. These patents become public within 18 months from filing.

[60] S. Rep. No. 1979, 82d Cong., 2d Sess., 5, 1952.
- H. R. Rep. No. 1923, 82d Cong., 2d Sess., 6, 1952.

[61] IPWatchdog.com, *Software Patents*, Available online: http://www.ipwatchdog.com/softwarepatents.html.

included digital computational devices.[62] According to the Federal Circuit the invention was not a disembodied mathematical concept. It was a specific machine that produced a *useful, concrete, and tangible result.* Consequently, a computer operating pursuant to software may very well represent patentable subject matter if the claimed invention fulfils also the other patentability criteria.

In the State Street Bank & Trust Co. v. Signature Financial Group (1998) the useful, concrete and tangible result was achieved by something so abstract as *"transformation of data representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price".* In this case also the ill-conceived *business method exception* was put to rest. Federal Circuit stated: *"business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method".*

Business Method Patents. Within the last five years a large number of patents have been granted especially to software and Internet companies that have invented novel ways of doing business. Online ordering and reservation processes, Internet advertising schemes, auctions, credit card services, brokerage services, banking services and tax preparation services are examples of these so called business method patents[63]. Usually combination of software and business methodology is involved in these inventions. The novelty and non-obviousness of the invention can, however, very well lie on the business side.[64]

In addition to software and Internet companies, non-technology companies like banks, insurance companies and even health care service providers are continuously filing business method patents. For example Cardiac Intelligence Corp. has several patents on its systems for automated collection and analysis of cardiac information and remote patient care. Health Hero Network patented a networked system for communicating information to a patient and for remote monitoring and True Position, Inc. got a patent for a wireless health monitoring system.[65]

Nevertheless, business method patents are not new. For example in 1985 the USPTO granted almost a thousand patents that belonged to this category. Now, the USPTO is granting approximately 10 to 12 thousand business method patents per year.[66] The reason for the dramatic increase in business method patent filings has been claimed to be the recent Internet boom combined with the State Street Bank decision that brought the possibility for patent protection to everyone's attention[67].

It is not just the business people that are interested in business method patents. These patents have received a lot of attention in the media as well as in the academics. Especially economists are trying to figure out whether granting these patents actually benefits the society by promoting innovation and accelerating the diffusion of technology.

In particular the USPTOs lack of expertise and resources in determining whether a business method is actually novel and inventive has been heavily criticized. Consequently, the USPTO has taken action in improving its business method patent search. The USPTO has for example

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[62] Harrington, Curtis R, *Computer-program Patentability Update*, Reed Business Information, 1995, Available online: http://www.manufacturing.net/dn/index.asp?layout=article&articleid=CA151434.

[63] Morris, R., *Software and Business Method Patent Licensing*, Practising Law Institute, 2003.

[64] Nolo, *Internet Business Method Patents*, 2003, Available online: http://www.nolo.com/lawcenter/ency/article.cfm/objectID/C2DBFF26-7097-4B7B-AE36DA00499851EE.

[65] Fields, S. and Roediger, J., *Health case business method patents*, 2001, Available online: http://www.physiciansnews.com/business/901fields.html

[66] Hall, B., *Business Method Patents, Innovation and Policy*, NBER Working Paper No 9717, 2003.

[67] Morris, R., *Software and Business Method Patent Licensing*, Practising Law Institute, 2003.

enhanced technical training for patent examiners and expanded their search activities: When it comes to business method patents (patent class 705) there is a mandatory search in certain databases and a second level review conducted by senior patent examiners.[68]

Also Congress has taken action in the field of business method patents. American Inventors Protection Act was approved in 1999 and it contains a special defence against business method patent infringement claims. The new defence is based on *earlier invention*. It was created for a party that had, in good faith, reduced the subject matter to practice at least one year before the effective filing date of the business method patent the party is claimed to have infringed. Commercial use of the subject matter, before the effective filing date of the patent, is required.[69]

The Business Method Patent Improvement Act was drafted in 2000. It has not been passed yet, but a new version of the Act was presented to the Congress in 2001. If the Business Method Patent Improvement Act is approved, changes concerning business method patents follow. There will, for example, be a mandatory publication within 18 months after the original filing date of *all* patent applications that claim a business method invention. Already now, most patent applications are published within 18 months but the publication is compulsory only if patents are applied in foreign jurisdictions. Applicants are granted an exception if they declare that they have no intention to file the application in a foreign jurisdiction that would require 18-month publication.

Also, a European type opposition procedure for challenging business-method patents will be implemented. Oppositions can be made within 9 months after the patent is issued. In addition, everyone has the opportunity to submit prior art to the Patent Office while the patent is pending.

The Act proposes changes in the validity presumption concerning business method patents both before and after the patent is granted: Currently all patent applicants are entitled to a patent unless the USPTO can show that the patentability requirements are *not* met. The new Act seeks to reverse this presumption when it comes to the obviousness of business method inventions.

Obviously, the patentability of software and business methods is old news in the U.S. Even the Congress who has the ultimate power concerning changes in patent law seems to have accepted the patentability of business methods. Consequently, the discussion in this sector has moved to topics like using software and business method patents as business tools, enforcement issues, damages and balancing the rights of patent holders' and the public in various ways (experimental use etc.). Economists have also been determining the consequences of strong patent protection in those fields of technology where cumulative innovation and complexity are typical.

In our opinion this type of discussion would be most beneficial also in Europe. The scene is not black and white: it is not just question of software and business methods being patentable or not. Although, unlike in the U.S., patent protection does not reach private parties and there are specific exemptions for experimental use in Europe, limiting patent holder's rights in certain situations could be considered. Also clarifying for example the *exhaustion doctrine* in the context of software patents should be thought about. Otherwise it might turn out that patent holder's rights never become exhausted: If making a copy of a computer program while using it, is interpreted to be manufacturing, it might not be possible to use the program without patent holder's consent even after the product has been legally sold or rented. This is because–unlike the right to distribute further and to use that specific product–the right to manufacture is not subject of

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[68] USPTO, *Business Methods White Paper*, 2000.

[69] Merges, R. and Duffy, J., *Patent Law and Policy: Cases and Materials*, 3rd edition, LeixsNexis, 2002.

exhaustion.[70] Although it seems rather absurd to interpret patent laws like this, it would lead to more control concerning the resale of patented products also in those cases where contracts were originally poorly drafted or they did not exist.

On the mobile Internet the challenges raise mainly in enforcing one's patents. The scene is international and different parts of the patented processes may be carried out in different jurisdictions. Nevertheless, patent rights are national and must be enforced separately in every country. Also, it is not possible to stop someone exporting parts of the patented invention to a country where the patent is not in force. On the other hand, taking into account the number of patents issued to Internet business methods and to software-based inventions, the risk of infringing someone's patents is huge. A Finnish company conducting business on the Internet can for example infringe someone's patent in the U.S. without even realizing that it is possible.

2.3 DATABASE PROTECTION IN EUROPE

Many business opportunities on the mobile networks rely on information systems that are built on top of databases. In general, more and more information is stored as data in databases. Therefore, databases form a crucial tool in the development of mobile business. On the other hand, peer-to-peer (P2P) networks enable interesting new solutions for building distributed databases.[71]

A database can include copyrighted works and even a database as a whole can be copyrighted if it is original enough. However, most databases are not copyrightable and their content is not copyrighted either. Yet, the making of databases requires the investment of considerable human, technical and financial resources while such databases can be copied or accessed at minimal cost. Therefore some kind of protection for databases is needed.[72]

European Union has adopted a directive concerning the legal protection of databases. It recognizes the possibility of copyrighting a database but also defines a neighboring right, a specific *sui generis database right*.[73] Several other countries are considering similar statutes. In the U.S, a number of bills have been introduced in relation to database protection, but no statutes have been passed so far.[74]

All EU member countries have implemented the database directive. However, they had the liberty to implement it in their own ways. Therefore the database legislation differs slightly within the European Union.

According to the database directive, the term 'database' means a collection of independent works, data or other materials arranged in a systematic or methodical way and individually accessible by

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[70] Soininen, A., *Tietokoneohjelmien patentointi erityisesti Suomen patenttilain ja Euroopan patenttisopimuksen perusteella*, Master's Thesis, University of Helsinki, November 2001.

[71] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[72] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[73] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996.

[74] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996.

- Hugenholtz, P.B., *The New Database Right: Early Case Law from Europe.* Ninth Annual Conference on International IP Law & Policy, Fordham University School of Law, New York, 2001.

electronic or other means. Databases should be understood to include literary, artistic, musical or other collections of works or collections of other material such as texts, sound, images, numbers, facts, and data. This means that a recording or an audiovisual, cinematographic, literary or musical work as such is *not* a database.

Clearly, *"works, data or other material"* in the definition of database are quite troublesome. The directive is obviously trying to state that databases can include many kinds of information, copyrighted works as well as other sets of information. The wording, however, is unsuccessful. Also *"arranged in a systematic or methodical way"* can be interpreted in many ways. It is difficult to determine, what is the required abstraction level. The directive does not require any qualitative or quantitative criteria for arrangement.[75]

Not all databases that fulfil the previously mentioned definition gain database protection. It is namely further required that in order to get the *sui generis* right, qualitatively and/or quantitatively substantial investment in either the obtaining, verification or presentation of the contents must have been made.[76]

The *sui generis* right provides the maker of a database with the *right to prevent extraction and/or re-utilization* of the whole or of a substantial part, evaluated qualitatively and/or quantitatively, of the contents of that database.[77] Although individual data items in a database are not protected by the *sui generis* right, not only the database as a whole is protected, but also a substantial part thereof. It is unclear, however, what is considered to be a substantial part in this context.

The most important qualification for the *sui generis* right is significant investment. Therefore, to judge what is substantial, the amount of investment should, in our opinion, be considered. If the investment needed to make a part of a database is significant, that is, if the part alone could be considered to gain the *sui generis* protection in case it was a separate database, then the part is a substantial part and its extraction and re-utilization without consent is prohibited.[78]

So, the *sui generis* database right requires *substantial investment.* The investment must be in obtaining, verifying or presenting the contents of the database. If the investment is aimed at something else, it does not constitute the database right. This is illustrated by spin-off doctrine that is especially popular in some courts in the Netherlands. For example, a television program listing, a real-estate listing, and a headlines listing were not databases according to Dutch courts, but merely spin-off products of other activities. On the other hand, Dutch courts have several times held that telephone catalogues and subscriber data are databases.[79] The logic here is not quite clear: it seems that telephone catalogues and subscriber data do require investments, but they are mainly outcome of other activities, namely marketing, customer recruitment, customer service, and the necessary information collection. How large a part of the investment is accomplished just for the

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[75] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[76] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996.

[77] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, 1996.

[78] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[79] Hugenholtz, P. B., *The New Database Right: Early Case Law from Europe*, Ninth Annual Conference on International IP Law & Policy, Fordham University School of Law, New York, 2001.

catalogues? Probably usually quite small although it is obviously possible to develop a database on subscriber information that needs a lot of investments.[80]

TABLE 2.1. COPYRIGHT AND THE SUI GENERIS RIGHT IN A DATABASE AS A WHOLE AND IN CONTENTS

Contents / The Whole	Not original	Original
No substantial investments	No legal protection	The whole not legally protected, but copyrighted contents
Substantial investment	Database sui generis right	Sui generis right + copyrighted contents
Original	Copyrighted as a whole	Copyrighted both as a whole and contents

When it comes to mobile appliances, it will be troublesome to characterize some databases as arranged in *a systematic or methodical way.* The physical structure of a database will be in continuous change as the devices move around, access points change, and connections and routings vary. The momentary snapshot of a database can appear arranged, but after a split second, the arrangement is completely different. Of course that depends on the level of abstraction. Certain levels, logical dependencies within database schema, and so on remain unchanged, although devices move. Yet, as stated above, it is quite unclear on what level of abstraction database right requires certain arrangement.[81]

We have concluded above that the requirement of *substantial investment* is central in the database *sui generis* right. Will the mobility or peer-to-peer approach change something in investments? In general, the mobility will be achieved with the help of enabling infrastructure and middleware. Those who build databases will not usually need to worry much about technical details related to mobility and peer-to-peer approach. Although significant investments will be required to develop sophisticated technologies to enable mobile P2P databases, they will not be investments in a particular database and they do not help to achieve the *sui generis* right. Instead, investments in a database as such will not change much.[82]

Also in the mobile P2P databases, there will be qualitatively and quantitatively substantial investments in the obtaining, verification and presentation of the contents. However, if the users will obtain, verify, or present the contents themselves in a peer-to-peer fashion, then it is likely that no single person or entity has contributed substantial investments. Such a P2P database may remain outside the *sui generis* right. That, nevertheless, is probably desirable. Most users, in all likelihood, prefer that no-one gets exclusive rights to the outcome of their joint effort. Another interpretation could be that if the total investment is substantial, then the database is protected and all the users that have contributed get a collective right. In practice that kind of collective right is very difficult to manage and does not necessarily satisfy users' expectations. The directive nonetheless does not tell us which interpretation is correct. Yet, if peer-to-peer technologies are

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[80] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[81] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[82] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

used only to deliver a database to users, but the content is obtained, verified, and presented by a single entity, a service provider, then this entity will have the database right.[83]

The Mobile Internet will be significantly international. It means that mobile P2P databases can spread among different countries effortlessly. The rights in databases nonetheless depend heavily on jurisdiction. Within European Union the database *sui generis* right brings forth a common legal ground for business models based on mobile databases. However, as a mobile database spreads further, the legal situation becomes more complex. From international perspective it would be desirable for the mobile business and ubiquitous services that countries adopt similar database protection laws.[84]

In practice efficient DRM systems may solve many of the legal uncertainties. An efficient DRM is also able to manage database rights to the information. From business perspective, therefore, it is a sound strategy to implement a DRM system in order to control the usage of databases. DRM can protect all layers of data regardless to its semantic characterization as information or data, and regardless to its representation and value to the user.[85]

2.4 STRATEGIC USE OF IPRs

As mentioned earlier, intangible assets have recently gained more importance within companies' resource pools. The problem with intangible assets, like knowledge, competence and intellectual property[86], is that it is often hard to value them and stop them from leaking to competitors.

Intellectual property rights give some intangible assets form, something "concrete" to exchange. Although, it is not easy to put a price tag on a right to manufacture patented inventions or to copy and distribute copyrighted works for example, there is at least someone who has the right and who is entitled to give it away. Also, when it comes to patents, an independent patent examiner has made the decision that that particular invention deserves patent protection. In addition, the fact that someone is willing to pay for filing and keeping a patent in force, possibly in many countries, is one sign of its value. Ultimately, the value of a patented invention is of course different for everyone.

Multiple intellectual property rights may be involved in one innovation. For example business methods can be subject of trade secret protection as long as the method is kept under wraps. Actually, keeping one's methods of doing business in secret has been the traditional way of prohibiting other companies from imitating them[87]. Also copyright protection is available for the software implemented business methods.[88] Copyright protection is automatic. It does not require any act from the creators of that particular software. Trademarks protect the name, the origin, of a product.

[83] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[84] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[85] Pitkänen, O.; Virtanen, P. and Välimäki, M., *Legal Protection of Mobile P2P Databases,* International Conference on Law and Technology, November 2002.

[86] Teece, D., *Managing Intellectual Capital. Organizational, Strategic and Policy Dimensions.* Oxford University Press, 2000.

[87] Syrowik, D., *Business Method Patents –A Strategic Response*, Computer Law Section Annual Meeting, 2003.

[88] Nolo, *Internet Business Method Patents*, 2003, Available online:
http://www.nolo.com/lawcenter/ency/article.cfm/objectID/C2DBFF26-7097-4B7B-AE36DA00499851EE.

Copyright does not protect from independent creation. Patent protection is hence useful especially if the invention can be easily imitated without infringing copyrights. Of course the invention must be of patentable subject matter. Not all potential innovations can or should be patented. One thing that should be considered when making this decision is the costs of patent protection versus the benefits. Also the capability of enforcing one's rights should be taken into account: Can the infringement be easily detected? Who are the potential infringers? Is the company in a position to defend itself?

When it comes to software innovations in particular, multiple patentable inventions are often involved. Also, many of these patentable inventions can be used in multiple products. Therefore, on the one hand the patent holder may have leverage concerning multiple innovations, not just one product. On the other hand his product may involve inventions that other companies have patented. Licences may be required.

When it is a question of complex products, compared to those fields of technology where one patent corresponds with one product, patents are used somewhat differently. Instead of protecting companies' key products and stopping other's from using them and consequently creating the company the possibility to gain monopoly rent, patents are often used as *negotiation tools.*

Of course, not all innovations contain multiple inventions even in ICT-sector. Patents can sometimes really protect company's key products from imitation. The maximum level of protection can be achieved by filing wide patents covering the key elements of a product or by filing multiple narrower patent applications continuously and thus developing a portfolio around the product. Also, other ways of achieving the same result should be patented. This makes designing around more complicated and costly.[89]

Nevertheless, licenses from other companies are often required in order to manufacture, sell and/distribute complex products. Since patents give leverage in licensing negotiations, it is often necessary that companies willing to manufacture the product have patents of their own. This way cross-licensing is possible and high licensing fees can potentially be avoided. Actually, some large companies file patents for their competitors' R&D field in order to gain leverage in potential licensing negotiations and/or for defending themselves from patent infringement claims. Also, it may be essential to have patents incorporated in standards.

Next we will move from the product level to more abstract, strategy level and concentrate on the big picture concerning IPR-strategy and patent strategy in particular. By the word strategy we mean those long-term goals companies have set for their patent activity. Also the implementation of these goals must occur. Hence, patent strategy includes filing patens, using patents in business *i.e.* licensing and selling them, enhancing company's reputation etc. as well as enforcing patents and giving up those patents, which are no longer useful. The management of these activities is part of patent strategy as well. The purpose of strategy is to unify company's patent activities so that it supports company's business in a best possible way. Strategy acts as a guideline when decisions are made in individual cases. The "strategy" concerning individual products is called *tactics.*

After discussing various types of patent strategies we jump back to a more limited application of strategy and discuss how patents can be used in standardization. Standardization is an important part of today's business climate and it definitely has its function when for example DRM technologies are involved.

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[89] Knight, J., *Patent Strategy for Researchers and Research Managers*, 2nd edition, John Wiley & Sons, LTD, 2001.

2.4.1 PATENT STRATEGIES IN GENERAL

Patent strategies are often divided into three categories: *defensive, offensive* and *transactional* strategies. In practise parts of these various strategies are often applied in one company. Some patents are filed for defensive purposes, some are intended to protect company's key innovations and some are used mainly for attracting capital funding. Of course patents can also serve all of these functions at the same time. The goal is to use patents so that company's competitive advantage is enhanced: the value of company's intellectual capital is maximized and the overall value of the enterprise is boosted. Patents may also be a part of company's risk management.

Offensive Strategies. The patent holder is in a position to stop others' from using his patented invention. Consequently, the patent owner can stop others from selling products that incorporate the invention described in the patent claims although the patent does not cover the entire product. If this actually helps the company to fight off competitors and makes its products distinctive, the patent holder may be in a position to gain monopoly rent. It can prize its products higher than it could if it had no monopoly power. Of course active enforcement of company's patent rights is in these cases required. You cannot expect others to respect your rights if you don't make them think twice about infringing them.

In many cases, however, it is possible to achieve the same functionality in different ways and to design around a patent. In particular in ICT-sector, one patent does not do much. Large patent portfolios are often needed for actually gaining competitive advantage. Since, it is costly to file patents portfolio building is mostly used by large companies. Nevertheless, patents can also protect small companies. For example in 1994 the court ordered Microsoft to pay Stac Electronics $ 120 million in damages for Microsoft's unlicensed use of two Stac Electronics' patents. These patents were related to data compression[90].

Many companies license or sell their technologies to others. In this aspect, patents usually enhance the value of companies' technologies. Although, having patents does not mean that no-one else has rights concerning the technology in question, they have an assuring function. At least nobody is able to patent exactly the same invention. Of course having a defendable position in the markets is always good. In addition, patents make negotiations easier: You do not have to worry that much about revealing trade secrets. A patent is a public document.

