

Intellectual Property Law and the Performance of Distributed Problem Solving Networks (DPSN)

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Purpose of the workstream

The examination of the role and function of intellectual property in distributed problem solving networks (DPSNs) was driven as a cross-cutting workstream touching and drawing upon the findings made by investigating several types of DPSNs in case studies produced by a joint project between the McKinsey Technology Initiative and the Oxford Internet Institute.

Function of Intellectual Property Law

Most of the end-products created by the organizations and processes of the "Information economy" are *intangible assets*. Intangible assets comprise tools and data. In contrast to most tangible assets they are *non-rival*, i.e. the use of an intangible asset by one person does not exclude other persons from using the same good at the same or a different time. It has been shown that the principles of the market alone do not perform well in allocating the resources required to produce public goods.¹ Further market and non-market instruments are required to allow investors to appropriate the benefits from their investment in the creation of a public good.²

One of the instruments, which will be the object of analysis in this paper, is intellectual property law. Under an intellectual property law regime, a market for intangible, non-rival assets is created by artificially limiting access to the assets, which results in a market price greater than zero for a suddenly scarce resource. All developed market economies have decided to create markets for intellectual creation by installing an intellectual property law system, which grants investors a limited exclusive right to exploit their creation and capture the benefits generated from the commercialization.

The term "intellectual property" is slightly misleading and has only recently replaced the traditional term "industrial protection rights". The term "intellectual property" suggests that intellectual *property* was an absolute exclusive right like the property right for a tangible asset. But comparing the nature of intellectual property rights with absolute property rights shows important systematic and substantial differences: Intellectual Property Law is a term referring to a body of law, which comprises several individual rights, which are substantially different with regards to the sorts of goods and aspects protected and the requirements to obtain protection. There are the "four big" IP rights (patent law, copyright law, trademark law,

¹ See Paul David: A Tragedy of the public knowledge 'commons'?, SIEPR Discussion Paper No. 00-02 (2000) at p. 2.

² See id.

and trade secret law) and several related or derivative rights like design protection, including design protection for integrated circuits or mask work (US), protection for plant variety and plant breeders, the rights of the performing artist, protection for trade dress, and most recently the sui generis right for databases in the European Union.³ In contrast to an absolute property right, all IPRs are limited in scope and time, and strike a balance between the interests of the creator, the owner and the interests of the users or society.⁴ Recent advances in information and communication technology and the resulting digression of transaction cost and shifts in the organization of information production are questioning the balance currently reflected in IP law.

The "Open Science" approach, which is increasingly popular in academic and public research, differs from the IPR-based approach in that it fosters rapid and wide sharing of research results to allow other researchers to confirm or disprove the findings made. The Open Science approach is not contradictory to the IPR approach, but rather complementary, because different institutions are working to achieve different goals and therefore require different approaches to producing information: While the Open Science approach aims to increase the body of available knowledge, research based on the IPR approach aims to increase the value of the sponsoring organization by appropriating the findings.⁵

A collaboration between multiple actors and organizations requires under both approaches a shared space of knowledge, in which information can float freely. While Open Science research is based on the existence of a free shared space of information, sometimes referred to as the "knowledge commons",⁶ IPR-based research has to actively create this shared space before starting a collaboration. While the primary challenge of Open Science is how to keep the shared space open,⁷ the challenge for IPR-based research is to create a shared open space first, then to maintain its openness for the duration of the collaboration, and finally to allocate the products derived from the collaboration to the contributors. Achieving these goals requires a significant investment and active information management within the community of collaborators to address the self-interest of the collaborators and the growing body of information covered by intellectual property rights.⁸ Under an IPR paradigm the free space is either created by a contract between the rights holders or by the rights holders' implicit or explicit consent to tolerate the use of their intellectual property. Creating an open space by contract produces significant upfront cost for negotiating a contract and may also undermine the trust base required for a successful collaboration.⁹

While economists have tried to explain that it is actually in the interest of a firm to tolerate the "trade in trade secrets" by its employees,¹⁰ legally the "tolerating" approach comes with significant uncertainty about the existence and reliability of the consent, in particular if employees are engaging in information exchange under implicit consent. Once the

³ See any reference book on IP law, e.g. Merges, Menell, Lemley: Intellectual Property in the New Technological Age (2000).