Technology licensing is naturally an essential part of cooperation with other companies. It is usually involved in outsourcing as well. However, pure patent licensing is getting more and more popular especially in the U.S. For example IBM has managed to obtain a continuous income stream by licensing its patents. During 1999, 2000 and 2001 IBM's yearly royalty rate was over 580 billion dollars [91].

Usually patents, which are not essential for the company, are the ones potentially licensed to others. However, there are few companies that base their entire businesses on patent licensing. These companies buy patents from other companies and/or individuals and sell them forward to those in need. In addition, these patent based companies may have their own R&D activity for patenting purposes although they do not manufacture the products themselves. The challenge is of course to find potential and actual buyers. One possibility to guarantee licensing revenues is to do it the "Qualcomm way": There are multiple standards that incorporate technology that Qualcomm has patented. Hence licences from Qualcomm are required for using these standards.

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[90] Showalter, B. and Baxter, J., *Strategic use of Software Patents*, Practising Law Institute, Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series, PLI Order No. G0-004D, February-March, 1999.

[91] Somaya, D., *Theoretical Perspectives on Patent Strategy*, Robert H. Smith School of Business, Maryland, Draft, 2002.

In many cases the licensee receives other type of value from licensing. A license agreement can for example involve a cross-license or other non-monetary assets. As mentioned earlier cross-licensing is normal especially in those fields of technology where complexity is typical and companies are dependent on other companies patents. One way to solve this problem is to form a *patent pool* between multiple companies. The pool consists of rights involved in certain product or technology.

When it comes to ICT-companies, offensive patent strategy is mostly deployed by large, multinational companies having operations in the U.S. However, it has been argued that also European companies use patents actively in their businesses and that companies react even if it is almost for sure that no actual infringement has occurred[92].

Nevertheless, none of those 11 Finnish ICT-companies SOININEN interviewed during 2003 was actively and continuously attacking their competitors by claiming they infringed their patents. Usually, companies did not react before the patent was actually granted and even after that it had to be likely that an infringement actually occurred. Usually companies' contacted possible infringers via polite letters. Filing patent suits was in particular avoided. None of the interviewed companies was at the time involved in a public patent litigation they had filed.[93]

In addition, although the interviewed companies usually drafted patent applications maximum protection in mind, patents seldom established them a monopoly position and affected companies' product prizes that way. Patents were of course essential and had an effect on prices in those situations where a company manufactured products that required the use of multiple standards and hence required licensing/cross-licensing. Then again other patent licensing efforts had in many cases turned out to require too many resources compared to the incoming money flow. Generally speaking, most Finnish companies saw patents as a waste of time and money and considered them fairly unimportant to their companies' operations. For instance publishing inventions was considered as an alternative for patenting.[94]

Defensive strategies. Many companies do not consider patents as one of their key resources. Rather, patent applications are filed for defensive purposes. The goal is to guarantee the freedom to operate and to avoid patent infringement claims. The objective can be accomplished by building large patent portfolios. This makes it more certain that company's products are proprietary and nobody can patent at least the same inventions. Also, making sure that those companies whose patents could potentially be infringed likely infringe some of company's own patents is usual.[95] What have raised concerns in this context, when interests of the general public are taken into account, are those companies that file patents in order to "reserve" as wide part of a business sector or a technology domain as possible (blocking patents).[96]

A defensive strategy is a must especially in the U.S. where multiple companies are using patents offensively. Although the amount of granted and filed software and business method patents has

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[92] Fiilin, P., *Patentti osaksi strategiaa*, Fakta, 2001.

[93] Soininen, A., *Yhteenveto Suomen ICT-sektorin yritysten patenttistrategioita koskevista haastatteluista*, Tietotekniikan tutkimuslaitos HIIT, De Core –projektin julkaisuja, 2003.

[94] Soininen, A., *Yhteenveto Suomen ICT-sektorin yritysten patenttistrategioita koskevista haastatteluista*, Tietotekniikan tutkimuslaitos HIIT, De Core –projektin julkaisuja, 2003.

[95] Rivette, K. and Kline, D., *Unlocking the Hidden Value of Patents, Rembrandts in the Attic,* Harvard Business School Press, 2000.

- Showalter, B. and Baxter, J., *Strategic use of Software Patents*, Practising Law Institute, Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series, PLI Order No. G0-004D, February-March, 1999.

[96] OECD*, Patents and Innovation in the International Context*, OCDE/GD(97)210, Paris, 1997.

declined a bit, it is important to be able to avoid expensive litigation and potentially extremely high damages. For example Internet patent litigation is already an established part of the e-commerce environment in the U.S[97].

In addition to "normal" amount of patent litigation, the current economical slump intensifies rivalry among competitors. Those software companies, which are nearly bankrupt, do not have anything to loose. Litigation may be their last change. Actually, these companies are sometimes even paid to start litigation. A company claiming licensing fees from the open source software users for example is likely to be crucified in the media. It is definitely not a tactic for attracting more customers[98]. Hence, a middleman who has nothing to loose, may be used to fight off competing products that are based on open source. In overall, patent litigation is something companies must be prepared of especially if they have operations in the U.S. The culture there is far more litigation oriented than the business environment in Europe for instance.

Patenting for defensive purposes is a typical reason for Finnish ICT-companies to pay attention to patents. According to SOININEN's interview data, patents are in most cases applied to ensure that companies are able to compete in certain markets also in the future, even if someone starts to use its patents offensively. The experience and the information about competitors that is enhanced through patent activities functions as insurance for "difficult times". Meanwhile, companies did not exploit most of their patents. Only fairly small amount of patented inventions was actually used in companies' products, and only few patents were licensed to others. To some companies, patenting was more about levelling company's patent resources with the amount of patents their competitors had.[99]

The problem with pure defensive strategy is that intellectual property rights are companies' assets. Hence, they should be used efficiently benefiting the shareowners. Something should be done if most of the company's patents are locked in a closed and not utilized in any way. Of course it is always a hard decision to give up those patents, which are not used in company's current products and it is definitely not easy to establish a licensing program and start to use patents actively.

Transactional strategies. Additionally, patents are important for transactional purposes. Investors often consider whether a company has protected its key innovations when they make their decision about financing. It is vital that companies have a secure and defendable market position. Also, when it comes to exit scenarios, patents may be of value. According to SHOWALTER and BAXTER start-up companies usually have two exit possibilities: portion of a company can be sold on the public market through an initial public offering (IPO), or they can consider possible corporate buyers. In either case company's patent portfolio affects its value.[100]

It has been argued that for example venture capitalists do not usually consider how good companies' patents actually are. It has to be noticed, however, that investors have become more careful when estimating the value of software and business method patents after the dot.com bubble burst and especially the value of business method patents was questioned by the

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[97] Riedinger, J., *Building Fences in Cyberspace: Business Method Patents and The Internet*, 2000.

[98] Franck, S., *Will patent pillage open source?,* News.com, April 16th, 2003, Available online: http://news.com.com/2010-1071-996906.html.

[99] Soininen, A., *Yhteenveto Suomen ICT-sektorin yritysten patenttistrategioita koskevista haastatteluista*, Tietotekniikan tutkimuslaitos HIIT, De Core –projektin julkaisuja, 2003.

[100] Showalter, B. and Baxter, J., *Strategic use of Software Patents*, Practising Law Institute, Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series, PLI Order No. G0-004D, February-March, 1999.

academics, the USPTO, the Federal Circuit and the Congress. It is not just patents, which make the difference when companies are raising capital.[101]

Because the amount of patents is generally thought to be a sign of innovation, patents have status value also to large companies. Especially those companies that aim to be technology leaders appreciate patents for this reason. Patents can also be used in marketing, which is actually extremely typical in the U.S. In many cases the general public considers patents as a sign of a good technology but making sure that company's patents are mentioned in its products has a legal meaning too. Without identifying patents a product includes, it is not possible to demand damages for patent infringement.

Some small, Finnish ICT-companies that SOININEN interviewed, did file patents especially for attracting investors. Patents were thought to enhance their negotiation position. Additionally, some fairly large companies told SOININEN that they do consider patents when making the decision about buying or partnering with a start-up for example. However, one company pointed out that they have changed their view in this respect. They used to require that for example start-ups have a patent/patents or that they have filed for them before they come and present their business ideas. Nowadays this company does not care that much about patents, but it is not willing to write non-disclosure agreements either: It is hard to know whether similar inventions have already been made within the company itself. Hence, on the basis of the interviews, patents are important in a sense that after filing and publishing the patent application, ideas can be represented freely without the fear that the other party steals the invention. Of course not all companies' considered patents at all important in this respect. There were some medium sized software companies that did not pay any attention to patents when they made decisions about buying, investing or partnering with other companies. Actually, this is understandable taking into account that these companies did not have much interest in patents in their own business either.[102]

When it comes to patents as status elements and mentioning them in marketing, Finnish ICT-companies did sometimes bring up the number of patents in their investor correspondence. In marketing, patents were seldom mentioned. Many companies actually pointed out that bringing forward the fact that a company has patents might actually have a negative connotation. It was understood that in the grassroots levels patents are generally opposed. In spite of this, one of the interviewed companies did continuously refer to "patented technology" in its marketing information.[103]

"No patents" -strategy. On top of offensive, defensive and transactional strategy, strategy of no patents should be introduced. Patents are not important for everyone: copyright protection added with lead-time and secrecy might be enough for gaining competitive advantage. Also companies' business ideas may be based on offering maintenance or other services making patents less attractive. In addition, some companies actually have an anti-patent attitude. Many software companies and software engineers in particular are against patenting and for the open source licensing. Open source licensing is based on non-restrictive copyright licenses and it is in its character to some extent incompatible with patents.

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[101] Shelby, J., *Business Method Patents and Emerging Technology Companies*, 2001, Available online: http://www.law.washington.edu/casrip/Symposium/Number7/3A-Shelby.pdf.

[102] Soininen, A., *Yhteenveto Suomen ICT-sektorin yritysten patenttistrategioita koskevista haastatteluista*, Tietotekniikan tutkimuslaitos HIIT, De Core –projektin julkaisuja, 2003.

[103] Soininen, A., *Yhteenveto Suomen ICT-sektorin yritysten patenttistrategioita koskevista haastatteluista*, Tietotekniikan tutkimuslaitos HIIT, De Core –projektin julkaisuja, 2003.

Research institutes and universities generally have the goal of adding public knowledge. The trend is however, that especially universities in the U.S patent their inventions, license them to companies and hence create a revenue stream for themselves. This trend is also starting to affect thinking in European universities and research institutes. Although, it is good that universities get extra financing, it is controversial to make them profit centers and restrict the flow of information, especially if these institutions are government funded. Usually researchers have an agenda to publish new information as early as possible as well. They do not want to keep their inventions secret until the patent application is filed.

What "no patents" -strategy means in practice is that companies and universities/research institutes acknowledge the existence of patents and plan their operations accordingly. They respect the rights of others and take them into account but do not see it worthwhile to file patents even for defensive purposes. The reason usually is that the costs of patenting exceed the benefits. If competitors do not have any patents for example and patents are not important for gaining competitive advantage for that company, why should it file for patents. To avoid those situations where someone else patents the same inventions, publishing the invention early is one possibility. This benefits the society at large.

What "no patents" -strategy does not mean is that companies have not acknowledged the existence of patent protection and considered whether patenting would benefit their operations somehow. Actually, when SOININEN's and PITKÄNEN's students interviewed eight ICT-companies that had no patents, the general answer was that these companies were not interested in patents, they had nothing that could be patented and that they could not care less about others' patents. The attitude towards patenting was negative. Some companies also assumed that computer programs are not patentable in Europe.

In overall, only a few of the interviewed companies actually had the type of patent activities that could be called patent strategy. In many cases, the activities concerning patents were based on case by case basis and there was no clear guideline for these occasions. In particular the link between business strategy and patent strategy was missing. Nevertheless, it appears that also European companies in ICT-sector are becoming more and more interested in patents and that some smaller companies are developing actual patent strategies too.[104]

The scene in this respect is definitely different in the U.S. Patents are viewed as companies' key assets, they are important and most companies realize already in their early days that patents must be filed. The hype around selling and licensing patents and gaining huge amount of money that way has ceased though. Companies' seem to be more practical about what patents and other forms of intellectual property rights can actually do for their business.

What does all this has to do with information products in mobile appliances then? Actually, a lot. Patent and IPR-strategies in general tell something about the way companies exploit their rights in this context. Of course nothing stops a company from selecting a different model for different products in the end, but it is not that easy, if the tradition is totally lacking. When it comes to international markets, it must be recognized that it is extremely important to pay attention to patents.

2.4.2 STANDARD SETTING AND STRATEGIC USE OF PATENTS

Standard setting has its advantages especially in an environment where network effects are strong. Making sure that everyone is able to use the same communication protocol for example makes it

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[104] See Komission arviointikertomus tekniikan siirtoa koskevasta ryhmäpoikkeusasetuksesta N:o 240/96 81 Artiklan mukaiset tekniikansiirtosopimukset, 1996.

possible that various products interconnect. Products and services are complementary and interoperable. The customers and the manufacturers clearly profit:

1) The product is more useful from the customer's point of view because there are more users with whom to interconnect. Also the risk of choosing the "wrong" technology diminishes. Standardization also provides the customers reasonably priced products that are interoperable and interchangeable. This accelerates the acceptance of a new technology.[105]

2) Thanks to setting a standard producers have immediately access to a larger customer base than they would have without the standard[106]. Therefore, standardization can in many cases be seen to promote competition and innovation among producers and lower barriers for international trade. However, standards can also restrict competition by reducing variety outside the standard.[107]

Standard setting in itself can be private, public or semi-public, open or proprietary, national or international. Openness in standard setting context means that the technology is available for everyone to use. It does not mean that there is no proprietary technology involved. Hence, using the standardized technology may require licensing. Patent-free standards are generally preferred, though, with the intention of ensuring their success and promoting their use[108].

Public standardization is operated by governments or official standardization organizations. European Telecommunications Standardization Institute (ETSI), American National Standardization Institute (ANSI) and International Telecommunications Union (ITU) can be mentioned as examples of these official organizations.[109] We concentrate now on problems associated with open standards set by different standardization organizations.

When choosing a standard it is important to be aware of all IPRs involved and at least try to guarantee that everyone is also in reality able to use the standardized technology for free or at reasonable cost. Therefore, many standardization organizations have a written IPR or Patent policies that obligate companies taking part in standard setting to disclose their essential patents. Since, in many cases patent-free standards are preferred, disclosures may affect negatively on what technology gets to be chosen for a standard. Companies have an incentive to hide their patents.[110]

Obligation to disclose essential patents reaches seldom to pending patent applications, especially to unpublished ones. Since standard setting takes a long time, many years in some cases, companies usually continue to file applications throughout the process. They may also modify their existing patent applications so that their patent claims cover the standard better. The more essential patents companies have, the less they have to pay licensing fees to others. Having a patent in standardized technology can in many cases be a valuable source of royalties as well.[111]

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[105] Shapiro, K. and Varian, H., *Information Rules. A Strategic Guide to the Network Economy*, Harvard Business School Press, 1999.

[106] Teece, D., *Managing Intellectual Capital. Organizational, Strategic and Policy Dimensions.* Oxford University Press, 2000.

[107] Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore –projektin julkaisuja, 2003.

[108] AIPPI reports, Summary Report, *Question Q 157 The Relationship between Technical Standards and Patent Rights*, 2001, Available online: http://www.aippi.org/reports/q157/q157-Summary-e.htm

[109] Rahnasto, I., *How to Leverage Intellectual Property Rights*, Academic Dissertation, Faculty of Law, University of Helsinki, 2001.

[110] Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore – projektin julkaisuja, 2003.

[111]Sarvas, R., and Soininen, A., *Differences in European and U.S. Patent Regulation affecting Wireless Standardization,* International Technology and Strategy Forum, Workshop on Wireless Strategy in the Enterprise: An International Research Perspective, Berkeley, October 15-16, 2002.

Since the early disclosure of patents and patent applications can lead to a different standard, if the obligation to disclose does not continue throughout the standard setting, it is even more likely that many patents surface after the standard is set. After the standard is accepted by the industry it is namely very difficult to design around the patent or change the standard's specifications afterwards. In the worst case, licensing fees required after the standard is set, are so high that the only solution is to abandon the standard[112].

As stated earlier the public interest in standardization is to license the patented technology for free. This is because a royalty-free standard has more chances of being accepted and used as widely as possible. Actually, especially manufacturing companies often prefer royalty-free standards or standards where the cumulative royalty cap is set beforehand. Otherwise the cumulative amount of royalties might get so high that it becomes unprofitable to manufacture the product. This occurs especially if a manufacturing company has no patents of its own within the standard making cross-licensing with other patent holders impossible[113].[114]

If a royalty-free licensing scheme cannot be negotiated, it is in the interest of the public to get the patent holder to agree to license at least on reasonable and non-discriminatory terms (RAND). As already mentioned earlier, the more patents companies have within these standards, the less they have to pay others for using the standard. For this reason, in standards where patents are licensed under RAND or other terms, companies have an incentive to obtain patents that are essential for using the technology. For example in CDMA 2000 standard Qualcomm owned 28%, Nokia 16%, NTT DoCoMo 13%, Ericsson 8%, Motorola 7% and Hitachi 5% of essential patents involved. In WCDMA standard Ericsson has 30%, Nokia 21%, Qualcomm 20% and Motorola 14% of the essential patents.[115] Then again companies, like Qualcomm, which do not manufacture the product themselves, do not have to pay other patent holders anything. Getting the technology they have patents for chosen for a standard guarantees them royalty stream. Hence, these companies do not usually have an incentive to license their patents royalty-free.[116]

If the patent holder refuses to license on these vague terms, the standardization process is usually halted and other solutions are searched for. In reality, refusing to license at all is very rare although it is the most influential form of leveraging one's patent rights[117]. It is a feasible strategy for those companies that opposes the standard. A company may for example have a reason to oppose a standard if it has proprietary technology, which competes with the standardized products. A company may also wish to delay the acceptance of a standard so that it has more time to develop standardized products.[118]

- Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore – projektin julkaisuja, 2003.

[112] Rahnasto, I., *How to Leverage Intellectual Property Rights*, 2001.

[113] Alkio, *Kovaa peliä patenteilla*, Helsingin Sanomat, 9th of March, 2003.

[114] Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore –projektin julkaisuja, 2003.

[115] Alkio, *Kovaa peliä patenteilla*, Helsingin Sanomat, 9th of March, 2003.

[116] Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore –projektin julkaisuja, 2003.

[117] Rahnasto, I,, *How to Leverage Intellectual Property Rights*, Academic Dissertation, Faculty of Law, University of Helsinki, 2001.

[118] Rahnasto, I., *How to Leverage Intellectual Property Rights*, Academic Dissertation, Faculty of Law, University of Helsinki, 2001.

- Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore – projektin julkaisuja, 2003.

The obligation to disclose relevant patents does not get hold of those who do not participate in setting the standard. Taken into account the continuously growing amount of patents especially in the field of software, it is likely that third parties have patents that are essential for using the standard. In these cases the patent holder would be in a position to demand royalties although the standard was royalty free. He might also refuse to license the patent at all.

Although, the patent holder has a very strong negotiation position if his patent "surfaces" after the standard is set, third party patents do not generally create problems. In most cases reasonable licensing terms can be agreed upon. Bad publicity can also be a reason for a patent holder to comply with a standardization organization's policy and for example license its patents royalty-free although it had no obligation to do so.[119]

2.5 CONCLUSIONS

It is possible to separate at least four IPR-trends: 1) trends in law and its interpretation, 2) trends in business climate, 3) trends in political views, as well as 4) trends in public/academic discussion. These trends are interconnected and they affect each other.

Legal trends. For the last twenty years the legal climate has been for the rights holders'. Their position has become stronger and stronger and protection has been gradually granted for new types of innovations. Computer programs are patentable in the U.S. as well as in Europe and even business methods can be patented in the U.S. Then again database protection is a new intellectual property type altogether. However, the trend seems to be changing its course. It has been realized that stronger and wider is not always better from the society's viewpoint. Balance is needed and searched for.

Usually legal trends flow from the U.S. to the rest of the world. This can be seen especially when international harmonization efforts take place. It seems, though, that at the moment European legislation is regarded as some sort of a guideline in the U.S: There has been discussion about legal protection of databases and for example prior user rights have been introduced in patent law. Also introducing the opposition procedure and giving up treble damages in cases where patent infringement is wilful have been suggested.

Business trends. Intellectual property rights have gained great importance in companies' resource pools. Especially U.S-based companies are using their IPRs strategically in order to enhance their business goals. IPRs–patents, copyrights, trademarks and trade secrets–are deemed essential and these rights are in many cases taken into account already when starting a company. The current economical slump and the burst of the dot.com boom have, however, cut the wings of the wildest attempts to build one's business entirely on IPRs. Conversely in Europe, many companies are just beginning to realize the value of IPRs. In addition to large companies small and medium sized companies are getting more and more interested in developing actual IPR and patent strategies.

Political trends. The political challenge is to balance the interests of individuals, companies and the general public and to plan a supportive policy framework that corresponds those needs at all times. This is not an easy task and changes in legislation occur slowly. Topics that are emphasized in the media and in the academic discussion as well as topics that are regarded important by companies' affect the direction and focus of political decision-making. Lately the importance of protecting intellectual property has been highlighted. However, practical problems like difficulties

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[119] Soininen, A, *Submarine Patents and Antitrust in Standard Setting Context*, Tietotekniikan tutkimuslaitos HIIT, DeCore – projektin julkaisuja, 2003.

in enforcing one's copyrights and patents rights as well as guaranteeing high patent quality have been taken into consideration.

Academic trends. Ten years ago patents used to be one of the most uninteresting research topics. The recent media attention has, however, brought a lot of awareness in particular to software and business method patents. Currently multiple academic research papers handling the topic can be found. These include legal, economical, political/societal, as well as technological articles.

In the U.S. the academic papers have covered the patent life cycle fairly well. First writings were about granting patent protection and opposing the change, then about how large software companies use their patents as bargaining chips creating potentially more barriers to entry for small and medium sized companies and hence discouraging innovation. Lately especially legal battles concerning Internet business method patents have reached media attention in the U.S. Academic side is discussing about the patent reform all over again. However, this time it is not about granting patent protection, it is about preventing further damages to the U.S. economy. Federal Trade Commission has for example published a report suggesting changes in a) post-grant review and opposition proceedings; 2) the presumption of validity; 3) subjective standards in patent law, including wilful infringement; 4) experimental use and 5) obviousness standards.

Compared to the U.S., the culture in Europe is fairly traditional. The media is not as savvy and companies generally avoid legal battles. Also the legal tradition is in most European countries based on civil law, not common law, making it more stable. Consequently, the discussion in Europe seems to be still in phase one and two. Trends in this respect flow slowly from the U.S. to Europe.

3 DIGITAL RIGHTS MANAGEMENT[120]

3.1 INTRODUCTION

Selling content over the Internet not only reduces physical costs compared to physical delivery, but also provides new opportunities to improve customer experience and to gain incremental revenues in a form of increased distribution. This has resulted to a great expansion of digitized content pushed through Internet distribution channels. META Group consultants' findings indicate that $300 billions worth of digital content will be distributed electronically by 2004[121].

However, when the content leaves the Web server, the publisher loses control of the reproduction, modification, reuse and redistribution of that content. Since the copies are as good as the originals, it is extremely difficult for the content provider to control and to track what is done with the original information. These are the very obstacles that hinder even greater expansion in content e-distribution. Challenges concerning copyright infringement, inability to collect royalties on digital content and more specific control over the usage, are being eroded by digital rights management (DRM).

Digital Rights Management (DRM) refers nowadays usually to copyright technical protection. In MobileIPR project, we have tried to advocate that DRM should not be defined that tightly, but it should also include many other management related activities. Furthermore, it should not be restricted to copyright or even to intellectual property rights, but rights should refer to other rights related to information products as well. In addition, if someone chooses to have a policy– for example–not to protect information products technically that decision is within digital rights management.

Actually, the term "digital rights management" is somewhat misleading in the sense that rights are not digital. In general, they do not have much to do with digits, but they are rather analog. The word "digital" refers supposedly to the subject matter, to information in digital form, not to rights in that information. It is also possible to think that the word "digital" refers to the fact that digital information technology is often used to manage the rights, "the digital management of rights" instead of "the management of digital rights". Yet, DRM does not refer to computer-aided rights management in general. For example, an investor can have a computer-based system to manage real estates, securities, contracts, etc., but this system is not called DRM.

As it has become evident that the meaning of DRM has now been established, we give up: DRM refers merely to the technical tools or measures that are intended to protect entities copyright in information products. Yet, in this report, we do not limit ourselves to copyright technical protection, but we deal with broader management issues as well.

DRM involves the description, layering, analysis, valuation, trading and monitoring of the rights over an enterprise's tangible and intangible assets. DRM covers the management of rights,

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[120] The outcome of this research area has previously been reported in a more detailed manner in the following publications:

- Pitkänen, O., *Managing Rights in Information Products on the Mobile Internet*, HIIT Publications 2002-4, 2002, Available online: http://www.hiit.fi/de/mobileipr/Pitkanen2002-4.pdf.

- Pitkänen, O. and Välimäki, M., *Towards a Framework for Digital Rights Management*, published in IEC2000, Manchester, 2000, Available online: http://www.hiit.fi/de/drm_framework_iec2000.pdf.

[121] See http://www.metagroup.com/.

whether they are rights in a *physical* manifestation of work, like a book, or whether they are rights in a *digital* manifestation of work, like an e-book.

Current methods of managing, trading and protecting companies' tangible and intangible assets are inefficient, proprietary or otherwise require the information to be wrapped or embedded in a physical format. Then again, in the digital world DRM is essentially but not merely about protecting intellectual property. This is often done by creating technical controls for protecting digital works.

Without exploiting DRM technologies for e-commerce, content publishers may lose a great deal of revenues due to piracy and illegal use of technically unprotected products. DRM enables for example content owners to embrace compelling new business models that provide publishers ways to match content distribution with consumer expectations and pricing models such as per chapter, page or song billing. Actually, several companies and organizations have recently published products for managing rights in digital information. Those companies include for example Adobe, IBM, InterTrust, Liquid Audio, and Xerox ContentGuard.

DRM market is still undeveloped, highly competitive and evolving quickly. Nevertheless, the META Group analysis forecasts that through 2006, specific digital rights management (DRM) technologies will be pursued by content producers and rich media distributors; however, corporate users will continue to experience mixed success, with most deploying DRM for specific business uses and in controlled environments. New solutions will emerge by 2007/08, based on the evolution of trusted, virtualized multidevice platforms, resulting in a rationalization of niche DRM technologies as natural market consolidation and legal claims over patents both accelerate.[122]

In many cases large media companies are old conglomerates based on traditional newspaper publishers acting slow to new technologies and opportunities. The big players are waiting for clear guidelines for the appropriateness of digital content distribution and the rights they associate with that content, as well as established but flexible strategies to maximize the protection provided by digital rights management systems.[123]

Although one might assume otherwise, digital rights management technology is not a new concept. Only the name has changed. A few large companies and public entities started research in Electronic Copyright Management in the early 1980's. Later in the 1990's, especially European Union funded several notable projects such as IMPRIBATUR and COPEARMS, which tried to study the whole field from *legal, technical* and *business* perspectives. However, digital mass-markets had not yet developed. Therefore, the results of these projects did not lead to direct market applications. Anyway, the understanding of the field increased and during the last few years we have discussed on first Electronic and then Digital Rights Management.[124]

In this chapter we discuss various aspects of digital rights management. Especially we summarize copyright and other legal background as well as user-rights in relation to DRM. We also present issues related to business models that depend on digital rights management. DRM technologies are explained more in detail in chapter 4.

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[122] META Group Research – Trend, *Content & Collaboration Strategies 2004/05 META Trends*, Available online: http://www.metagroup.com/us/displayArticle.do?oid=46201.

[123] Lajoinie, J., *Securing Digital Content*, January 2001, Available online: http://itmanagement.earthweb.com/secu/article.php/623081.

[124] Dusollier, S., *Electrifying the Fence: The Legal Protection of Technological Measures for Protecting Copyright,* European Intellectual Property Review, 21:6, 1999.

- Möschel, W. and Bechtold, S*., Copyright-Management im Netz*, Multimedia und Recht, 1998.

3.2 LEGAL RIGHTS AND LEGAL PRODUCTS

The basis of the DRM framework consists of the rights to be managed. In the center there are intellectual property rights (IPRs). They protect the valuable outcomes of *e.g.* content production and software engineering. Copyright has traditionally been the most important legal tool to protect texts, pictures, computer software, and other original intangible works while patents have been used to protect more hardware related inventions.[125]

However, in the last few years, many software companies especially in the U.S. have begun extensive patenting to gain a better strategic position among competitors. These companies are now using patents as the primary means for legally protecting their software. Moreover, U.S. Patent and Trademark Office (USPTO) began to issue Internet business method patents several years ago. Therefore more and more inventions related to, for example, multimedia or Internet applications are within patentable subject matter. As explained in Chapter 2, this development has also been widely criticized. It seems that sometimes patents are issued too easily without proper examination. Also it is not clear in general that patents are the best way to promote innovation and industrial development.[126]

In Europe, copyright has still kept its dominant position in contents and software industries, but also there, a heated discussion on software and Internet patents is going on. Despite the shortcomings, it seems obvious that patents are becoming increasingly important. It should also be noted that it is largely possible to extend intellectual property rights in contract terms. For instance, in a license agreement, a licensor and a licensee can agree that the licensor has rights that are not stated in the law. That kind of an agreement is normally binding and enforceable between the contracting parties. It seems that these agreed intellectual property rights are becoming quite common and significant.

In general, intellectual property rights protect the content of an information product and related computer programs. The metadata of an information product is not usually protected. However, in some cases parts of metadata can be legally protected. This is because, based on the Article 12 of the WIPO Copyright Treaty, many countries have changed their copyright laws making it illegal *"to remove or alter any electronic rights management information without authority".*

In addition to copyright and patent protection, database protection and trademarks should be taken into consideration in this context. Trademarks are used to promote and distinguish manufacturer's/seller's products from those of others. As trademarks protect some valuable parts

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[125] Haarmann, P-L, *Tekijänoikeus ja lähioikeudet*, Kauppakaari, 1999.

- Lang. J., *Patent Protection for E-Commerce Methods in Europe*, Computer Technology Law Review, 6:5, 2000.

- Merges, R; Menell, P. and Lemley, M., *Intellectual Property in the New Technological Age*, 2nd edition, Aspen Law & Business, 2000.

[126] Aharonian, G., *Does the Patent Office Respect the Software Community?,* IEEE Software, Jul/Aug, 1999.

- Lang. J., *Patent Protection for E-Commerce Methods in Europe*, Computer Technology Law Review, 6:5, 2000.

- Merges, R., *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform.,* Berkeley Technology Law Journal, 14:2, 1999, Available online:
http://www.law.berkeley.edu/journals/btlj/articles/14_2/Merges/html/reader.html.

- Merges, R; Menell, P. and Lemley, M., *Intellectual Property in the New Technological Age*, 2nd edition, Aspen Law & Business, 2000.

- Samuelson, P., *Good News and Bad News on the Intellectual Property Front*, Communications of the ACM, vol. 42 no. 3, March 1999.

of an information product, especially brands, they are an essential part of digital rights management.[127]

It must be noted that not only intellectual property rights but also several other types of rights may be involved in information products. For example, right to privacy is a fundamental right in multiple legislations and can affect the distribution of information products in many ways.

Consequently, an entity may have various legal rights in one single product. Those rights can be overlapping and protecting the same parts of the product, though in principle different rights protect different parts of a product. For instance, patents protect new, non-obvious inventions related to a product, copyright protects the way ideas have been expressed/implemented, trademark protection covers the names and symbols used to differentiate company's products from other products and trade secrets are used to protect business information that should be kept confidential in order to maintain competitive advantage.

As mentioned earlier, there are a number of international treaties that aim at harmonizing intellectual property rights. Nevertheless, details vary from jurisdiction to jurisdiction. For example, patentable and copyrightable subject matters in the U.S. and in the Europe differ in a way that must be taken into account when designing interoperable rights management systems. Although a product is adequately protected in one country, say, by copyright, in another jurisdiction it might be completely out of legal protection. Thus, for an entity that operates on the Internet or otherwise internationally, it is very important to understand the complex international legal situation.

Even in one single country, intellectual property rights are nowadays typically developing in a fast pace. The situation is very dynamic. Therefore, an efficient digital rights management system should be able to handle the dynamics of the field in multiple dimensions: entity's own rights change in the course of time, the legal system is changing and the differences between jurisdictions can be remarkable.

To sum up, a *legal product* can be defined as a combination of legally protected parts of an information product. These legal rights can be different in different jurisdictions and times. Therefore a legal product is a very dynamic concept.

The legally protected parts of an information product are called *legal components*. A legal component can also be a legal product by itself. For instance, a multimedia product consists of many parts; video clips, texts, and pictures. Then again a video clip is typically another combination of several parts. Therefore, a multimedia product includes a legal product that may consist of other legal products/components.

At the lowest level, all the legal products are combinations of *atomic subject matters* like a piece of text that is created by one author or a picture created by one artist. This relation is illustrated in figure 3.1.

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[127] Garner, B. A., (ed.). *Black's Law Dictionary*, 7th ed., West Group, 1999.

- Lang. J., *Patent Protection for E-Commerce Methods in Europe*, Computer Technology Law Review, 6:5, 2000.
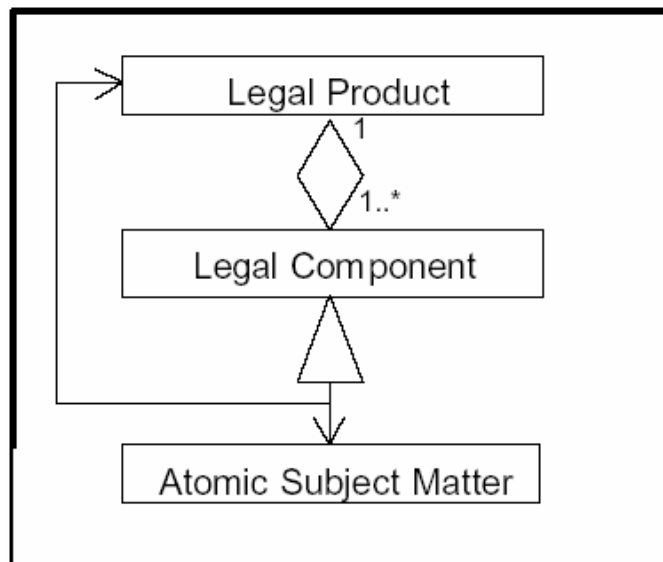
FIGURE 3.1. A LEGAL PRODUCT IS THE COMBINATION OF ONE OR MORE LEGAL COMPONENTS THAT CAN BE EITHER LEGAL PRODUCTS OR ATOMIC SUBJECT MATTERS

From the DRM point of view, it is important to notice that an entity needs to manage intellectual property rights not only on a legal product level but also on the atomic subject matter level. For example, a publisher of a multimedia product needs to be able to license all the components of the product and to share the revenues with all rights holders. Also, if someone wants to reuse a legal part of a product, *e.g.* someone would like to copy a picture from a multimedia work to her book, it should be possible to find out who may legally grant the right for it. This leads us to think about a rights clearing system. This system could be incorporated–with the help of third parties–into a well-designed DRM system.

3.3 USER RIGHTS IN COPYRIGHTED WORKS

One important, and arguably often neglected, aspect of rights management is the right that an end-user has or should have in an information product. Typically user rights are limitations to copyright or assigned from a copyright-holder. Therefore, in the following, we mainly discuss copyright-related user rights although they can be related to any rights.

The objective of copyright law is namely to create a balance between promoting the creativity of authors and the need of the society at large to utilize earlier copyrighted works. Therefore, author's works should be legally protected but at the same time there should be some exemptions for users in order to guarantee a socially optimal result.

Three main legal layers that protect the dissemination of *copyrighted works* under a DRM system are:
- copyright law (for content)
- anti-circumvention regulations (for protection technology)
- contract law (for license terms)

The last two support the copyright protection in DRM systems: Anti-circumvention regulations protect the technical protection systems from circumvention. Both unauthorized access to the content protected via technical measures and the manufacturing and distribution of circumvention devices are prohibited. Then again, contract law may apply–at least analogically–if

copyrighted subject matter is licensed. In practice, the required rights expression metadata, or a digital certificate, may be interpreted to be a license or an agreement.

User rights are exemptions to the rights assigned to copyright holders in the copyright laws. Copyright law as a legal doctrine is expanding to a more general information law when multiple protection layers are added. Conversely, each protection layer has specific exemptions that can be generally characterized as user rights.

Copyright. An ideal user rights scheme should provide users the possibility to exploit the content despite the three layers of rights. To be precise, copyright or any other law does not recognize such concept as "user rights". However, numerous exemptions and specific rules give users a bundle of rights to guarantee access to copyrighted information. These include for example the general "fair use" provision in the U.S. copyright law, specific private use, scientific use, educational use, interoperability research, citation and parody provisions in the copyright laws of various countries.

The Anti-circumvention Regulation. The anti-circumvention regulation has its own user exemptions starting from privacy, reverse engineering and encryption research. It is especially stated that anti-circumvention regulation should not shake the balance of users and authors defined in copyright law. Nevertheless, it should be noted that user rights assigned in copyright law do not directly apply to anti-circumvention regulation.

Contract Law. Lastly, contract law may include rules that protect end-users. For example in many countries there exist specific consumer protection rules. For instance, if DRM limits those rights user's are normally expected to have–like copying purchased music from CD to tape, so that it is possible to play it in different devices–products may be deemed "defective". It is of course not allowed to sell "defective" products to consumers.

As a whole, we are clearly heading towards a world where active DRM systems are capable of monitoring almost all uses of copyrighted works. Necessary technology to protect and monitor the users is soon widely available. However, we should not forget the user/consumer point of view. They ultimately keep the economy running. Users must feel they benefit from DRM limitations. Then again copyright holders should implement user rights support in their DRM systems and keep in mind that only a satisfied user is willing to pay without complaining. Even if the content is technologically protected, it will be circumvented if users have enough incentive to do it.

3.4 THE LEVELS OF RIGHTS MANAGEMENT

The rights management can be discussed on two levels: *organizational* and the *product* level. Both of the levels are closely related and they depend on each other. The rights management on the organizational levels includes at least all the activities that

- *Set and refine rights management policies.* An entity should define and continuously improve definite courses of action on how to manage its rights in information products as part of its intellectual asset management strategy.
- *Make and manage agreements.* Making agreements on rights in information products, and contract management related to those agreements is a part of rights management in organizational levels.
- *Manage information on acquired rights.* In most cases, at least some rights in information products are acquired from other entities. It is important to know whom those rights were received, how broad the rights are, how much and when the entity must pay for the rights, and so on.

- *Control and enforce licenses.* In most cases, reasonable business requires that a company licenses some rights to other entities. Therefore it is essential that a company is able to control what the others do with its products and enforce the license agreement if necessary.
- *Support marketing.* There will be lots of different business models and marketing methods involved in digital information. For that reason, rights management activities need to be flexible enough to support whatever marketing methods an entity decides to use. For instance, if an entity, for marketing purposes, wants to let other entities to use information for free for a certain period of time or a certain number of times, and thereafter charge an increasing fee for each usage, rights management activities should be able to support that.
- *Support revenue collection and sharing.* Especially for commercial entities, it is crucial to be able to collect revenues from the users of the information. Also, those entities need to be able to account and share revenues with other entities in accordance with agreements on acquired rights.
- *Risk management.* Risks involved in digital rights management are possible losses related to information in digital form. It is possible to manage those risks in advance in several ways.

The rights management in a product level includes product properties that support DRM activities in the organizational levels. Especially the following properties are often useful:

- Adequate information on policies, agreements and rights so that entities can be informed about their rights and responsibilities and policies and agreements can be enforced.
- Properties to enforce policies and license agreements.
- Revenue collection support.