⁴ Although the proper balance is a constant object of controversy, see numerous references.

⁵ See Paul A. David: The Economic Logic of "Open Science" and the Balance between Private Property Rights and the Public Domain in Scientific Data and Information: A Primer (2003).

⁶ See David, *supra* fn.1, p. 19.

⁷ For an overview of the initiatives in this area see Paul A. David: Towards a cyberinfrastructure for enhanced scientific collaboration: providing its 'soft' foundations may be the hardest part, Oxford Internet Institute, Research Report No.4 (2004), p. 16f.

⁸ See Paul David, Michael Spence: Towards institutional infrastructures for e-Science: the scope of the challenge, Oxford Internet Institute, Research Report No. 2 (2003), p. 42.

⁹ See David, *supra* at fn. 8, p. 15f.

¹⁰ See Paul David: On 'Trading in Trade Secrets' and the Economics of Double-Agents, SIEPR-NSF Project Working Paper (2001).

interaction has created valuable end products, the right holders may decide to exercise their rights to appropriate the results derived from the use of their knowledge.

Relationship between DPSNs and IPR

Intellectual property and distributed problem solving networks are an intrinsically linked topic for several reasons:

DPSNs are characterized by the interaction of a multitude of actors across organizations and legislations, sometimes formed spontaneously and without a formalized contractual relationship. The majority of DPSNs process non-tangible data as input factors, i.e. as "raw material", and create end-products, which by nature are also eligible for IPR protection. Every contributor is adding their intellectual creation to the solution produced by the network, and is thereby also adding intellectual property to the network. In the absence of clear contractual agreements a highly complex network of intellectual property rights is woven during the problem solving process.

Industries, which have traditionally been characterized by distributed or temporary collaboration, e.g. the motion picture industry,¹¹ are increasingly struggling with the complexity of the intellectual property created during production. According to an industry expert,¹² it is in many instances economically unfeasible to clear the rights for even small portions of film material, which contains more than natural scenery, e.g. to reuse an extract of a movie for a documentary. The multitude of individuals holding any kind of right for a movie scene, among those actors, screenplay writers, and musicians, makes it almost impossible to track every right holder down.¹³ In most cases, one right holding entity is holding all rights for a particular scene, but in not in all cases and not for all uses. In order to re-use older material in a new format, e.g. CD-ROM, tedious individual negotiations with each of the right holders would be required to get "clearance" for a particular movie scene.¹⁴ Economic analysis has shown that if complementary elements are owned by multiple agents, who each individually could exclude others from using at least one input element, the resulting price for each element will be higher than the efficient price for the compound product.¹⁵ Although intellectual property rights have served the industry well to create valuable products, they now pose a major roadblock for further use or reuse of the product.

To address these challenges, some DPSNs have created implicit or explicit arrangements with regards to ownership, management, and use of the created intellectual property rights. Some well-known examples of DPSNs, in particular the Open Source Software (OSS) communities, constitute themselves around a set of norms, e.g. the GNU Public License and its many derivatives. For these communities, the terms of the license are more than a legal statement to agree on the rights involved with the creation, ownership, and use of the end-products of the solution process: the terms of the license reflect and constitute an important part of the identity of these communities, which have emerged around a movement rejecting the "proprietary paradigm" of software creation. In particular in recent years, the actors creating DPSNs are not only such communities of practice, but increasingly profit-maximizing entities, which aim to monetize DPSNs under a proprietary, rent-extracting paradigm. To

¹¹ See Andrew Currah: Hollywood versus the Internet: the media and entertainment industries in a digital and networked economy. *Journal of Economic Geography* 6(4), p. 439-468, (2006).

¹² Meeting with Simon Gibbs, Managing Director BBC Motion Picture gallery, September 2007.

¹³ See Lawrence Lessig: *Free Culture* at p. 102.

¹⁴ See *id.*

¹⁵ See David, *supra* fn. 9, p. 36.

realize the value proposition to their stakeholders, they attract, maintain, and facilitate a community of collaborators, and impose the terms of their own IPR license.