An entity does not always have much influence on the rights it has. In many cases, however, an entity is in a position to determine what rights it wants to pursue. For instance, it may apply for a patent in Finland and hence gain the rights ascertained in Finnish patent law. An entity may also try to influence on legislation and change the law. The results, of course, are not available immediately. Nevertheless, not only legal rights affect rights management, but also rights management can have an effect on legal rights.

3.5 BUSINESS MODELS

The history knows many failed businesses based on DRM. For example, in 1980's many software companies tried out various copyright protection mechanisms but none of them, neither hardware nor software based solutions, proved successful enough to become a standard.

Digital video was the first media type on which a large-scale DRM system was implemented. The experience was not promising: ultimately the DivX standard died out in 1999. The main reasons for the failure were: the relatively high price, lack of real ownership of films, lateness to markets and the inadequate supply of popular movie titles. Disappointed users complained that the format offered no real quality or price advantage and they were all too wary of a Beta-VHS or Laserdisc repeat.

DVD format is another example of a mass-market DRM system for digital video. It managed to capture the critical mass perhaps because users did not have real alternatives. In 1999 the system was hacked by the developers of DeCSS and the hack is now widely disseminated. After litigation attempts, the content owners considered new DRM mechanisms. The content owners seem to have two problems, however. On the one hand, litigation is not possible anymore because the

user community is decentralized. On the other hand, introducing a new DRM system is difficult and costly because of the lock-in effect to current DRM technology that is installed in DVD-players.

To make the situation worse, some cryptography-experts like BRUCE SCHNEIER believe that it is not even possible to build a secure DRM system as long as general purpose PC is the main tool for information management. Software-based solutions will work against normal users, but advanced users will always be able to find cracks from the Internet, even if there is legislation that makes it illegal to publish such programs. Then again, hardware-based solutions are normally too difficult for even advanced users, but there is nothing that can stop professional pirates. The division between different user types is illustrated in table 3.1.

TABLE 3.1. USER CAPABILITIES AND DRM

Normal user	Advanced user	Professional pirate
Little technical knowledge Almost any protection scheme works	Good technical knowledge Software-based schemes do not work	Excellent technical knowledge Can eventually crack any protection

It should be noted that for a consumer product, most potential end-users belong to the first group, normal users. Advanced users form a minority and there are only a few professional pirates. Therefore almost any protection works for most end-users – unless advanced users or professional pirates are able to cannibalize markets by distributing cracked, unprotected versions of the product. For example, if 96 % of the users cannot circumvent protection, it can still make a reasonable business even if 4 % can use the product for free. However, if those 4 % can distribute the unprotected version of the product to the rest 96 % of users, the business collapses. It depends fundamentally on the product and the means of protection, how effective the protection needs to be – to be efficient in practice.

In addition, for a rational, capable, potential infringer, the question is that of cost/benefit: does the cost to circumvent the protection overcome the benefit of getting the information? For a less rational potential infringer, it is often the question of ability and bother: one is not capable or does not want to take the trouble to bypass the protection. Moral and psychological issues should not be ignored either. For many of us, the fact that something is protected means that it is not allowed to be accessed and that as such is a reason not to circumvent the protection but to respect the right holder's will whether legally grounded or not.

Even from the technical point of view, there are certain factors that suggest that the situation is not hopeless. In the future the relative share of handhelds with embedded software will most probably exceed the share of general purpose PCs. Consequently, users do not have unlimited access to their systems and therefore it might be possible to build a DRM system that is effective against normal and advanced user groups. There is still the problem that if customers have a choice, they do not necessarily want to buy products that do not offer as good functionality and usability as the equivalent non-DRM product. The only solution for this problem is that DRM systems must offer some added value to the users in order to compensate the lost functionality and usability.

Taken as a whole, DRM systems have long been expected to solve fundamental problems with rights management. So far content owners have focused on minimizing unauthorized use with DRM systems. This approach is negative from user point of view and it seems to be the very reason for failed and postponed application examples. Hence, one could suggest that one reason to all these failed examples is insufficient user requirement analysis.

3.6 PROBLEMS INVOLVED IN UTILIZING DRM TECHNOLOGIES

As explained earlier, one of the biggest non-technical problems with DRM is how to sell it to the consumers. Earlier experiments have shown that a DRM featured version of a product may be worse and more expensive for a consumer than its unprotected counterpart. Actually, some actions that have been generally allowed by copyright laws–like copying a product for personal use or reproducing a part of a product for educational purposes–can be prevented by using DRM technologies. This type of functionality may dramatically decrease the product's usability and the adaptation period longer.

In addition, DRM systems will put the industry in turmoil also for publishers and distributors. The future role of publishers is unclear, since in the digital world the main work is no longer producing and delivering physical products, or selecting the "white list" media to be introduced to wide audience. New metadata enhanced search engines can quickly find new media for eager consumers, which are no longer limited by the selection of their next block store. Already now digital products travel freely across the Internet, without any protections. Publishers have awakened to the reality too late. There is already a mass of digitized songs, movies and images available to anyone. Only a click of a mouse is needed. The publishers must be able to give an answer to the people who find out that they have lost some of those rights that they used to have.

3.7 CONCLUSIONS

Digital Rights Management (DRM) is an ambiguous term. It usually refers to the technical protection of copyrighted information. It may also refer to broader management issues: the set of actions, procedures, policies, product properties, and tools that an entity uses to manage its rights in information in digital form. We have used the broader definition in MobileIPR, although we admit that nowadays the narrower definition is prevailing.

In this report, we present some facts and opinions about the usefulness of digital rights management, but the underlying assumption however is that it depends on the situation and on the entities whether DRM is needed or not and what kind of DRM should be used. Strong legal rights and their strict enforcement is not usually the best solution nor is the situation in which no legal rights can be applied to information products. Also, technological solutions alone can hardly solve all the problems that information technology has caused. Anyone who wishes to do business that is related to information products should consider risks related to rights management. Then again, of course, it depends on the business model and strategy how much one wants to invest in managing those risks.

4 BUILDING A DRM SYSTEM: THE NONIUS SOFTWARE PROJECT

The challenges of DRM systems have been extensively researched during the MobileIPR project. Therefore, demonstrating how these systems actually work was one part of the project. The demo (Nonius project) was built in co-operation with the University of Technology. Before we explain the Nonius project in more detail, we take a look at the various possibilities to implement DRM systems in general.

4.1 DRM TECHNOLOGIES

Rights management is performed with the help of technical tools (see figure 4.1.). In general, these tools can be divided into three categories: 1) Rights definition languages, 2) Technical protection systems and 3) Rights management systems in organizational levels.

Rights definition languages are meant to describe the rights involved in a specific product in a detailed manner so that all entities involved can act accordingly. For example, using a rights definition language, an entity can state that it gives another entity a non-exclusive license to complete specific operations on particular information certain amount of times in a specified period of time if the other entity pays certain fees. Such information is adequately included in the rights description part of information product's metadata.

It is quite demanding to define a formal language that can be used to correctly express all the necessary rights in different jurisdictions. There is some interesting work going on for defining such a language. Notably, eXtensible rights Markup Language (XrML) is a quite promising attempt. Another emerging example is Open Digital Rights Language (ODRL) developed by IPR Systems Pty Ltd. These languages are discussed more in detail below.

In addition to rights definition language, entities need a common understanding how to transfer data from one entity to another. One of the most important requirements on the DRM technical tools is that they are interoperable enough in a network environment. Therefore, at least a defined set of communication protocols is required.

Technical protection systems are mostly used in product level and are meant to assist product level rights management. Examples include software tools for authentication, access control, integrity and watermarking. In most cases, encryption is an essential part of these tools. Many technical protection systems need hardware support. In practice, it is not even possible to make a perfect copy protection system without hardware support. However, the best solution, a globally tamperproof hardware, is not easy to develop and standardize. Still, there exist several projects, which try to reach this goal.

Technical tools to protect certain information products gain special legal protection based on Articles 11 and 12 of the WIPO Copyright Treaty. According to those articles many countries have provided legal protection against the circumvention of technological measures that are used to protect copyrights as well as against those who remove or alter rights management information without authority. Yet, there are unsolved questions concerning the legal status of technical protection systems.

Rights management systems in organizational levels are used to support activities in organizational levels. A trivial example is an information management system for managing information on acquired rights and license agreements.
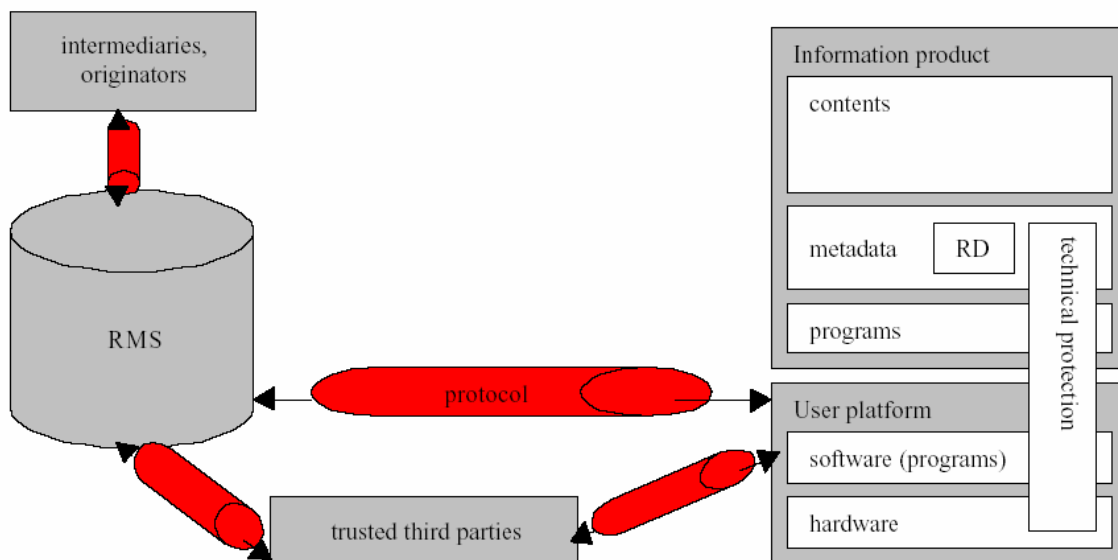
FIGURE 4.1. TECHNICAL TOOLS IN DIGITAL RIGHTS MANAGEMENT

4.1.1 RIGHTS EXPRESSION LANGUAGE (REL)

A Rights Expression Language (REL) provides the syntax and grammar needed to specify rights on how digital content may be distributed or used. It allows a publisher to designate a detailed set of usage controls. For instance, the REL is able to control the number of times text can be read, can set timed controls governing access and can manage complex relationships between distribution, sale and lending.

On the other hand, a rights expression language does not have the enforcement ability by itself. To gain that capability the REL must be used in a context of a system. Since the rights can include distribution of protected works from one party to another in the form of sales or lending, the system must encompass all parties and all means of interaction. The system that offers security from end to end is called a "trusted system". The development of trusted systems has occupied the attention of computer scientists and companies for quite some time. Although there is probably sufficient theory to understand how they should work, creating trusted systems that actually work and are widely accepted in business is another matter.

As discussed earlier, the main challenges concerning digital rights are essentially political and cultural. Only a few of the challenges are technical, such as finding a standard method for describing exactly what rights are conveyed, for what price and under what restrictions, or how to implement a secure crypto processor. Previous efforts to address these challenges with proprietary schemes have been discarded without general acceptance. Why, one of the reasons could be that a widespread DRM system would give to a single controlling company a vast power on the e-commerce market. What seems likely to work in the long haul is a rights expression language that's rich enough, simple enough and open enough to satisfy all parties in this turbulent industry.

The two most prominent emerging RELs for common standards are Extensible Rights Markup Language (XrML) from ContentGuard, Inc.[128] and Open Digital Rights Language (ODRL) from IPR Systems Ltd[129] The growth engine for XrML is Microsoft that has incorporated either the

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[128] See http://www.xrml.org/.

[129] See http://www.odrl.net/.

full language or a subset of the language in all of its DRM solutions, including Media Rights Manager for Windows Media Format (audio and video) and Windows Rights Management Services for Windows Server 2003. Another big name that has licensed XrML is Sony, but the consumer electronics giant has yet to implement any technology based on XrML.

Meanwhile, ODRL is the selection created by Open Mobile Alliance (OMA)[130], headed by Nokia. Nokia has already released an SDK for implementing OMA compatible download applications with DRM, and it has implemented the spec in its 3595 phone. ODRL is also supported in an open-source DRM package for the emerging MPEG-4 multimedia format called OpenIPMP. When comparing the languages, ODRL has the advantage of being more concise, meaning that rights descriptions in ODRL tend to be more compact than their equivalents in XrML and that ODRL interpreters can be smaller (in memory footprint) than XrML interpreters. The latter factor is especially important in the mobile device space, where memory is at a premium. Research group Datamonitor predicts the market for digital content over mobile phones will reach 38 billion dollars in three years. ODRL also has some media-specific constructs that XrML does not share, including the ability to specify attributes of media objects such as file formats, resolutions and encoding rates.

4.1.2 OPEN DIGITAL RIGHTS LANGUAGE (ODRL)

The Open Digital Rights Language (ODRL) Initiative is an international effort to develop an open standard for the Digital Rights Management sector. The ODRL is a proposed language for the DRM community for the standardization of expressing rights information over content. The ODRL is intended to provide flexible and interoperable mechanisms to support transparent and innovative use of digital resources in publishing, distributing and consuming of electronic publications, digital images, audio and movies, learning objects, computer software and other creations in digital form. The ODRL specification supports an extensible language and vocabulary (data dictionary) for the expression of terms and conditions over any content including permissions, constraints, obligations, conditions, and offers and agreements with rights holders. The ODRL provides the semantics for DRM expressions in open and trusted environments whilst being agnostic to mechanisms to achieve the secure architectures and it has no license requirements and is available in the spirit of "open source" software.[131]

4.2 THE NONIUS PROJECT

The University of Technology arranges a "Software Project" course for its students every year. The course lasts for two semesters. During this five-credit course, students work through a major software project in groups of seven. Each project comprises all typical software design and implementation phases, such as requirements analysis, conceptual and detailed design, coding, testing, documentation, and delivery to the customer. The course emphasizes well-planned and well-implemented software engineering methods, project management, team management and system documentation.[132]

HIIT's MobileIPR project[133] was one of the institutional stakeholders proposing a software project topic (Nonius) and acting as a customer on the course. The aim of this type of co-operation is to provide the students interesting, real-life projects in connection with educational purposes. Actually, acting as a customer on the course can be seen as a good opportunity for

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[130] See http://www.openmobilealliance.org/.

[131] ODRL, *The Open Digital Rights Initiative*, Available online: http://www.odrl.net/.

[132] The detailed description of the course is available online at http://www.soberit.hut.fi/T-76.115/.

[133] More information about the MobileIPR project is available online at http://www.hiit.fi/de/mobileipr/.

various research projects in order to implement some of their research results to practice. Even though, educational requirements are part of the software projects budget, the customer gets the software in the end. The software is coded and tested during the project. This happened in the Nonius project as well. The project produced a working demo with 4114 lines of code.

The Nonius project was aimed to produce one possible implementation of a DRM system. The implementation base for the Nonius project was the X-Smiles XML browser[134]. The DRM system was integrated into the browser with ODRL right expression language.

4.2.1 THE GOALS OF THE NONIUS PROJECT

The main goals of the Nonius project were to produce a working and interesting demo as an extension to theoretical research, to implement some limited functionalities of real DRM systems and to document difficulties rising along the development work of the DRM system.

The produced demo system, a DRM extension to X-Smiles XML browser named DRMTool, responded well to the set goals. It was able to demonstrate how digital content can be distributed by using DRM technologies. The selected technologies were standards like ODRL and XML languages. The documentation was academically interesting and resulted the "Nonius: Implementing a DRM Sysytem" report published as apart of the HIIT Technical Reports series, number 2002-3 ISSN 1458-9451, as well as a pile of working documents.

4.2.2 THE OVERVIEW OF THE DRMTOOL

As mentioned earlier the DRMTool was built on top of the X-Smiles, which is a Java based XML browser. The X-Smiles is intended for both desktop use and embedded network devices and to support multimedia services. The main objective of X-Smiles is to deliver a pure Java XML browser, capable of displaying documents written in various XML languages. The main advantage of the X-Smiles browser is that it supports several XML related specifications and is still suitable for embedded devices supporting the Java environment. Another important characteristic of X-Smiles is that it should be suitable for small, embedded devices supporting Java.

In the Nonius project, the X-Smiles browser was used to view XML tagged digital content, which is protected by the means of the ODRL language. In fact, DRMTool used the subset of the ODRL language, because the whole language was too large to implement in the Nonius project.

For stimulating the hardware enforcement, the content cannot be viewed on the XML browser without the DRMTool plug-in. Hence the protected content is first forwarded to DRMTool, and then it accesses the local database for the file specific ODRL description file. The ODRL file expresses the rights the user has to the content. DRMTool acts according to the description or definition and, if so expressed, delivers the file for the viewing. The fourth and the final step was to update the ODRL description file on the database to reflect the viewing. This is important especially if the rights are charged on per view basis. One of the handicaps was that the system did not authenticate the user in any way. Hence, possible payment system needs to bring also this feature into the system. The overview of the DRMTool functionalities is illustrated in Figure 4.2.

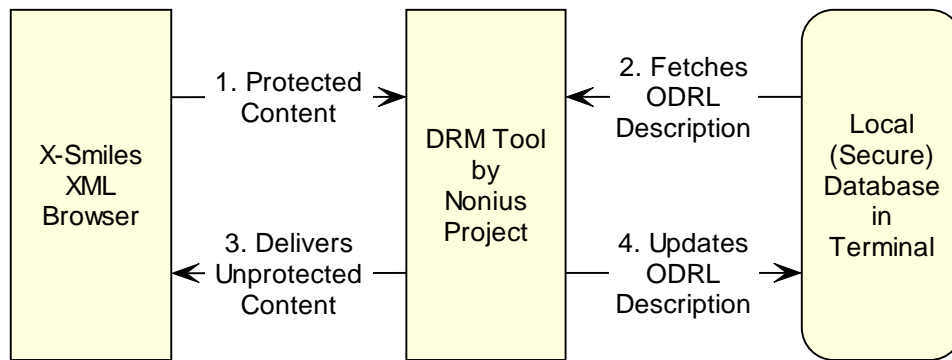
[134] See http://www.xsmiles.org/.

FIGURE 4.2. DRMTOOL FUNCTIONALITIES

Due to the nature of the project being an educational coursework and not a commercial software project and due to the limited coding and other resources, many issues were left outside the scope. One of the obvious bottlenecks was, however, the vulnerability of the unprotected local ODRL description database. When unprotected, it is rather easy to directly modify the content rights description files and pass the checks of the DRMTool. Generally, this is a well-known problem when making technically copy-protected digital content such as software. The history of software industry is full of failed attempts to produce DRM kinds of systems. The cracking of the DVD disc copy-protection is one of the most well-known examples.

The DRM system with the DRMTool includes two types of information: rights definition documents (ODRL descriptions) and content files. Each of the content files matches to a specific rights definition file, which tells the user's rights to the content file. The rights file in itself doesn't take account on how the content is shown or which player is used to view the content. However, in the Nonius project the viewer is the XML browser, so the content needs to be something this browser can handle.

Usually the user needs to buy the rights for the content, hence it is important to secure the rights file from abuse. The rights file is the tool for a publisher to implement various pricing models such as per chapter, page or song billing. It is also possible and needed in some cases to maintain and update the information on the rights file. For instance, the file may include a counter for numbering the viewing times. It also needs to consult with the system clock to know what date it is, if the billing is tied with the dates or to certain period of time.

4.3 CONCLUSIONS

Without exploiting DRM technologies for e-commerce, content publishers can lose a great deal of revenues due to piracy and illegal use in distributing content that is not technically protected. DRM enables content owners to embrace compelling new business models that provide publishers ways to match content distribution with consumer expectations and pricing models such as per chapter, page or song billing.