DPSNs do not only amplify existing challenges of copyright law and knowledge production based on division of labor, they also create substantially new ones: In order to enjoy protection under copyright law, a piece needs to possess a certain amount of originality or otherwise constitute a personal expression of an author. A "click" to rate the quality of an article is the result of a personal judgment, but it is by itself hardly considered as a personal expression of an author eligible for protection under copyright law. Only the aggregate information collected from several authors, filtered and data mined may finally constitute a protected expression. But who is the author of this new expression?

DPSNs also pose challenges for patent protection. In order to be patentable an idea has to be novel and inventive. The first requirement means that an invention must not be known to the general public at the time the invention was been made (US) or the patent application was filed (EU) respectively. Commercial entities address this by imposing contractual obligations on their employees not to disclose proprietary knowledge, i.e. talk outside the lab about the work they are doing and keep a research log. The nature of distributed problem solving invites contributions from its members, which may or may not belong to the same commercial entity. This raises at least two questions:

- How do companies deal with employees, who are participating in inter-organizational distributed problem solving and may by doing so disclose proprietary information, which weakens the company's position to file a patent?
- Is an invention made in or even by a distributed problem solving network eligible for patent protection given the (semi-) open nature of a network?

Classes of legal problems

Participants face a number of potential legal risks, when engaging in a collaboration, among others, risks stemming from liability law, anti-competition law, and intellectual property law.¹⁶ Within the scope of this paper only the latter type of legal risks shall be considered. There are four different classes of legal problems related to intellectual property law, which may arise when engaging in a problem solving collaboration:¹⁷

- Problems arising from the legal relationship between the actors and organizations engaged in the distributed problem solving network
- Problems related to data and tools each party brings to the collaboration
- Problems related to the products and resources, which stem from the collaboration
- Problems arising from contracts between the individual actors engaged in the collaboration and their employing organizations

Problems arising from the legal relationship between the actors and organizations engaged in the distributed problem solving network

The first dimension is the question of the applicable law. Care must be taken not to confuse the creation of a right with the enforcement of a right. With the signing of the Berne

¹⁶ See David and Spence: *supra* fn. 9, p. 42ff.

¹⁷ *In adaptation and extension of the framework presented in David: supra* fn. 8, p. 14.

Convention by the United States in 1989, copyright is created in all major legislations with the act of expressing an idea. The natural holder of a copyright is the individual person expressing the idea. When enforcing a claim under copyright law, each court in each country of the Berne convention is free to apply the standards set forth by the national implementation of the Berne convention. The criteria constituting a copyrighted expression are generally harmonized in the Berne convention countries, but local courts will apply the law in accordance with local customs and judge case by case if a particular expression satisfies the hurdle for protection under copyright law.

The copyright situation is getting even more complicated if several authors are involved in the joint creation of a work, because the rules with regards to what constitutes a work and who owns which part of it differs from country to country both within the European Union and across the Atlantic.¹⁸ And as if these rules were not already difficult enough to be applied to situations in which a discrete and countable number of collaborators are creating a product, it is hard to imagine applying them to collaborations with hundreds, if not thousands of collaborators, each contributing a portion of the final result.

The European Union's Database Protection Law, which protects the investment made in the creation of a database, causes problems in international contexts, because databases which may be free to use outside the European Union may be protected in the States of the European Union, which have implemented the EU directive on the protection of databases.¹⁹ Also within the European Union the implementation of the EU Directive has not resulted in a harmonization of the standards of protection, and individual countries follow their previous practices even after the implementation of the Directive.²⁰ No other major jurisdiction outside the EU has so far followed the example and implemented an independent right for databases. But databases may qualify for protection under copyright law in some countries if they satisfy the criteria of copyright protection, in particular by overcoming the originality threshold, which most databases will regularly fail to do.

The other IPRs mentioned, in particular designs, patents, and trademarks, are created by registration with the respective local or national authority. The European Union has made efforts to grant patents and trademarks with effects for the whole European Union through the creation of the European Patent Office and the European Design and Trademark Office. The question where an invention was made or a trademark was designed is not important for the creation of patent or trademark protection.