The key feature of managing rights digitally is the substantial increase in re-use of digital material on the Internet as well as the increased efficiency for physical material. The pervasive Internet is changing the nature of distribution of digital media from a passive one way flow from publisher to the end-user to a much more interactive cycle where creations are re-used, combined and extended *ad infinitum*. This trend can also be identified from a network technology point of view: instead of client-server networks, distributed networks and peer-to-peer networks are becoming more and more utilized.

At all stages, the rights need to be managed and honored with trusted services. Although DRM market is still undeveloped, current DRM technologies already include languages for describing the terms and conditions, tracking asset usages by enforcing controlled environments or encoded asset manifestations, and closed architectures for the overall management of rights. The challenge lies in establishing a wide enough and compatible system between different parties, through out the whole value network from content producer and publisher to content distributor and consumer[135].

The Nonius project succeeded in implementing a piece of software capable of demonstrating the most important DRM features. Many general technical problems were also discussed although most of them were left unanswered. Actually, some of the challenges found are common in many software development projects. For example how it is possible to make secure software when the source code is available to anyone and how secure should the system be, are common questions. More specific problem is the question of in which layer should DRM be supported: application software, operating system, audio devices or even further.

Hands-on work in the Nonius as part of the MobileIPR project raised many important issues involved in implementing a DRM system. For example when selling certificates the question is, how to respond when customer loses the bought and downloaded user rights certificate or if DRM is carried out on an operating system level, how to make sure the compatibility issues between operating systems. Yet, the project found that merging different certificates into one and implementing an interface for creating certificates are among the most challenging tasks when implementing a DRM system.

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[135] ODRL, *The Open Digital Rights Language Initiative*, Available online : http://www.odrl.net/.

5 POLITICAL ASPECTS OF DIGITAL RIGHTS MANAGEMENT AND INTELLECTUAL PROPERTY RIGHTS IN GENERAL

In this section we take a brief look at the political aspects of digital rights management. This was one of the research areas in MobileIPR.

In the first part of this chapter, we apply the theory of advocacy networks to the anti-DRM movement. In the second part we make use of the public rent-seeking concept used in economics and apply it to the decision process pertaining the harmonization of IPRs in the European Union.

5.1 TRANSNATIONAL ADVOCACY NETWORKS OPPOSING DIGITAL RIGHTS MANAGEMENT

5.1.1 INTRODUCTION

To this day, every DRM system with economic significance has been cracked. Especially DRM systems without dedicated hardware have been vulnerable. Nevertheless, the argument that DRM systems and electronic commerce in general require supportive legislation has been often presented. Actually, there has been recent legislative development in this sector. Two major legislative acts that outlaw circumvention tools and also circumvention itself to some extent are Digital Millennium Copyright Act (DMCA) in the United States and the EU copyright directive (EUCD) within the European Union. They are both based on the international WIPO Copyright Treaty signed in 1996.

There is little if no evidence that the new legislation actually affects on the business of media companies. Instead, a resourceful and uncontrollable DRM opposition network has been developed. This network receives at least some support from the general public.

Global advocacy networks use methods, which are in many ways similar to guerrillas: disrupted indoctrinated organization attacks on exposed targets, where the defence is at its weakest[136]. They use different tools ranging from presenting claims in court to distributing circumvention tools on the Internet. The network also relies on more traditional activist methods such as leaflets and demonstrations for attracting media attention.

5.1.2 ADVOCACY NETWORKS IN GENERAL

It is not easy to describe the organizations that are behind the work against DRM-systems. There is no single coordinating association or people in control. Instead, the organization is task based. Ad hoc groups dedicated to a certain task interact with each other until the work is done. After this the contacts between various groups fade away. Modern communication technology is the breeding ground for this kind loosely connected grass roots activism: anonymous gatherings may be arranged with no time or place constraints in mailing lists and chat rooms.

Still, there are also more parties taking part in the opposition. Especially the academia has been notoriously active in the United States. In addition, certain companies have increasingly teamed up with DRM-opposition to protect their commercial interests. There exists a few organizations specialized in this area. Figure 5.1 illustrates the current situation.

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[136] Tse-Tung, M., *On Guerrilla Warfare*, 1961, translated by Samuel B. Griffith III, University of Illinois Press.

Organizations
Lobbying, fund-rising,
arranging legal defence

Media
Spreading
informati
on

Hackers
Technical tasks

Grass
roots
Pickets,
contagious
information

Academical
Research

Corporations
Funding, lobbying

Anti-Globalization
Movement
Not yet active

Developing
Countries
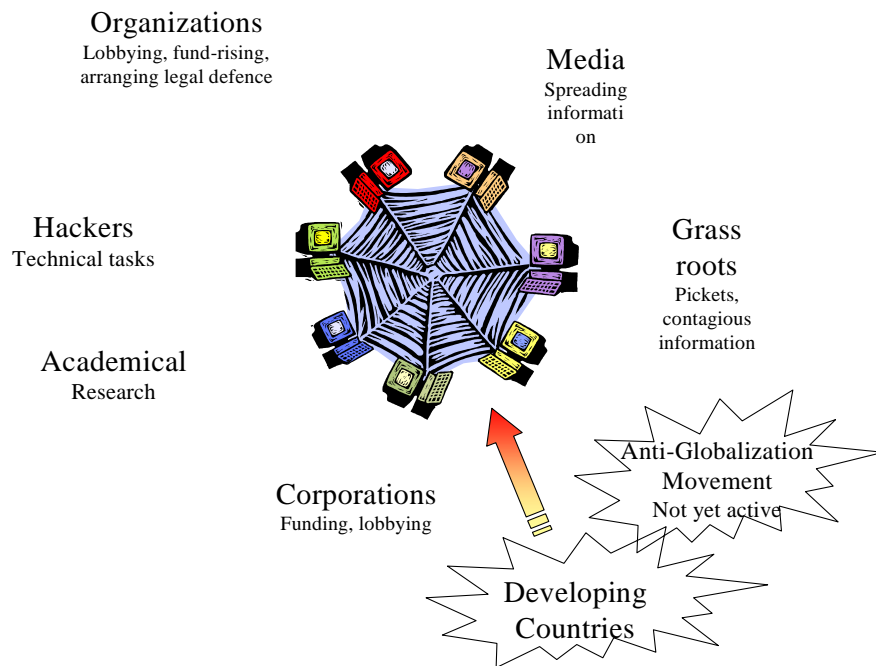
FIGURE 5.1. DRM OPPOSITION GROUPS

KECK and SIKKINK have developed a theoretical basis in their book "*Activists Beyond Borders*" (1998) for somewhat loosely connected groups sharing certain common goals. They call them transnational advocacy networks. KECK and SIKKINK go through three modern versions of this kind of network: *human rights advocacy network in Latin Africa*, *Environmental advocacy networks* and *networks on violence against women*. All of these networks function in a similar way to the anti-DRM movement (although mostly without the Internet).

5.1.3 NON-GOVERNMENTAL ORGANIZATIONS

The organizations working against DRM can be classified under two categories:
  1) Organizations founded for electronic civil liberties, and
  2) Organizations with more diverse goals.

For example in the U.S., Electronic Frontier Foundation[137] belongs to first category while Free Software Foundation[138] belongs to the second. These two organizations are currently the most visible ones. Of course, these organizations are not alone. In Europe various national groups from civil liberties organizations to different library associations and members of the academia have also participated in the DRM opposition.

The Electronic Frontier Foundation. The Electronic Frontier Foundation (EFF) is without a question the most visible cyber-rights-organization. EFF was founded in 1990 as a response to a threat to bulletin board systems. Bulletin board system is an electronic mailing system that existed before the Internet era. MITCH KAPOR, JOHN PERRY BARLOW, and JOHN GILMORE formed the organization to work on civil liberties issues raised by new technologies.[139]

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[137] See http://www.eff.org/.

[138] See http://www.fsf.org/.

[139] Electronic Frontier Foundation, *About EFF*, available online: http://www.eff.org/abouteff.html/.

EFF is currently involved in all major DRM-related court cases in the U.S.[140] EFF has also an experienced and capable legal team, although it has not brought too much success in DRM-arena. EFF has close relationship to certain law faculties in the U.S. universities. The most recent outcome of university cooperation is the Chilling Effects Clearinghouse[141], which is a joint project of the Electronic Frontier Foundation and Harvard, Stanford, Berkeley, and University of San Francisco law school clinics.

EFF is not totally against copyright and in so far recognizes the need to compensate authors. EFF still opposes categorically digital rights management and the laws, which back it up. Their argument is that DRM systems cannot ever accommodate the full range of fair use and consequently the public is better off without DRM even if it means that there will be some unauthorized copying[142].

Free Software Foundation. Free Software Foundation (FSF) is best known for its GNU-products and GPL-license. The organization is, however, also opposing DRM systems. The priority has been given to questions related to software, but the organization has supported drafting GNU-compatible content distribution terms as well. FSF's attitudes are in many cases more radical to those of the EFFs. The organization's chairman and main ideologist Richard M. Stallman frequently speaks about the fears of expanding copyright law.[143] Mr. Stallman believes that the society would function well without copyright, but a very limited protection against commercial use might be acceptable[144].

FSF's role in opposing DRM-systems has been two-fold: Firstly, the organization has been using its' communication channels in order to spread information about different anti-DRM-related events, and it has built a network of activists within the U.S.[145] Secondly, the FSF supports software projects, which aim at DRM-free standards. For example, they helped in creating Ogg Vorbis -audio format, which does not support any DRM-systems and is free from copyright or patent claims.[146]

5.1.4 SITUATION IN EUROPE

DRM-opposition in Europe is more unorganized and low profile than the one in the U.S. With relation to recent discussions in international politics this is understandable as the U.S. participants seem to push problems to be solved while Europeans emphasize due process and open discussions[147]. Also practical issues such as language barriers and cultural differences explain why there are no strong European-wide formal opposition organizations.

As recently as in June 2002 some of the most active electronic civil liberties organizations from seven different countries within the European Union founded, however, a common organization

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[140]Electronic Frontier Foundation, *Active EFF Legal Cases and Efforts,* Available online: http://www.eff.org/Legal/active_legal.html.

[141] See http://www.chillingeffects.org/.

[142] Lohman, F., *Fair Use and Digital Rights Management*, 2002, Available online: http://www.eff.org/IP/DRM/fair_use_and_drm.html.

[143] Gnu Project, *GNU and Free Software Speakers*, Available online: http://www.gnu.org/people/speakers.html

[144] Stallman, R., 2001, *Science must 'push copyright aside'*, 2001, Available online: http://www.nature.com/nature/debates/e-access/Articles/stallman.html.

[145] *The Digital Speech Project*, Available online: http://www.digitalspeech.org/.

[146] *OggVorbis: open, free audio*, Available online: http://www.vorbis.com/.

[147] Kagan, R., *Power and Weakness,* Policy Review, 2002, Available online: http://www.policyreview.org/JUN02/kagan.html.

titled *European Digital Rights* (EDRi). This organization is supposed to coordinate also European-wide DRM-opposing activities.

On the national level the picture is mixed. A few countries have very active organizations while many have none. The main national organizations presented here are *the Campaign for Digital Rights* (Great Britain)[148], *Electronisk Forpost Norge* (Norway) and *Electronic Frontier Finland*[149].

The Campaign for Digital Rights was formed with the DIMITRY SKLYAROV case in fall 2001 but it soon expanded to cover also other DRM-related questions. The group has decided that it does not want to form any formal legal entity because that would make it an easy target for legal attacks. The group has been featured in The Economist, Financial Times, Wired, New Scientist and also BBC's Newsnight program. The number of active participants has never exceeded fifty. The campaigning is coordinated with a mailing list and chat room meetings.

Electronisk Forpost Norge and Electronic Frontier Finland are both inspired by the model of the EFF. They are well featured in the national media. Both organizations have for example opposed the DRM regulation in connection with the national implementations of EU Copyright Directive.

5.1.5 MEDIA

Media support is essential in order to reach the decision makers. As CASTELLS points out, political decision makers must to a large extent act according to the rules stated by the "public opinion". This is then again created by the mainstream media. However, while media support is essential, it is not enough to guarantee desired political actions.[150] Therefore, grassroots activism does not exclude media politics but rather depends on it. For example court cases and related activism with individual DRM-victims (Dmitry Sklyarov, Jon Johansen) have created a momentum for new activist networks to enter and leverage media politics.

The most important news-source for transnational advocacy networks opposing DRM has been website Slashdot[151]. The site was founded in 1998 and it quickly became the central news-source and discussion area for technically orientated people who are also interested in the social and political implications of technological development. Slashdot does not only offer a channel for communication but also pushes a pro-civil liberties and anti-DRM in its editorial line. The site has covered all DRM-related court cases extensively and it has been a first hand reference in those cases. Other important news-sources have been for example Wired magazine and website TheRegister in Europe.

5.1.6 ACADEMIC OPPOSITION

The opposition to DRM has a strong support inside academia especially in the U.S. Arguably DRM poses a threat to the classical academic values like free exchange of information[152]. Another problem is that new DRM regulations (DMCA, EUCD) have created a sphere of legal uncertainty around certain research areas like cryptography and steganographia.

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[148] See http://uk.eurorights.org/.

[149] See http://www.effi.org/.

[150] Castells, M., *The Power of Identity*, Blackwell Publishers, 1997.

[151] See http://www.slashdot.org/.

[152] Stallman, R., *Science must 'push copyright aside',* 2001, Available online: http://www.nature.com/nature/debates/e-access/Articles/stallman.html.

The epicentre of academic activism can be found from the University of California at Berkeley and Stanford University. Both universities have a law faculty with charismatic and publicly known professors such as PAMELA SAMUELSON (Berkeley) and LAWRENCE LESSIG (Stanford). Both universities are also known for their information economics research and for their advanced computer science departments, which have strong connections to Silicon Valley. Also Harvard has been an active participant mainly because of the Berkman Center for Internet & Society. The center has helped the co-ordination of anti-DRM-court cases with its OpenLaw-project.[153]

The academic activism is not limited to the U.S. Also European scholars are active in the field. For example, ROSS ANDERSON, Professor of Computer Science in Cambridge, has published critical FAQs and online memos about the Microsoft's Palladium system and the creation of Trusted Computing Platform Alliance. Both of these projects aim at creating a truly secure DRM.[154] The summary of the academic opposition in the U.S. is presented in the table 5.1 below.

TABLE 5.1. THE ACADEMIC OPPOSITION IN THE U.S.

University	University of Berkeley	Stanford University	Harvard University
Administrative organization	Samuelson Law, Technology and Public policy Clinic	Stanford Center for Internet and Society	The Berkman Center for Internet and Society
Most visible person	Pamela Samuelson	Lawrence Lessig	Wendy Seltzer
Projects	Chilling Effects, Clearing House	Creative Commons, Chilling Effects, Clearing House	OpenLaw, Chilling Effects, Clearing House

5.1.7 HACKERS

It is not surprising that hackers have been in the frontline attacking DRM-systems. LEVY describes in his book Hackers (1984) the attitudes of hackers towards the locking of information: *"To a hacker a closed door is an insult, and locked door an outrage. Just as information should be clearly and elegantly transported within computer, and just as software should be freely disseminated, hackers believe people should be allowed access the files or tools which might promote the hacker quest to find out and improve the way the world works."[155]*

A typical DRM-system is therefore by its nature a challenge to hackers. In spite of the new regulations, many hackers prefer their own ideology to society's norms. This group will continue to break DRM-systems even if the side-effect is to break the law. While hackers do not work in formal organizations, the hacker movement has become more politically active during the recent years[156].

Hackers do not only break DRM-systems but also knowingly produce tools, which prevent any type of censorship to counter the threat these systems pose to the free flow of information. The

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[153] See http://eon.law.harvard.edu/openlaw/.

[154] Anderson, R*., TCPA / Palladium Frequently Asked Questions*, 2002, Available online: http://www.cl.cam.ac.uk/~rja14/tcpa-faq.html.

[155] Levy, S., *Hackers, Heroes of the Computer Revolution,* Doubleday Press, New York, 1984.

[156] See Thomas, D., *Hacker Culture*, University of Minnesota Press, Minneapolis, 2002.

hackers call this for of activism "hacktivism".[157] Because of their technical skills, hackers form a very powerful force inside the anti-DRM movement.

5.1.8 GRASS ROOTS ACTIVISM

Grass roots activism is central to any campaign work. Its role within the anti-DRM advocacy networks has also been significant. These activists are extremely important because only they are able to reach the non-technical general public and explain the relatively difficult issues. Grass roots activism is organized in a cheap and efficient way via Internet communications.

Although grass roots activism is to a large extent invisible, actions in public are carried out from time to time. For example in the Dmitry Sklyarov case, the pickets, which forced Adobe to back down were mainly arranged by these activists. Actually, EFF even tried to suppress these pickets because it wanted to negotiate with the Adobe first.[158]

5.1.9 COMPANIES

Corporate support has lately become more and more important in the anti-DRM-movement. The fight between Silicon Valley and Hollywood has heated after the movie studios launched a new attack in order to pass legislation, which would mandate DRM in all digital devices[159].

Even though there is only a small likelihood that this bill currently titled as Consumer Broadband and Digital Television Promotion Act will ever pass, it presents a severe risk to the consumer electronic manufacturers. It has also been argued that the media companies' motive behind the proposed legislation is to get a better negotiation position in different standardization processes. The Broadcast Protection Discussion Group[160], which will decide the future of digital TV, is one of these standardization forums.

The support to the anti-DRM movement from technology companies is, however, only partial. For example Philips has on the one hand taken a stance not to use DRM in compact discs. Philips also sells a CD-player, which can copy these copy-protected CDs. On the other hand the company is at the same time using its patents to block the import of DRM-free DVD-player into Europe.

5.1.10 ANTI-GLOBALISATION MOVEMENT

Finally, the anti-globalisation movement is a potential network for anti-DRM activities. For example, KLEIN covers briefly intellectual property rights in her book *"No Logo"*. This book is considered as the bible of anti-globalisation movement.[161] To be sure, she makes many errors in her presentation (like mixing copyright, trademarks and libel-suits). It is also clear that she did not consider them to be a serious threat at that time. However, the anti-globalisation movement was already fighting against drug-patents, which pose more direct problems for developing countries than copyright or digital rights management.

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[157] Flagan, A., *H2K2 - Hope (Hackers on Planet Earth),* 2002, Available online: http://hacktivism.ca/article.pl?sid=02/07/27/0920209&mode=thread.

[158] Slashdot, *EFF gets meeting with Adobe,* Available online: http://slashdot.org/article.pl?sid=01/07/20/2045220&mode=nested&tid=123

[159] Clark D. and Vaida B., *Hollywood vs. Silicon Valley*, National Journal's Technology Daily, 2002, Available online: http://nationaljournal.com/members/news/2002/09/0906nj1.htm.

[160] See http://www.cptwg.org/Assets/BPDG/home%20page.htm.

[161] Klein, N., *No Logo*, Flamingo, London, 2000.

An open question is, whether the activists taking part into the anti-globalisation networks will also start paying more attention to DRM-related issues. If this happens, it would potentially cause a much more serious risk to the future of DRM than all the other grass root activities together. Actually, some evidence of this could already be seen in the World Summit on the Information Society (WSIS)[162]. During this occasion the cyber rights activists worked closely together with the anti-globalisation activists.[163]

The anti-DRM network has so far been cautious of getting the anti-globalisation movement more involved. The reason is that after the violent riots in Seattle, Gothenburg and Milan the anti-globalisation movement is facing image problems.[164] In addition, a typical anti-DRM-activist, especially from Silicon Valley, scorns on the leftist rhetoric typically used in anti-globalisation movement[165]. Nevertheless, there have been occasional attempts to get support from the anti-globalisation movement, but without notable results[166].

5.1.11 DEVELOPING COUNTRIES

The developing countries will most likely become an ally for the anti-DRM movement. China, India and especially Brazil have been very aggressive in recent international treaty processes. They want to protect their national interests, which currently do not favour strong intellectual property rights.

5.1.12 DRM CASES WITH ACTIVIST REACTION

Next, we turn to six case studies. In these cases media companies have experimented with different strategies against DRM circumvention initiated and endorsed by transnational advocacy networks.