Again, the rules to obtain protection are different by country. The United States is following the "first to invent" system for patents, rather than the internationally dominating "first to file" system. Under a "first to invent" system, an inventor must prove the date he "made" the invention, which regularly is the date on which he conceived the invention.²¹ This results in an increased diligence with regards to notebooks and research logs. On the other side, the "first to file" system, prevents the inventor from disclosing his invention to others before filing the patent application. This impedes the sharing of information, in particular in a corporate setting, because a careless disclosure will regularly destroy the option to obtain a patent. In all international collaborations, which cover subject matter eligible for patent protection and span both patent regimes, this will inevitably lead to frictions between the collaborators and requires an elaborate set of rules and guidelines or a clear understanding that no patents will be filed from the results produced by the collaboration.

¹⁸ See David and Spence, *supra* fn. 9, p. 49ff

¹⁹ EC Directive 96/9 on the legal protection of databases.

²⁰ See Wolf Richter: Sui Generis protection for databases in the EU: The example nobody wants to follow, Diploma thesis, ETH Zurich, 2003.

²¹ See any Reference on US patent law or Wikipedia.

The enforcement of a registered right, i.e. patents, designs, trademarks, etc. is again subject to the local authorities or courts of the territory in which the right has been registered and for which protection is sought.

Problems relating to data and tools each party brings to the collaboration

Inserting material into a collaboration may expose the contributor to legal liability, because the contributed material may be protected by intellectual property law.

For academic research collaborations, there is a research exception (or "fair use" in US terms) to copyright law. U.S. fair use law also regularly covers private uses of copyrighted material, but courts have recently interpreted this exception narrowly, in particular if private persons share material with an undistinguished group of other private persons over the Internet. The extent to which an exception for research exists in the European Union still varies across the States of the Union despite the implementation of the European Directive on the Harmonization of Copyright Law.²² The narrow scope of the exceptions also implies that any commercial flavor to the nature of the collaboration forfeits the applicability of the exception. There are only very limited exceptions in patent law and almost none under the database protection law implemented in the European Union. Material inserted into a collaboration must either satisfy the criteria to qualify for one of these narrow exceptions or must be inserted with the explicit or implicit consent of the author and the holder of the right respectively to avoid legal liability.

The challenge for DPSNs is to keep the open space of shared knowledge free from being infiltrated with proprietary knowledge: How does a problem solving network deal with solutions, which have been (intentionally or unintentionally) created using proprietary information? The recent allegations of SCO against IBM and several other industry players to violate their copyright by including protected lines of code in the open Linux source code have drastically shown the potential and severity of such a threat for a distributed problem solving network, although the claims have never been substantiated by SCO.²³

Problems relating to the products and resources, which stem from the collaboration

The products created by a collaborative effort are, in the absence of specific contractual provisions, governed by a complex network of intellectual property rights. This gives rise to two questions: Is the created product by itself eligible for any kind of protection under intellectual property law and if yes, who is the right holder? How does the DPSN handle claims by individuals to appropriate the intellectual property created based on their contribution?

Intellectual property law recognizes the possibility that more than one person is the author or inventor of a creation, although the rules are not harmonized in the international context, which may lead to confusion when cooperating internationally. The massive collaboration of individuals through a Distributed Problem Solving Network poses a new dimension of complexity to determine who is recognized as a co-creator or a co-inventor. Particularly challenging are situations in copyright in which a multitude of actors contribute by themselves meaningless or little original pieces of information, for example the mentioned "click" on a box to rate a certain information. The result of this collection of "clicks" could be protected under database protection law in the European Union if it were shown that a "substantial investment" had been made to create the collection of data. The computation of patterns

²² See Bernt Hugenholtz et. al.: Study on the Implementation and Effect in Member States' laws of Directive 2001/29/EC on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society, report to the European Commission, DG Internal Market (2007).