The typical process behind the creation and distribution of a circumvention tool is described in figure 5.2. The time-span of the process can be anything from days to months. In most cases, the process ends to the mirroring phase. This is because the media company does not have resources to start a legal fight. In addition, the DRM-systems do not have a global legal protection and therefore the DRM-vendor is more or less armless if the information is located in a country, which has not yet ratified the WIPO copyright treaty.

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162 See www.itu.int/wsis/.

163 See http://geneva03.org/.

164 Pickett, N. (neale@woozle.org). 03 Jan, 2002, [free-sklyarov] Re: WTO and Sklyarov/Adobe/DMCA, E-mail to free-sklyarov@zork.net.

165 Borsook, P., *Cyberselfish, PublicAffairs,* New York, 2000.

166 Hervold, K. (kieran@digitalflock.org). 03 Jan, 2002, [free-sklyarov] call out for reinforcements?, E-mail to free-sklyarov@zork.net.
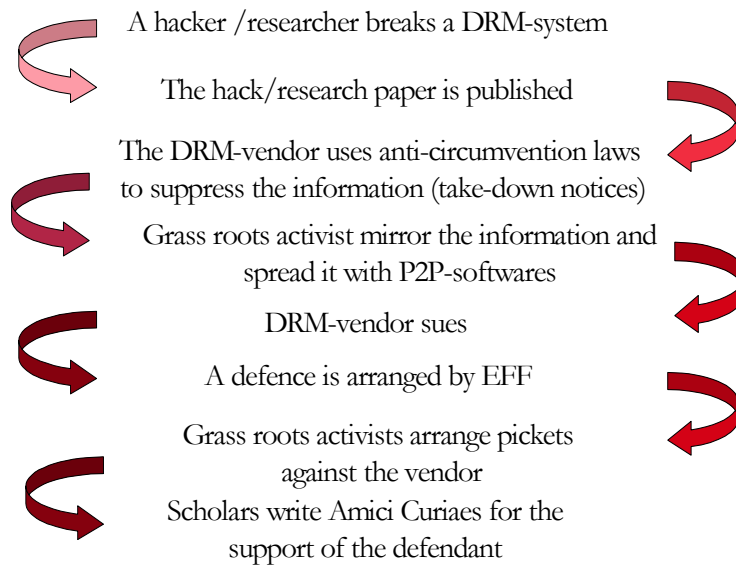
A hacker /researcher breaks a DRM-system

The hack/research paper is published

The DRM-vendor uses anti-circumvention laws
to suppress the information (take-down notices)

Grass roots activist mirror the information and
spread it with P2P-softwares

DRM-vendor sues

A defence is arranged by EFF

Grass roots activists arrange pickets
against the vendor

Scholars write Amici Curiaes for the
support of the defendant

FIGURE 5.2. THE CIRCUMVENTION TOOL CREATION AND DISTRIBUTION PROCESS

DeCSS cases. It is unknown who exactly was the first to break the CSS scrambling algorithm, used as part of the DRM system in DVD-decoders. Nevertheless, it is Jon Johansen, who is often (wrongly) referred as the first "cracker". He released the source code to the Linux developer community in the middle of October 1999. Later the analysis of the CSS algorithm revealed serious weaknesses, which made it possible that CSS could be defeated without a player key using only few lines of code[167].

The advocates of media companies DVD-CCA and the MPAA began sending threatening letters to the owners of websites offering CSS decryption programs for download. The letters were sent indiscriminately around the world, although-at that time-the U.S. was the only country that had legislation prohibiting the circumvention of DRM-systems.

In the weeks following the release of DeCSS, hundreds of websites, FTP sites and even email mirrors that published the code appeared around the world. Some of these sites did this merely for protesting reasons. Actually, some of these distribution points were established for reaching a single goal –to spread the program as widely as possible. The theory was that even if a handful of individuals is forced to remove the code, there are far too many mirrors in far too many jurisdictions to ever force DeCSS technology out of circulation. This strategy was generally known as the "Whack the Mole" strategy[168].

When it became apparent that threatening letters did not help, the media companies decided to start legal actions against the web sites offering the DeCSS code. The first case was filed in California and was based on trade secret law. The second, more cautiously prepared suit was filed in New York and it relied on the DMCA.

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[167] Touretzky, D. S., *Gallery of CSS Descramblers*, 2000, Available online:
http://www.cs.cmu.edu/~dst/DeCSS/Gallery.

[168] Seng, L. (loke.kar.seng@busit.monash.edu.my), *[myoss] whack the mole*, 28 Jan 2000, E-mail to myoss@my-opensource.org.

Electronic Frontier Foundation arranged the defence in both cases. The second case ended recently, because the defendant and the EFF decided that they are not going to appeal to the Supreme Court.[169] The first case is still pending.

TABLE 5.2. DeCSS CASES IN THE U.S.

Case	Legal basis	Case Started	Plaintiff	Defendant	Current State
CA DVD Case	Trade Secret Law	27.12.1999	DVD-CCA	521 Individuals	Pending in the California Supreme Court
NY DVD Case	DMCA	14.1.2000	MPAA	Eric Corley/ 2600 Magazine	Defendant lost the appeal in 2nd Circuit Court of Appeals

Jon Johansen case. The Norwegian government indicted Jon Johansen–who was 15 years old at the time–for his role in creating DeCSS-software. Johansen's indictment occurred in the beginning of 2002 more than two years after the Motion Picture Association of America (MPAA) initially contacted ØKOKRIM prosecutors to request a criminal investigation of the Norwegian and his father, Per Johansen, who owned the equipment on which the DeCSS software was posted. The case was based on Norwegian Criminal Code section 145(2), which outlaws breaking into another person's locked property in order to gain access to data that one is not entitled to access. Johansen won his case in both lower and appeal court. The ØKOKRIM did not appeal to the Supreme Court[170].

Adobe eBook case. The case against Russian Dmitry Sklyarov and his employer ElcomSoft was the first case where the criminal provisions of DMCA were applied. What Sklyarov did was that he helped to create the Advanced eBook Processor software for his Russian employer ElcomSoft. The software permitted eBook owners to translate Adobe's secure eBook format to a more common, Portable Document Format.

Sklyarov was initially arrested in Las Vegas and charged with distributing a product designed to circumvent copyright protection measures. He was released on $50.000 bail and restricted to California. However, in December 2001, he was permitted to return home to Russia in exchange for his testimony. The U.S. government lost its case against ElcomSoft after a jury trial.

Sklyarov's case received large attention among hackers and also among the general public. Instead of suing a company or a journalist, the FBI attacked an individual who was "just" an ordinary programmer. Suddenly the threat felt very real to anyone dealing with computers and programming. This motivated people to act.

The process was also followed very closely by the DRM opposition. They arranged a wide range of activities around the world to support Dmitry. These activities involved for example a highly published picket outside the U.S. London embassy.[171] Eventually, the organized outcry forced Adobe to publicly withdraw its support for the case.

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[169] EFF Media Release, *2600 Magazine won't seek Supreme Court review in DVD Case*, July 3, 2002, Available online: http://www.eff.org/IP/Video/MPAA_DVD_cases/20020703_eff_2600_pr.html.

[170] Electronic Frontier Norway, Available online: http://www.efn.no.

[171] See http://www.freesklyarov.org.

Microsoft Media Player. It is interesting to compare the approach Adobe took after eBook-hack to what Microsoft did after their Windows Media Audio file format (.wma file) as implemented in Windows Media Player was hacked. Instead of trying to suppress the information, Microsoft just let the discussion die. They will most likely just update the DRM-system sometime in the future without making any noise about it. The hack was originally posted to the newsgroup sci.crypto with a long manifesto why DRM-systems are harmful. This was done by an anonymous poster calling himself/herself Beale Screamer.[172]

Sony AIBO. The AIBO-case has some unique characteristics as well. First of all Sony was trying to use the anti-circumvention provisions of DMCA to stop consumers hacking their AIBO robot dogs. Second, in this case, the grass roots support forced Sony to back down.

The case started when Sony sent a letter to the anonymous owner of Aibopet.com warning that the information available on this web site contravened both copyright and the U.S. Digital Millennium Copyright Act by enabling the circumvention of the encryption guarding the code stored in memory sticks. As a result, the site owner removed the contested material from the site excluding links to other sites that organized protests against Sony.

The case was covered in popular media including the New Scientist, Los Angeles Times, Wired, ZDNet and Slashdot. Apparently Sony realized at this point that it was alienating its' most fanatical customers and made a deal with the owner of Aibopet.com, allowing him to continue his work.

5.1.13 THE THEORY OF ADVOCACY NETWORKS APPLIED TO THE ANTI-DRM MOVEMENT

KECK and SIKKINK measure the success of the networks with the five stages of effectiveness:
    (1) issue attention, agenda setting, and information generation;
    (2) discursive change, or establishing prescriptive status of norms;
    (3) procedural changes, such as treaty ratification or cooperation within international organization;
    (4) changes in policies; and
    (5) influence on behaviour of state and non-state actors.[173]

The transnational advocacy network opposing DRM systems covers at most the stage one and two. The network has succeeded in obtaining the attention of mainstream media. It has set a clear agenda: DRM is intolerable since it makes fair use impossible and results in unfair and unstable social conditions. The network has also been very effective in collecting and sharing information. It has, to a large part, succeeded in changing the language used in the media. To give an example, the term private copying is nowadays used more often in the media instead of the word stealing.

The network has not yet been fully integrated in the democratic legislation processes, and its impact can be best characterized as unorganized. It has not, for example, influenced the drafting of international treaties like the WIPO Copyright Treaty. In those European countries where the network has "active nodes", it has, however, affected the national implementation processes of the Directives.

As can be seen from table 5.3, the network can easily defy legal measures against DRM-hacks. This can partly be explained by the economics of copying on the Internet. The costs of adding a mirror to another jurisdiction is minimal compared to the cost of starting litigation or

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[172] See http://web.elastic.org/~fche/mirrors/cryptome.org/beale-sci-crypt.htm.

[173] Keck, M. and Sikkink, K., *Activists beyond borders – Advocacy networks in international politics*, Cornell University Press, London, 1998.

prosecution. The situation is even more complicated as soon as peer-to-peer –systems, like FreeNet, become more popular. Those systems require legal attack against all nodes in order to get rid of the unwanted information. The "netizens" have also learned to save the potentially infringing information right after its publication in their personal computers. All this makes it practically impossible to remove the information from the Internet once it has been posted.

TABLE 5.3. SUMMARY OF THE DRM CASES

Case	DeCSS-CA	DeCSS-NY	DeCSS-No	eBook	WMA	AIBO
Plaintiff	DVD-CSS	MPAA	Økokrim	FBI	None	None
Defendant(s)	571 Individuals	Mr. Corley – 2600 Magazine CSS	Jon Johanssen	Sklyarov, ElcomSoft	None	None
DRM-system	CSS	CSS	CSS	Different Adobe's	WMA DRM v.2.	Memory Stick
Boycott-threats	Some	Some	Some	Yes	No	Yes
Demonstrations	Active Court Participation	No	Yes	Yes	No	No
Mirroring	Yes	Yes	Yes	Yes	Little	No
EFF involved	Yes	Yes	Yes	Yes	No	Yes
Information still available (search done with Google 5th of July 2002)	Yes	Yes	Yes	Yes	Yes	Yes

Another problem for media companies is that the strongest resistance correlates with single individual defendant. The dataset here is rather small, but the outcome is nonetheless rational. This goes also very well along with the theory of framing by KECK and SIKKINK, which predicts that the advocacy networks are least successful if they try to present the issues in their general form and most successful if it is possible to give a face to the campaign[174]. Therefore, suing an individual as a warning for others is not a viable strategy.

To conclude, what options do the media companies have left if the legal path is useless? The answer has to be found from the technical side. Microsoft's example to make the DRM-system easily upgradeable is one option, although it is not possible in all solutions since it requires an Internet connection. Another, more radical option is to design DRM-systems so that they are flexible enough for satisfying most of the end-user requirements–even if this means that the systems are not fully secure. This approach has worked at least in Apple's iTunes-service.

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[174] Keck, M. and Sikkink, K., *Activists beyond borders – Advocacy networks in international politics*, Cornell University Press, London, 1998.

5.2 HARMONIZING LAWS COVERING INTELLECTUAL PROPERTY RIGHTS AND THE PUBLIC CHOICE THEORY

The European Community has been very active lately and tried to harmonize the rules pertaining the IPRs. The reason for these actions can be traced back to the growing economic–and therefore political–significance of IPRs.[175] This legislative process forms a good test case for public choice theory and IPRs because it is widely documented.

The typical definition of public rent seeking is quite straightforward. *"Rent seeking consists of legitimate, non-voting actions that are intended to change laws or administration of laws such that one individual and/or group gains at the same or greater expense to another individual or group."*[176]. It is important to notice that *illegal acts* are not part of definition. Thus, for example bribery and coercion are not covered by it. Nevertheless, these acts play a role at least in less development societies.

In this chapter we will first describe the legislative background and then proceed to explain what kind legislative processes where involved in the context of certain Directives and what was the outcome of these processes.

5.2.1 LEGISLATIVE BACKGROUND

Copyright. The 1988 Green Paper on *"Copyright and the Challenge of Technology"* was the starting point for copyright harmonization in Europe. In this paper six separate areas were identified in need of harmonization and the European Commission subsequently considered five of these areas requiring prompt action.

A determined political process followed and as a result the directives for the legal protection of computer programs (1991), rental rights, lending rights and the main neighbouring rights (1992), satellite broadcasting and cable retransmission (1993), the duration of protection of authors' rights and neighbouring rights (1993), and the legal protection of databases (1996) were created. The sixth directive is the Directive on the Artists' Resale Right, which has been much more controversial than the other directives. After five years of lengthy heated discussions, it was finally adopted in 2001.

The harmonization work did not end here, however. A first draft of a more ambitious Directive on copyright and related rights in the Information Society (EUCD) was introduced by the Commission in December 1997. Unlike the earlier directives, which had been focused on relatively narrow areas, EUCD covered a wide range of issues. EUCD will be analyzed more in detail below.

Patents. Interestingly, the patent harmonization process has been less successful than the copyright harmonization although patents are traditionally considered to be a fundamental part of trade policy. One could argue, though, that the need for EU-level harmonization has been more limited than in copyright sphere because some harmonization has already taken place through the adaptation of European Patent Convention (EPC), signed in 1973. Consequently, the patent system in Europe is already relatively uniform. Nevertheless certain questions were left open in

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[175] For more detailed discussion see Maskus, K., *Intellectual Property Rights in the Global Economy*, Institute for International Economics, Washington, 2000.

- May, C., *A global political economy of intellectual property rights: the new enclosures?*, Routledge, London, 2000.

[176] Gunning, J., *Understanding democracy: an introduction to public choice,* 2003, Available online: http://www.gunning.cafeprogressive.com/votehtm/vm-16.htm.

the EPC[177] and as a result the legal status of software and biotechnical patents varies from one country to another. This may be considered harmful for the single market.

To partly solve this problem, Commission issued in October 1996 the Directive on the legal protection of biotechnological inventions. This directive has been very controversial and only a minority of member states have implemented it at the moment. Nevertheless, the new member states are still required to implement the Directive.

Commission has recently published the Directive on the patentability of computer-implemented inventions (February 2002). This Directive is aimed to remove national differences in patent applications concerning software patents. Also this Directive has been extremely debated.

The most ambitious legislative project so far in the field of patents has, however, been the *community* patent. The idea here is not to replace European Patent Office but instead to create a new system, in which the patent applicant can get a European Union wide patent with one application without multiple filings and language translations.[178] Community patent has received rather strong opposition from most member countries. Especially giving up native languages in patent applications might create formal as well as practical problems to smaller member countries. How can one assume that companies and individuals in a particular language region have identical possibilities to get knowledge of patents only available in one or two major Western European languages?

TRIPS. It is important to remember, that at the same time EU was working with the Directives, it was also putting the same agenda forward in international forums. Starting as a loose initiative the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) finally resulted in 1994 as substantive requirements to strengthen both the copyright and the patent protection.[179]

The original idea of adding a treaty about IPRs under WTO umbrella came from the United States, but EU was backing the process very strongly after it managed to secure its goals. TRIPS is part of World Trade Organisation's (WTO) complex treaty-package and used as the main tool to harmonize especially the enforcement of IPRs in a global level. Unlike the other IPR-treaties, TRIPS has also effective sanctions against countries, which do not fulfil the obligations. In practice, these sanctions are typically different trade restrictions like punitive tariffs.[180]

TRIPS regulates seven IPR areas, namely copyright, trademarks, geographical indicator, industrial design, patents, layer-designs of integrated circuits, and trade secrets. The agreement sets minimum protection levels in the covered areas. For example, all fields of technology have to be patentable with only two possible exceptions: 1) human and animal treatment methods (diagnostic, surgical) and 2) plants and animals and essentially biological processes for the production of plants and animals.[181] This almost unlimited patenting was under intense but futile opposition from the developing countries. They saw clearly that it would mean the end of the

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[177] Another problem is that there is no unifying structure with binding effect on national courts and there is therefore the potential for differences to appear over the interpretation of particular aspects of patent law.

[178] The translation costs are often the largest cost of the EPO patent application. This makes patenting much more expensive in Europe than in the U.S. which enjoys the benefits of one single official language.

[179] Drahos, P. and Braithhwaithe, J., *Information feudalism : who owns the knowledge economy*, Earthscan, London, 2002.

[180] Las Das, B., *An introduction to WTO agreements*, Zen Books, New York, 1998.

[181] WTO, *Intellectual property: protection and enforcement*, 2003, Available online:

http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm6_e.htm.

production of cheap general drugs in their countries. However, the resistance could not overcome the aggressive lobbying from the United States.[182]

In the field of software, TRIPS requires software to be treated as literal work. This makes it clear that software is of copyrightable subject matter. When it comes to patents, it is stated in the TRIPS that patents should be available in all fields of technology. Unlike in many national patent laws, software is not mentioned as being of non-patentable subject matter as such[183]. Therefore, some have argued, TRIPS implicitly requires software patents to be granted.

There are essentially no exemptions to less developed countries. This suggests that the acquisition costs of software in less developed countries as well as barriers to entry to international markets have risen significantly. In order to compete in global markets, any would-be market participant must in the first place license a substantial amount of copyrights and prepare a patent portfolio to defend its position.

5.2.2 THE DIRECTIVES

Next we go through the most relevant directives from the perspective of software industry. The reason for choosing software industry is relatively obvious. The economic importance of it is far greater than in any other sector. When going through each of the Directives we explicate first the legislative process and secondly the outcome of that process. In the end we use public choice theory or more exactly the rent-seeking theory to explain the outcomes.

EUCD. As the following BOLKESTAIN quote demonstrates, the fight on the copyright directive was extremely ugly. He stated: *"The Parliament has been subjected to unprecedented lobbying onslaught on this Directive, and I regret that some of the parties concerned strived to obtain nothing less than total victory, using sometimes highly emotive arguments, rather than seeking a balanced compromise between the various legitimate interests involved. That is not the European way - to move forward we all have to be prepared to accept compromise and I congratulate the Parliament for having done so."[184]*

To simplify the matters a bit, the parties participating in lobbying the EUCD were content industry on the one side and the telecommunication industry and library associations on the other. At the time, consumer organisations did not play any major role and there were no EU-level cyber-rights organisations in effect.[185]

When assessing the content of the EUCD, it seems at the first look that EUCD should not have any effect on software. Directive's preamble states: *"(50) Such a harmonised legal protection does not affect the specific provisions on protection provided for by Directive 91/250/EEC. In particular, it should not apply to the protection of technological measures used in connection with computer programs, which is exclusively addressed in that Directive."*

In practise, the claim that EUCD does not affect copyright protection of software is untrue: EUCD may not apply to computer programs as copyrighted works but it does regulate the

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[182] Drahos, P., and Braithhwaithe, J., *Information feudalism: who owns the knowledge economy*, Earthscan, London, 2002.

[183] Lea, G., *Digital Millennium or Digital Dominion? The Effects of IPRs in Software on Developing Countires,* in Drahos, P. and Mayne, R., *Global Intellectual Property Rights*, Oxfam, New York, 2002.

[184] Bolkestain, F., *Commissioner Bolkestein welcomes European Parliament vote on copyright Directive, IP/01/210*, 2002, Available online:
http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/01/210|0|AGED&lg=EN&display =.

[185] Oksanen, V. and Välimäki M., *Transnational Advocacy Network Opposing DRM - Technical and Legal Challenge to Media Companies*, 2002, Journal of Media Management 4/2002.

essential functionality of software. Arguably the most important part of EUCD, the legal protection of technical protection measures (TPMs), applies also to software so long as it is used as a tool for creating technical protection measures. This dual nature of software of being a work itself and a gatekeeper to other works gives content owners more protection alternatives to choose from. It is rather trivial to add other protected works like music inside a software product and, moreover, practically all TPMs are implemented with software.

Technical protection measures enjoy very strong protection. The circumvention is never allowed for individuals. However–at least in theory–the governments may take action against the works, which do not permit circumvention for the limited exemptions stated in article 5. For example, Portugal is planning to forbid selling protected works, which are not accessible for disabled people. The so-called E-Commerce Safety Clause (Article 6.4.4) forbids even this limited governmental veto-right for the works sold in digital form. This will most likely be the predominant distribution method for digital works in the future and thus there won't be any exemptions.

Software Copyright Directive. Also the software copyright directive raised some waves during its legislative process. The difference between the legislative process of the EUCD and the Software Copyright Directive was that in this case there were two more or less equally strong parties fighting against each other: The other side consisted of a number of dominant American companies (Microsoft, IBM, Apple, Lotus etc.), which established the *Software Action Group for Europe* (SAGE). SAGE aimed at getting as stringent law as possible in order to curtail the European competition. They were lobbying to add user interfaces under the scope of copyright and, perhaps more importantly, trying to ban reverse engineering altogether.

To counter this threat, the European software industry (Amstrad, Bull, Olivetti and Fujitsu from Japan) formed the *European Committee for Interoperable Systems* (ECIS), which aimed to secure an open competitive environment. This group received some mixed support from the academic community.

The Commission sided with SAGE and prepared a proposal, which would have made it nearly impossible to create interoperable software. However, the European Parliament choose to support ECIS and adopted a substantial set of amendments to the proposed Directive, including three key amendments dealing with the interface and reverse engineering issues. Finally the Council of Ministers drafted a well-balanced compromise.

The most important part of the Directive is without a question Article 6, which defines the decompilation right. The Article requires that in order the be legal, the following six requirements have to be met:
1) The acts are performed by the licensee or by another person having a right to use a copy of a program, or on their behalf by a person authorized to so.
2) The information necessary to achieve interoperability has not previously been readily available.
3) The acts are confined to the parts of the original program, which are necessary to achieve interoperability.
4) The information may not be used for goals other than to achieve the interoperability of the independently created computer program.
5) The information may not be given to others, except when necessary for the interoperability of the independently created computer program.
6) The information may not be used for the development, production or marketing of a computer program substantially similar in its expression, or for any other act which infringes copyright.

The final version does not state anything about the user interfaces, which was a clear win for the ECIS. This is also in line with the outcomes of a few high profile court cases (Lotus vs. Borland etc), which took place more or less at the same time in the U.S.

Proposed Software Patent Directive. The debate on the patentability of software has been going on for a while. It took place earlier around European Patent Office practices but lately the EU-activity in the field has drawn most of the attention.

The first hearing on the possible EU-directive started in October 2000[186]. The Commission received most likely more responses than they expected. The European Free/Libre and Open Source Software movement (FLOSS-movement) rallied behind the EuroLinux Alliance and as a result the Commission received a total of nearly 1450 responses before the closing date. Out of these responses, approximately 1200 were in line with EuroLinux Alliance's position. Nevertheless, only 114 responses were clearly in favour of software patenting, but these responses included the biggest industry groups like EICTA and UNICE.[187][188]

After the consultation the Commission came out with the proposal for the Directive, which was, at least in theory, more limiting than the current EPO practice. The commission argues that they have taken account the results from the consultation: *"The objective is to achieve the right balance between making patents available where appropriate in order to reward and encourage innovation, while avoiding stifling competition and open source development. The Commission received some submissions arguing that patents tend to restrict innovation in fields like software development. We also received submissions from organisations representing many thousands of companies arguing that computer-implemented inventions should remain patentable or even that patentability should be extended. The Commission's proposal reflects the balanced interests of the EU's economy and society as a whole."[189]*

The proposal was considered to be not enough far-reaching in the Council of Ministers and they made amendments, which made the Directive in line with the EPO practice. The directive was also voted in European Parliament, which accepted sweeping limitations on patenting after a very fierce, bitter and intense lobbying. As a result the directive will face now a second hearing, although it is possible that the Commission will kill it if European Parliament shows no signs of willingness to make a compromise.

The content of the directive is currently still open. The main question here is, whether product claims should be accepted on top of the process and apparatus claims. Currently the European Patent Convention does not allow software patents "as such", which means that the software innovation has to make a technical contribution to the art or it must have a technical effect in order to be patentable. In practise this does not limit software patenting, and when it comes to the claim construction, product patents (software on a carrier, like CD-ROM, or as a signal) are also allowed in EPO practise. Some of the national patent offices decline to accept them, however.

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[186] DG Internal Market, *The patentability of computer-implemented inventions*, Consultation paper by the services of the Directorate General for the Internal Market, 2000, Available online: http://europa.eu.int/comm/internal_market/en/indprop/comp/soften.pdf .

[187] Academic Institutions 4, Industry Associations 16, IPR Associations 19, Governmental organisations 13, Large Industry 15, IPR Professionals 18, SME 9, Individual Software Developer 1, Individuals of unknown type 19. One might argue that this group represents rather well the most likely beneficiaries.

[188] PbT Consultants, *The results of the European Commission consultation exercise on the patentability of computer implemented inventions*, 2001, Available online: http://europa.eu.int/comm/internal_market/en/indprop/comp/softanalyse.pdf.

[189] DG Internal Market, *Proposal for a Directive on the patentability of computer-implemented inventions - frequently asked questions*, 2002, Available online: http://europa.eu.int/comm/internal_market/en/indprop/comp/02-32.htm.

5.2.3 APPLYING THE PUBLIC CHOICE THEORY

We can find in all of the presented cases elements that fit the GUNNING's definition of public rent seeking. In each of the cases several parties had conflicting interests and the parties were trying to use lobbying in order to get the most favourable outcome from their perspective.

There are also some interesting differences between the cases. In the case of EUCD, there was no real counter balancing force, which would prevent the rent seeking of content industry. The telecommunication companies were active, but their goals were mostly limited to securing the right to make temporary copies,[190] and to the right of not to be forced to implement any DRM systems. The library unions had also a narrow interest, which they managed to secure at least to a certain extent. Practically no one was defending the general public. Also small and medium sized software companies' interests were defended only to a small amount. The general public and SMEs were both arguable the biggest losers when it comes to the outcome of the EUCD.

The process of drafting the Software Copyright Directive was a classical example of a case, in which two powerful parties with opposite interests were engaged in lobbying. The result was more or less a compromise without a clear winner. The society, which is better off compared to the situation, in which no reverse engineering is allowed, could, however, be thought as a winner.

The most interesting case is the Software Patent Directive. This time there are two coalitions, which have directly the opposite interests. Compared to the other cases, the difference is the nature of coalitions. The European Free/Libre and Open Source Software movement (FLOSS) is much larger if we consider the number of individual activists but the pro patent-side has much more economic power and also more experience on lobbying. The outcome is still unclear but at the moment the pro-side has succeed better in processes, which are in reality controlled by civil servants: Commission and Council of Ministers. The FLOSS-side has gained some success in the Parliament.

The similar trend is interestingly visible in the other two cases. For some reason the Parliament seems to be more resistant to rent-seeking carried out by the supporters of strong IPRs. This is an area, which requires further research.

The idealistic view to democracy is that the decision makers try to consider the public good while making decisions. At least in the analysed cases there is little if no evidence about this kind of decision making.[191] The outcomes seem to be dictated mostly by the composition of the interest groups involved. When it comes to IPRs, the potential benefits are clear to small group of parties and they have therefore a reason to invest in lobbying. On the contrary, the general public does not have very easily demonstrated benefits from active participation and the questions are often so complicated that even the experts are not sure what the different outcomes really mean for the society at large.

The experiences from the U.S. seem to support this view as well. BOLDRIN and LEVINE note *"that public rent-seeking plays an important role in the acquisition of intellectual property. The recent Sony Bono copyright extension law is a good case in point: the U.S. Congress unanimously on a voice vote extended copyright*

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[190] The content industry demanded that even the technical copies, which have to be created to transfer the information on the Internet, are part of the exclusive rights of the copyright holder. Needles to say that this would have meant the end of the Internet, as we know it.

[191] For example, most decisions are made without having independent economic research as background. This should be one of the basic starting points if the public good is at aim.

retroactively by 20 years - yet there is no economic argument whatsoever in favour of retroactive extension of intellectual property."[192]

5.3 CONCLUSIONS

The purpose of this chapter was to show that DRM and IPRs have a strong political dimension. The research in this area is still undeveloped, but without it, it is impossible to really understand the process, which will shape the outcome concerning content distribution in the digital era. Therefore, much more work needs to be done. Especially the role of the leading developing countries (China, India and Brazil) is something that should be monitored closely. These nations can, if they act together, affect the international rules of trade with profound results. They have also strong political motives to shake the existing *status quo*. The current situation favours the U.S in particular.

Also, the role of grass roots movement is should not be underestimated. The democratic nature of western countries dictates namely the limits of IPR-protection: if the majority of people support certain changes in legislation, these changes will eventually occur. Even the strongest lobbying by the IPR-industries, is not able to challenge the power of the general public.

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[192] Boldrin, M. and Levine, D., *Rent-seeking and innovation,* 2003, working paper, Available online: http://levine.sscnet.ucla.edu/papers/cr35.pdf.

6 LICENSING AND OPEN SOURCE[193]

One part of the MobileIPR project was to study how new licensing models pioneered in the software industry would change the rights management landscape at large. In effect, we published a number of papers covering both open source code and open content licensing issues from legal and business perspectives. In this chapter, some of the results of these separate studies are summarized.

6.1 WHAT ARE OPEN SOURCE LICENSES?

Open Source Initiative formally accepts licenses that fulfil Open Source Definition as open source licenses[194]. The definition requires essentially that a qualified license should allow free distribution, should offer open and easily available (but not necessarily free) source code, should allow derivative works, should not discriminate different usage situations (based on e.g. number of users or equipment) and should provide author integrity. By May 2003, Open Source Initiative had accepted over 40 different software licenses as open source.

There are different ways to classify open source licenses. METZGER and JAEGER have used six different classes in their detailed legal analysis[195]. Here, we use two classification systems: *functional* and *practical.* Based on functionality, we separate three different license categories: *strong copyleft*, *standard copyleft* and *permissive* licenses. Based on practicality we separate four categories: *GNU, academic, community* and *corporate* licenses. Let's define each category in turn.

6.1.1 FUNCTIONAL DEFINITION

From functional perspective open source licenses can be classified based on how each license treats the copyright licensing of source code. First, we define standard and strong copyleft as follows:

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[193] The outcome of this research area has previously been reported in a more detailed manner in the following publications:

- Välimäki, M., *Vapaammista kirjallisten ja taiteellisten teosten lisenssiehdoista* (In Finnish, On More Liberal License Clauses for Literal and Artistic Works), Defensor Legis 6/2003.

- Välimäki, M. and Oksanen, V., *The Impact of Free and Open Source Components on the Competition in Microcomputer Operating System Software Markets*, published in the proceedings of 8th Annual Center for Tele-Information Conference, Technical University of Denmark, Copenhagen, 2003.

- Välimäki, M., *Dual Licensing in Open Source Software Industry*, Systemes d´Information et Management, Vol. 8, No. 1, pp. 63-75, 2003.

- Välimäki, M., *From individuals to political institutions - The discourse on institutional change in free software and open source communities*, Mediumi 2.1.

- Välimäki, M. and Oksanen, V., *Open Source Licensing Models for A Company Developing Mass Market Software*, proceeding of LawTech 2002, Cambridge MA, USA, 2002.

- Välimäki, M., *Strategic Use of IPR in the Digital Economy - Case of Software Markets*, published in the proceedings of the 4th International Conference on the Management of Intellectual Capital and Electronic Commerce, Hamilton, Canada 2001.

[194] Open Source Definition, 2003, Available online: http://www.opensource.org/docs/definition_plain.php.

[195] Jaeger, T. and Metzger, A., *Open Source Software. Rechtliche Rahmenbindungen der Freien Software,* Verlag C.H. Beck, 2002.

- *Standard copyleft* license requires that the distribution terms of the source code are maintained. If the source code is developed further, the licenses terms cannot be changed or the source code, for example, closed. However, if the source code is combined with another source code to create a new work, then standard copyleft does not apply to the combined work.
- *Strong copyleft* license has an additional characteristic on top of the standard copyleft, which may be called inheritance. Inheritance means that even adaptations and derivative works must keep the license terms intact. Some call this *viral effect* meaning that even if a new work is only partially based on source code under strong copyleft it may not change the license terms. With standard copyleft that would be allowed. In other words, if the source code is initially distributed free of charge with strong copyleft then no-one can charge for the source code later in any adaptation.

Also LERNER and TIROLE make the same functional distinction between standard and strong copyleft. However, They use terms *restrictive* (standard) and *highly restrictive* (strong) licenses instead.[196]

A third major functional category is *permissive* licenses. These allow free distribution, copying and modifying. Even change of license terms and adaptations of the original source code is allowed. Therefore, there are no copyleft requirements in permissive licenses.

To sum up, we illustrate the functional differences between open source licenses in figure 6.1.
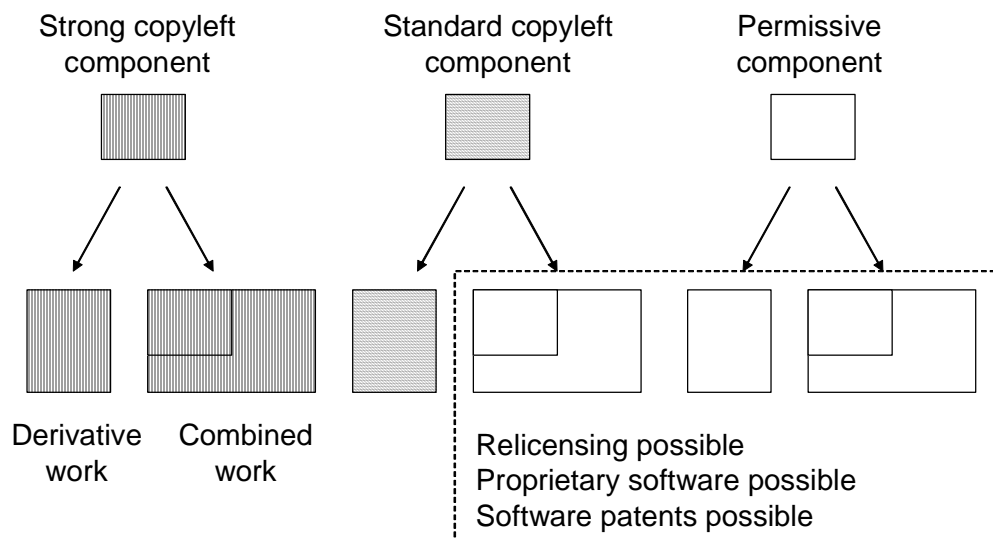

FIGURE 6.1. FUNCTIONAL DIFFERENCES BETWEEN OPEN SOURCE LICENSES

A software component under strong copyleft license will maintain its license terms even if it is used as a part of a combined work (embedded software). Under standard copyleft, combined software can be re-licensed, *i.e.* the licensee is not tied to standard copyleft terms. However, if the component itself is further developed, all derivative works must remain under copyleft. Components under permissive licenses do not have any of these licensing restrictions. They can be combined in proprietary software and further developed under any conditions.

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[196] Lerner, J. and Tirole, J., *The Scope of Open Source Licensing*, 2002, work in progress, presented at the conference on Open Source Software: Economics, Law and Policy, Toulouse, France, June 20-21st 2002, Available online: http://www.idei.asso.fr/Commun/Conferences/Internet/OSS2002/Papiers/Lerner.pdf.

6.1.2 PRACTICAL DEFINITION

Many open source licenses carry the load of history. From this perspective we can identify four major license categories. The differences here do not deal with the functionality of source code but are merely related to the readability of the licenses and the extent each license takes into account other rights and obligations in addition to the copyright to source code. These practical factors may be decisive when choosing a license as we show later in this chapter.

The first category includes all the so-called *GNU* licenses. Introduced by Richard M. Stallman and Free Software Foundation in the 1980s, these licenses carry a strong ideological message. The language of GNU licenses is written as to any "like minded" software developer and the licenses are already quite familiar among developers. Not surprisingly, as open source has become more common in larger organizations, lawyers have become hesitant to GNU licenses for too vague language and uncertain implications. A special feature of GNU licenses is that they are incompatible with software patents: those bind to GNU licenses should license to anyone for free any patents that apply to GNU licensed software.

In the second category we have *academic or university named* licenses. These licenses originate from universities starting from UC Berkeley in the United States. Academic licenses are short and rather clear in language although they do not take into account that many rights and obligations either that corporate counsels might find comfortable to live with. However, one could think that an academic license is more often read than *e.g.* a GNU license and probably understood also by others than developers. Academic licenses do not typically take any stand on software patents.

Third category consists of *community* licenses, which typically originate from some major free software project. They have gained popularity along with the Internet and free Unix implementations. Most popular is Artistic License originally distributed with Perl programming language. Another popular community license Zlib is somewhat similar to university licenses but has no warranty or liability disclaimers. No corporate lawyer would perhaps ever suggest using such a risky and uncertain license but it may fit perfectly the hacker culture. We include public domain into this category although it could form a separate group as well.

Finally, when open source software became more popular in larger corporations in the late 1990s, these corporations started to introduce licenses of their own. The first major *corporate* license was introduced by Netscape in 1998 when they opened the source code of their popular web browser. Some other corporations followed and in 2002 also Open Source Initiative itself introduced more corporate-minded open source licenses written in lawyer language. Corporate licenses are typically very detailed addressing issues such as trademark ownership, copyright to code contributions and liability in detail. There are differences though; a popular corporate license QPL likens other "pure" open source licenses in its writing but only includes some company specific parts.

6.1.3 POPULARITY OF OPEN SOURCE LICENSES

We did searches at Sourceforge.net's online database in order to find empirical data on the licenses and licensing models that are used in different kinds of projects. Sourceforge currently hosts over 60 000 programming projects. Each project lists there information for example on the license(s) being used, project's intended audience and project maturity. The information is publicly available.

Sourceforge lets projects list eleven different intended audience or user groups. As discussed above, the intended audience category is selected by the developers. It is not objective in any sense. In the table 5.1 below, we list projects based on license functionality. Strong copyleft

includes GNU GPL, Mozilla and QPL. Standard copyleft consists of GNU LGPL. Permissive licenses include BSD, PD, Artistic, MIT, Apache and Zlib.

TABLE 6.1. POPULARITY BASED ON LICENSE FUNCTIONALITY

Intended audience	Projects	Strong copyleft	Standard copyleft	Permissive
Developers	22602	67,9%	13,5%	18,6%
End Users/Desktop	20527	80,9%	6,2%	12,9%
Sysadmin	9878	78,0%	6,0%	16,0%
Other	4990	77,8%	7,2%	15,1%
IT	1538	72,0%	11,9%	16,1%
Education	1278	76,8%	10,1%	13,1%
Science/Research	1161	69,2%	14,8%	16,0%
Customer Service	379	85,8%	5,5%	8,7%
Telecom	354	71,2%	13,3%	15,5%
Financial	163	66,9%	17,8%	15,3%
Manufacturing	145	69,7%	11,0%	19,3%

As can be seen from the table 6.1, standard copyleft is most common in projects aimed at developers. This is understandable as LGPL license was originally intended for programming libraries.