²³ See Pamela Jones: Summary of SCO vs. IBM *available at* <http://www.groklaw.net/staticpages/index.php?page=20050315132709446> (last visited 10/12/2007)..

identified in the click-stream of the users or the creation of recommendations based on users' recorded tastes constitutes an expression, which if created by a person would be protected by copyright. But in this case the question is: Who is the author of this expression and who is holding the copyright accordingly? Distributed problem solving networks often transform a set of intrinsically meaningless or insignificant contributions into a protectable expression. But there is no identifiable author, but instead an amorphous mass of (potentially even anonymous) contributors, which are connected by a network and who jointly produce the solution by feeding unrelated contributions into a machine-processed algorithm. This is a new and emerging field of copyright law theory, which is still surrounded by legal uncertainty.

Regularly the challenge is not to obtain protection for the end products, but to keep the end-products in the open space or distribute the fruits of the collaboration among the collaborators. The challenge for DPSNs is to prevent shared knowledge from being appropriated by individual collaborators. Every individual collaborator who contributed significantly to the creation of the end-product, earns a legal entitlement to a portion of the intellectual property. The nature of this entitlement varies significantly among legislations and among different types of intellectual property. But also within one legislation, the iterative nature of creation pushes the limits of the law. Let us take a look at the co-creation of text: Some of the contributions may be protected as original expressions, while others may not. Contributor A and B correct typos in a Wikipedia article. Most people will agree that no protection should be granted to such changes. But what about a change to the grammar of a sentence or a rewording of the sentence without adding new information? This is a difficult decision and will in the absence of any significant precedence be decided case by case. In practice most networks have developed explicit regulations or implicit norms how to handle such cases, similar to the ones in non-distributed writing, e.g. acknowledging minor contributions to an academic paper in the footnotes of the first page and of a major contribution by naming the contributor as an co-author.

Substitution of IPR protection by technical means

An important trend, which is closely related to the discussion of the influence of intellectual property rights on distributed problem solving is the increasing use of technical means of restricting access to data and information. "Digital Rights Management" or DRM is the term for a bundle of technologies which control the use of copyright protected material. In the absence of legal protection by copyright law, databases have for a long time been protected by access restriction systems, which allow only registered (read paying) users access to the database, control the number of documents a user can access, and the uses to which a user can put the accessed documents. Access restriction and DRM are not mutually exclusive. To the contrary, they are usually used in conjunction. The terms of the license for a specific user may for example restrict the printing of documents obtained from a database. If this particular user logs in he can only access documents in a DRM-protected format, which prevents him from printing the documents. A different user, who is accessing the database under a different license, may get access to documents, which can also be printed. The database area in particular is a good example of how the lack of legal protection, e.g. in the United States, has led manufacturers to implement technical "self-help" mechanisms like access control or DRM to "enforce" their rights. Relying on technology, they can even enforce restrictions which go beyond the legal rights. In the latter case, the DRM implicitly creates and enforces a license between the right owner and the user, which imposes further restrictions on the user's ability to access and use the protected asset. DRM is agnostic to the intended use of a document. The use of DRM virtually renders exceptions like "fair use" or "private use" ineffective, because it prevents *all* uses, not only those who do not fall within the scope of an exception. Circumventing a DRM system to make a private copy or use material for research has been prohibited and recently even criminalized by a revision of copyright law in the US and the European Union. Several other states like Jordan, Chile, Guatemala, Singapore, the CAFTA countries, Morocco, Bahrain, and Australia, have

implemented similar legislation following the push of the United States in bilateral free trade agreements (FTAs) to comply with the 1996 WIPO copyright treaty.

It is therefore not sufficient to consider the performance of DPSNs in relation to their underlying IPR structure. The actual flow of information among participants is shaped by legal *and* technical constraints, which together build the framework which governs access and the use of data and tools within the network.

Performance of DPSNs and IPR

To structure the analysis of the problem space surrounding IPR and DPSN on the basis of a set of case studies, the following set of questions will be addressed for each:

- What is the subject matter protected / protectable by IPR? Which IPR are relevant, i.e. patent, copyright, trademark, trade secret, derivative rights?
- Which technical restrictions are shaping access and use of data and tools in the Distributed Problem Solving networks?
- What design decisions have been taken to address the challenges posed by IPR and technical protection?
- What function do IPRs serve in a DPSN?