Then again strong copyleft license is most common in End Users/Desktop category quite contrary to the other two license types. Also LERNER and TIROLE show that projects geared towards end users tend to have stronger copyleft features than other projects[197].

In Science/Research and Telecom both standard copyleft and permissive licenses dominate. This could be explained by the open nature of scientific process and the desirability of open and non-discriminatory interoperability standards in Telecom sector.

6.2 RIGHTS MANAGEMENT AND OPEN SOURCE LICENSING

It is essential for software companies that they have undisputed rights to software products they wish to license. Control of rights is central because it allows the company to price its software, change its licensing policy and distribute software with different licenses.

A major legal risk in using open source licenses is that the license may "dilute" the ownership and even eliminate the possibility to re-license the software. Therefore, assignment of rights must be managed carefully.

In an efficient license contract, all known rights that cover the software product in question are assigned. Most important of the rights are copyright, trademark and patents. All creative software is covered by copyright and now also patents are granted to software products.

However, there is a practical problem that proprietary rights in software are not clearly defined in copyright, patent and trademark laws. Instead, there is ambiguous language in law, interpretation

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[197] Lerner, J. and Tirole, J*., The Scope of Open Source Licensing*, 2002, work in progress, presented at the conference on Open Source Software: Economics, Law and Policy, Toulouse, France, June 20-21st 2002, Available online: http://www.idei.asso.fr/Commun/Conferences/Internet/OSS2002/Papiers/Lerner.pdf.

problems, clear gaps and overlaps. Consequently, software licenses tend to be more or less incomplete. This makes it more understandable why some licenses are hesitant in assigning specific rights. Persistent licenses GNU GPL and LGPL are in this sense significant because they require free licensing of any patent covered by the licensed product (copyrighted software). This is to say that GNU GPL and LGPL licenses and software patents are incompatible. A company cannot use at the same time a permissive license on a software product it has a patent upon and wishes to license the patent for a fee.

6.2.1 THIRD PARTY RIGHTS AND RIGHTS CLEARING

The one who has written new or rewritten old software is granted exclusive copyright to the work. However, with multiple authors the copyright ownership may also become distributed, which poses challenges to licensing. We can think of three typical situations:

1. Distributed incremental development with no coordination. In this case every contributor has copyright to his contribution (bundled work and authorship).
2. Focused and centrally controlled development. In this case, every contributor has copyright to the work as a whole (joint authorship).
3. Complete rewriting of existing works. In this case the rewriter(s) have copyright to the new work overriding all previous copyrights (new authorship).

One difficult problem with distributed development is employment relationship. According to many national laws, the employer owns automatically all copyrights and therefore the employee cannot license his work without the permission of his employer. Consequently, software under a persistent license may actually infringe some third party company's copyright without anyone's consent.

The problems with distributed authorship call for rights clearing: a company should obtain all rights to the product it wishes to license and make sure that there are no hidden liabilities in code contributions from unknown third parties. Under persistent license, a fully open and distributed development process without sufficient rights clearing is not suitable for any company that wishes to make any direct license sales from their project. For example companies distributing Linux such as Red Hat, SuSe, Caldera and Mandrake do not own the copyright to their core products. Because Linux kernel is under GNU GPL and no single entity holds copyright to it, they are unable to change the license and make any direct license sales.

To compare, under all permissive licenses the copyright ownership does not restrict any successive third party from utilizing the software by any means. It is necessary only to make a little modification to the software in order to license it with new terms as a whole. These copyright transfer problems are further illustrated in figure 6.2.
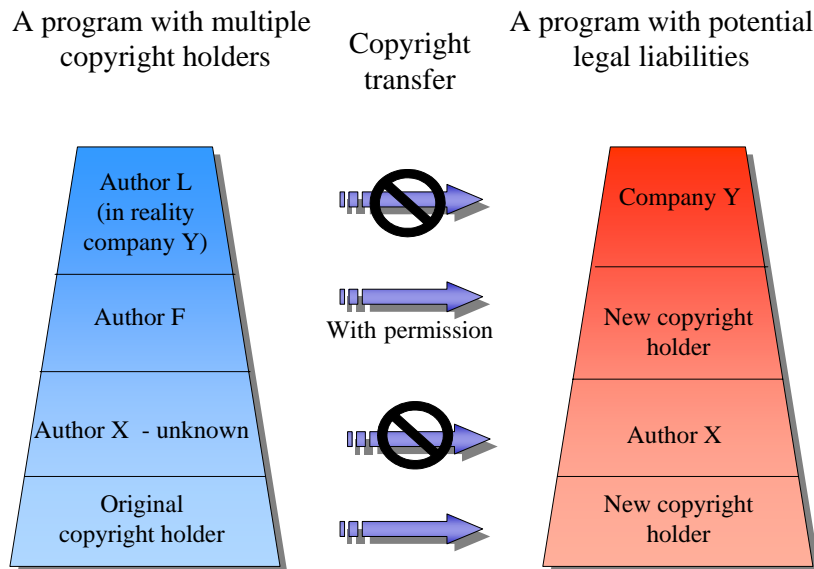
FIGURE 6.2. PROBLEMS WITH COPYRIGHT TRANSFER UNDER DISTRIBUTED DEVELOPMENT AND AUTHORSHIP

It is possible to think of two ways to clear rights: You can rewrite the software, which may require a lot of work but is nevertheless legally the safest bet, or you can obtain the rights with a license term or a specific contract. The last mentioned option leaves the possibility of legal risks if the transfer is somehow incomplete for example because the code contributor has no authorization to give necessary rights.

6.2.2 DERIVATIVE WORKS

Computer programs with source code are easy to modify, compile and distribute further. Under open source licenses, the source is in fact distributed encouraging programmers to study each others source codes, get inspired and contribute more. However, some open source licenses, most notably GNU GPL, control strictly the further distribution of derivative or modified works. They require that no-one changes the license terms on the derivative copies. Otherwise distribution further is not allowed. What is meant by a derivative work is further defined by the interpretation of copyright law. Therefore the concept of derivative work in copyright law is most central with open source licensing.

Maybe most controversially, the connection between GNU GPL and derivative works is stated in the term 2b) of the license: *"You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License."*

Other strong copyleft licenses have similar terms. The question is what does this kind of term legally mean? Let's look first at the middle part between commas, which defines the GPL's applicability regarding derivative works. Note that its wording includes both "derived from" and "in whole or in part contains". Hence, it seems to cover more than derivative works. We can rephrase the question as follows:

- When does a computer program derive from a GPL program?
- When does a computer program in whole or in part contain a GPL program?

The first part of the question seems to be quite straightforward link to the concept of derivative works in copyright law. We discussed that already in the previous chapter.

The second part of the question sounds more troublesome. One may argue that it creates a vague contractual definition of what is meant by a derivative work: another program needs only to contain parts of source code under GPL to become governed by it. However, because there is no indication of the quantity or quality of the "contained" code and its relationship to the combined work, it could be further argued that the interpretation of derivative works applies also to the second part of the question. It can hardly mean situations where non-copyrighted source code is used. After all, if we take GPL as a copyright license, it can only govern something that is copyrighted, *i.e.* original work of art.

Finally, consider the first part of 2 b). It further limits the applicability of the license to those derivative works that are "published" or "distributed". These both refer to well founded legal concepts in copyright law. In the context of computer programs, however, their interpretation may not be that straightforward. For example, it is unclear whether selling a software subscription service means that the software is distributed or published at all.

6.2.3   LICENSE COMBINATIONS

A specific problem with GNU GPL license is that it is incompatible with many other licenses. That is, works under GNU GPL cannot be bundled with works under other licenses unless all rights in the other works are waived in favour of GNU GPL (although interpretation of this term is vague). This is especially crucial for developers if they wish to license their software under GNU GPL. It is also crucial for companies that wish to use software under GNU GPL license as embedded software combined with other type of licenses.

A recent legal case between MySQL AB and Progress Software Corporation illustrates problems with license combinations. Progress combined their own software under commercial license with that of MySQL AB under GNU GPL and sold it under their own license. MySQL argued that because GNU GPL is incompatible with this kind of combination the license sale was illegal. The case was settled out of the court in the early 2003.

License compatibility problems are not restricted in the combination of restrictive licenses with GNU GPL. In fact many company specific open source licenses have the same incompatibility problem.

6.3 LICENSING AND BUSINESS MODELS

Various software business models can be distinguished, for example, depending on whether the software is sold as a product or service, structure of the sales channel, and income sources[198]. MESSERSCHMIT and SZYPERSKI emphasize the difference between technical distribution channel (pre-installed, self-provided) and pricing method (subscription, pay-per-use, cross-subsidy) and conclude that users have four ways to acquire software: make, buy, license or subscribe[199].

Perhaps the most common way software companies do business is to sell software projects. In this model, a software company sells its programming work as a service rather than the sole software. Typically, the software is sold or licensed to the user. As a business model, project

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[198] Rajala, R.; Rossi, M.; Tuunainen, V. and Korri, S., *Software Business Models. A Framework for Analysing Software Industry,* 2001, Technology Review 108/2001. Finnish National Technology Agency, Available online: http://www.tekes.fi.

[199] Messerschmit, D. and Szyperski, C., *Industrial and Economic Properties of Software. Technology, Processes, and Value,* University of California at Berkeley Computer Science Division Technical Report UCB//CSD-00-1130, Jan. 18, 2001.

business is not far from a taxi firm with limited scalability. More cars running (programmers) mean more money to be charged.

Next, the traditional model for software product business could be described as software publishing. In this model, the software is licensed as if it were sold as a physical product. Software publishing works in a somewhat similar way to print publishers who sell physical books commoditized from manuscripts.

The Internet as usage environment and distribution channel has enabled several new ways to do software business. Software subscription can be seen as a combination of the two traditional models. Commonly called as application service providing (ASP), subscription is a more interactive way to sell software as an online product with add-on services tailored to the customer. It works like any subscription service: pay your monthly fee or your line is cut.

Finally, different free software business models have emerged. Here, the core product is usually free to use and distribute. It is also often required that no user can charge for the use or distribution of the product (standard copyleft clause) or even any of its derivatives (inheriting or strong copyleft clause). Therefore, sales are based on indirect means that leverage the potentially large and dynamic user base. Add-on services, bundled products and branding are essential indirect revenue sources. Four generic software business models are identified in table 6.2.

TABLE 6.2. FOUR GENERIC SOFTWARE BUSINESS MODELS

	Software Projects	Software Publishing
Product Focus	Customer project	Product family
Copyright	Licensed or transferred	Licensed with restrictions
Income	One-time project fees	License fees
	Software Subscription	**Free Software**
Product Focus	Parametrized products	Core product
Copyright	Licensed with restrictions	Licensed with an open source License
Income	Service fees and application rents	Indirect from services, bundling, branding

6.3.1 DUAL LICENSING MODEL

Dual licensing mixes several of the introduced generic software business models. Duality means that both the free software distribution mechanism and traditional software product business are combined. There is technically only one core product but two licenses: one for free distribution and free use and another for other (proprietary).

Dual licensing model differs from pure free software model in several ways. First, the development community does not have development power to start competing products (forks). Copyright and control of the core product development is held in one hand, the original developer. The ability to license the product with other terms than open source requires full ownership of all rights to the product.

Second, the users of the free license have an option to obtain a proprietary license. If a software product with an inheriting copyleft clause – as for example term 2b) in the GNU GPL License – is embedded to become a part of another product then the combined product should be distributed for free. A proprietary license may free the user from this restriction. In this way,

third party product businesses become also possible. From the user's perspective, dual licensing can be described as indiscriminating. The dual licensing model is described in Figure 5.3. in more detail.
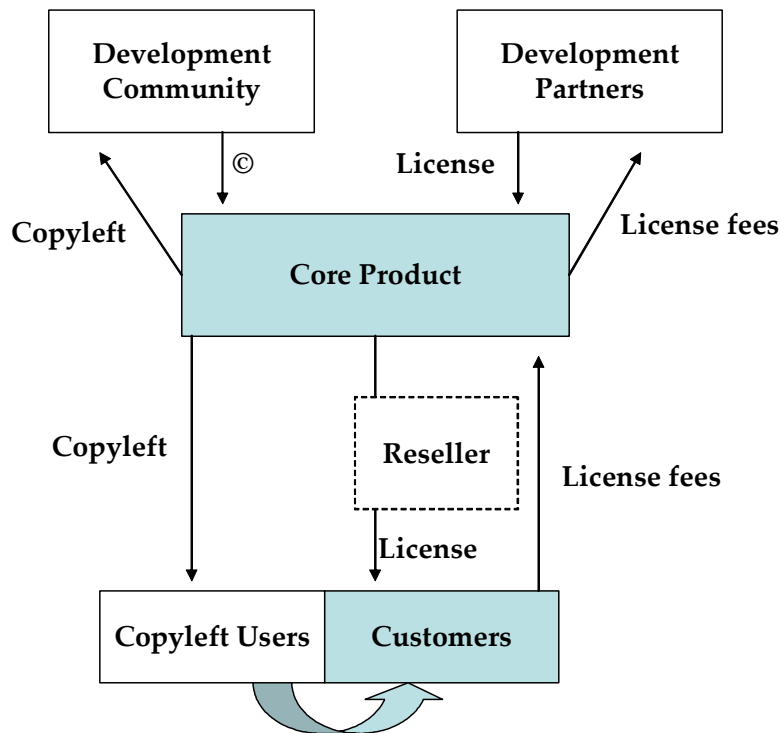

FIGURE 6.3. THE DUAL LICENSING MODEL

Let's look at the figure 6.3 from the bottom up. At the bottom we have software users divided into two segments. They interact with the software company that dual licenses its core product with a strong copyleft license to the first user segment called copyleft users and with a commercial license to another user segment titled customers. Note that the arrow from the copyleft users to customers indicates that when the copyleft users extend the usage of the copylefted software they tend to reach the limits of free usage. For example copyleft concerns, commercial support and warranty requirements may attract copyleft users to buy a commercial license. To simplify the picture, there is no feedback mechanism (fixes, development ideas etc.) from software users to core product developers described; those are assumed to come from the above.

Above the core product we have two developer segments. On the left is the open source development community, which may give bug fixes and code contributions with copyright back to the core product developers[200]. On the right are commercial development partners who develop essential components of the core product; they may either transfer or license the copyright of the component to core developers.

6.3.2 LICENSE SELECTION PROBLEM

It is difficult to give any general suggestion on license use for some particular purpose. Every open source license has its individual implications and the choice of a license must be made case by case. Among others, these questions are relevant when making the license choice:

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[200] Fink, M., *The Business and Economics of Linux and Open Source*, 2002, Prentice Hall.

The market focus of the software should be perhaps the most important factor affecting the license selection. If a product is aimed at end users, the benefits from choosing an open source license are little if none. Therefore the license terms can be restrictive. The situation is slightly different if the target platform is Linux or some other free operating system where most of the competing products are under open source licenses. For developers and other third parties the license should be more permissive to maximize the incentives to get third party support for the product

Free product distribution is not limited to open source licenses. Indeed, many software companies use commercial and restrictive (shareware, freeware) licenses to distribute either limited or full versions of their software for free. Microsoft distributed its Explorer browser for free originally to compete against Netscape. As of now, the browser is distributed for free mainly because it ties users to many proprietary standards controlled by Microsoft or its beneficiaries. Some companies develop add-on software on open source products, which they then sell under all restrictive licenses. For example Covalent and theKompany develop in-house and license with all restrictive terms easy-to-use configuration and management tools for many open source core products including Apache web server and MySQL and Postgres databases.

A software producer who has the copyright and other rights that cover the full product is able to license the software according to market demand. Actually many companies who release their software under persistent licenses also sell the same software under commercial license to those who do not want to be bind by the terms of persistent licenses. As noted above, this is commonly called dual licensing and it gives the only option out of a lock-in situation to persistent license for the user. For example MySQL AB developing most used open source database MySQL and TrollTech AS developing QT development tools use this licensing strategy. Both of the firms own all copyrights to their software and generate most profit from the sales of commercial licenses. They control the development with leadership.

6.4 CONCLUSIONS

In this chapter we have used two categories for open source licenses: *functional* and *practical* licenses. Based on functionality, we have separated three different license categories: *strong copyleft*, *standard copyleft* and *permissive* licenses. Based on practicality we have separated four categories: *GNU, academic, community* and *corporate* licenses.

Functional licenses. Standard copyleft license requires that the distribution terms of the source code are maintained. If, however, the source code is combined with another source code to create a new work, then standard copyleft does not apply to the combined work. Then again strong copyleft licenses have a viral effect. This means that even adaptations and derivative works must keep the license terms intact. Unlike standard copyleft and strong copyleft license, permissive licenses allow free distribution, copying and modifying. Even change of license terms and adaptations of the original source code is allowed. Hence, the copyright ownership does not restrict any successive third party from utilizing the software by any means. It is necessary only to make a little modification to the software in order to license it with new terms as a whole.

Practical licenses. The language of GNU licenses is written software developers in mind and these licenses are pretty familiar among developers. Lawyers, however, are hesitant to GNU licenses because of their vague language and uncertain implications. Since persistent licenses GNU GPL and LGPL require free licensing of any patent covered by the licensed product (copyrighted software), a company cannot use at the same time a permissive license on a software product it has a patent upon and wishes to license the patent for a fee.

Academic or university named licenses are short and rather clear in language although they do not take into account that many rights and obligations. Then again community licenses have gained popularity along with the Internet and free Unix implementations. No corporate lawyer would suggest using such a risky and uncertain license but it may fit perfectly the hacker culture. Finally, corporations have presented their own open source licenses. These licenses are typically very detailed addressing issues such as trademark ownership, copyright to code contributions and liability in detail.

Hence, the license type affects how and in what kind of situations different licenses can and should be used. What must be taken into account is for instance whether the license has a viral effect, the possibility to close the code and change the licensing terms, the legal validity of these licenses as well as the compatibility of various open source licenses. Also, how these licenses affect company's other IPRs like software patents should be considered.

7   PROJECT PUBLICATIONS

- Olli Pitkänen - Martti Mäntylä - Mikko Välimäki - Jukka Kemppinen: Assessing Legal Challenges on the Mobile Internet, International Journal of Electronic Commerce, Fall 2003, Vol. 8, No. 1, pp. 101-120, 2003.
- Ville Oksanen - Mikko Välimäki: Some Economic Aspects of the European Harmonization of Intellectual Property Rights in Software and its Impact to Eastern EU, Presented at Conference on the Economic Integration of the Eastern EU, Warzaw, June 2003.
- Olli Pitkänen (ed.): Proceedings of the First International Mobile IPR Workshop: Rights Management of Information Products on the Mobile Internet, HIIT Publications 2003-2, Helsinki Institute for Information Technology HIIT, 2003.
- Ville Oksanen - Mikko Välimäki: Music Collecting Societies and Webcasting, presented at the to the Annual Conference of the Society for Economic Research on Copyright Issues, June 2003.
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- Olli Pitkänen - Mikko Välimäki - Jukka Kemppinen - Martti Mäntylä: Assessing Legal Challenges on the Mobile Web, in the proceedings of the First International Conference of Mobile Business, Athens, Greece, July 2002.
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- Olli Pitkänen: Scenario Based Method in Futures Information Technology Studies, speech presented at International Seminar on Research Methods, Las Vegas, 2002.
- Mikko Välimäki: Tekijänoikeus ja käyttäjä ("Copyright and user", in Finnish), position paper published in the proceedings of a seminar arranged by UNESCO and the Ministry of Education, Helsinki, 2002.
- Mikko Välimäki - Olli Pitkänen: Digital Rights Management on Open and Semi-Open Networks, published in WIAPP 2001 proceedings, San Jose, 2001.
- Mikko Välimäki: Strategic Use of IPR in the Digital Economy - Case of Software Markets, version published in the proceedings of the 4th International Conference on the Management of Intellectual Capital and Electronic Commerce, Hamilton, Canada 2000.
- Olli Pitkänen - Mikko Välimäki: Towards a Framework for Digital Rights Management, published in Manchester 2000.

- Mikko Välimäki - Petri Martikainen: Framework for Online Intermediary Liability Published in the Proceeding of EMMSEC 2000, Madrid 2000.