Overview of case studies

We will address these research questions by analyzing a set of DPSNs, which have been codified as case studies during an investigation of the Performance of Distributed Problem Solving Networks jointly driven by the Oxford Internet Institute (OII) and the McKinsey Technology Initiative (MTI). To avoid repeating the analysis documented in the case studies, we will not specifically introduce the projects, but enter directly into the analysis of the IPR related questions connected with each case study.

Table 1: Case studies by industry and IPR regime

Name of case study	Industry	IPR involved	IPR regime
Firefox	Software	Copyright	MPL
Wikipedia	Encyclopedia publishing	Copyright	GFDL
A Swarm of Angels	Film production	Copyright and derivative rights, trademarks	CC
Atlas	Research tools	Copyright, patent, database	Custom
Online news aggregators	News publishing	Copyright, database	Some CC, some proprietary
Sermo	Health information	Copyright	Proprietary

Paul David has identified three different strategies organizations can employ to capture the benefits from DPSN:²⁴

- Hold monopoly power over a complementary product or service
- Hold monopoly power over a productive asset required
- Drive positive externalities

All three strategies can be supported or even be entirely based on IPR, eg by claiming database protection for a productive database, filing a patent for a complementary service (for example the MP3 compression technology), or claiming copyright for a piece of software implementing an open standard. The question when designing or using a DPSN for problem solving is therefore not a binary decision to entirely give up or fully claim and exercise IPR protection for all aspects of all assets. As we will see in the following analysis, in each case study the decision on the appropriate strategy was taken jointly with the decision on the asset or the service that will remain under the control of the network and an appropriate means of control to capture the benefits.

Observations from the case studies: proprietary collaboration

Sermo

The Sermo community was initiated by Sermo, Inc., a US-based start-up company funded by venture capital. Sermo is a profit-maximizing organization, which has significant interest in capturing the benefits created by the collaboration of "Sermo's authenticated community of medical experts".²⁵ It pursues an appropriation strategy, which has two major elements: First, it claims in the terms and conditions copyright for all comments contributed by its users and second, it maintains exclusive power over the database with the responses of the participants through copyright and technical protection means. This allows Sermo to selectively release information and price each piece of information in accordance with the value it creates for Sermo's customers. The Sermo case study is interesting because it demonstrates the role of technology to complement the law as a means of protecting intellectual property. In the US, there is no dedicated legal protection for databases. On the contrary, the revised standard of originality required for copyright protection after the *Feist* decision will regularly prevent legal protection of databases under copyright law in the US.²⁶ Although the Database Protection Directive in the European Union has created a huge stir in the research community, most notably in the US,²⁷ the observable effect is still small because access restriction technology acts as an effective replacement for the law as a means of enclosing and appropriating the information contained in databases. Therefore few cases have actually been litigated in court.

²⁴ See Paul David: Distributed Problem-Solving Organizations and the Evolution of Innovation Strategies: A Quick Tour around the Entire Elephant in "Open Source Corporate Strategy", A Symposium at the AOM Conference, Philadelphia (2007).

²⁵ David Bray, Karen Croxson, William Dutton, Benn Konsynski: Sermo: An Authenticated, Community-Based, Knowledge Ecosystem, Working Draft 4.0 (October 2007) at p.13.

²⁶ See Jane Ginsburg: No "sweat"? Copyright and other protection of works of information after *Feist v. Rural Telephone* in Columbia Law Review Vol. 92 p. 338ff at p. 343.

²⁷ See Jerome Reichmann and Paul Uhlir: Database protection at the Crossroads: Recent developments and their impact on Science and Technology in Berkeley Technology Law Journal Vol. 14 p. 793ff (1999).

Sermo is creating value to its customers by giving them exclusive rights to preview the responses produced by the Sermo community. This period of exclusivity has been agreed by contract between Sermo's customers, which pay Sermo to get a response to a question from the Sermo community, and is enforced by the rules implemented in Sermo's database management system, which regulates access to information. To link this system back to the three appropriation strategies mentioned above, Sermo is holding monopoly power over a required productive asset, i.e. the database system. Sermo also holds monopoly power over the access to the network of physicians communicating over the Sermo network. The list of physicians is Sermo's property, and protected as a trade secret and potentially also under copyright law.

Sermo "produces" responses to survey questions. The answer to a posed question is the aggregate of the responses of Sermo's members. Sermo or its employees do not provide medical advice themselves, but facilitate access to experts, who collectively provide medical advice. If that is sufficient to protect Sermo from legal actions because of malpractice based on advice "produced" by Sermo remains to be seen. The responses to the multiple choice questions as well as the answer choices should regularly fail to qualify for protection under copyright. Therefore there is little risk of "infection" with proprietary information from the outside.

According to Alex Frost, VP of Marketing at Sermo, there had been some resistance in the past against the copyright provisions in Sermo's terms and conditions in the community,²⁸ which originally claimed the exclusive copyright for all contributions. While this seems uncontroversial for the survey responses (which are little use outside the specific context), some members seem to contribute their medical knowledge amply in the discussion forums. After a controversial discussion with its members, Sermo announced that it would continue to claim all copyright to the contributions, but that it would grant a license to physicians allowing them to publish their contributions in academic articles elsewhere. This compromise seems to have struck a satisfactory balance between Sermo and its community.

News aggregators

Similar appropriation strategies have been observed in the news aggregator case: Traditional news publishers like the BBC or the International Herald Tribune publish frequently updated online versions of their news articles and claim copyright for these articles. In Europe, such collections are also frequently protected by the Database law of the European Union as cases in Belgium, Germany and the UK have clarified.²⁹ But not only traditional news publishers like the BBC claim copyright for all their published news items - so does the citizen journalism platform OhMyNews. OhMyNews operates under a "shared copyright" regime, i.e. OhMyNews and the writer own the copyright jointly. The scope of the writer's entitlement under "joint ownership" is vague, but OhMyNews explicitly allows its reporters to republish the articles they publish at OhMyNews elsewhere.³⁰ OhMyNews editors review all articles before publication. Whether they also check for potential copyright infringements is unclear at this stage. Citizen journalists would have a potential motivation to misappropriate articles from other sources and submit them as their own production to OhMyNews in order to get remuneration. On the other hand, the remuneration paid to the journalists by OhMyNews is rather nominal (at a maximum rate of USD 22 per article on the front page and much lower for articles in the later sections) and the risk of being found out with an article published on the front page is too high to make this an attractive option.

²⁸ Personal conversation with Alex Frost in Oxford on Nov 5th 2007.

²⁹ Add References.

³⁰ See OhMyNews: FAQ *available at* http://english.ohmynews.com/reporter_room/qa_board/qaboard_list.asp?div_code=56 (last visited 22/11/2007).

Google News uses a proprietary web crawling technology based on their page rank algorithm to identify and prioritize news-worthy items extracted from a number of news sources. On the homepage Google News displays the headline, a short abstract, usually the first paragraph of the article, and if available a picture to attract users' attention. If a user clicks on an item, she is redirected to the original source. News articles are regularly protected by copyright law. In the European Union, collections of news articles are also regularly protected by Database protection law. The aggregation of news items from different sites by the analyzed news aggregators could constitute a violation of the news publisher's copyright law. In the US, the use of parts of an article for such purposes is regularly covered by the fair use doctrine of copyright law.³¹ The European Union's Copyright Directive allows the European Union's Member States to implement exceptions to copyright law for several purposes, among others for reproduction by the press³² and for criticism and review under certain conditions.³³ The actual implementation of these exceptions varies significantly between individual Member States. Therefore it is difficult to give a comprehensive account of the legal situation across Europe.

The scope of the exceptions to copyright law in the European Union has been evaluated recently in a court case in Belgium. The court heard the claim of a group of Belgian news publishers, represented by the plaintiff *Copiepresse*, which had brought action against Google for infringement of the plaintiffs' copyright and database rights.³⁴ Google News had displayed extracts from articles produced by the claimants and also provided a copy of the full article in their "cache", i.e. a technical storage unit to preserve and provide access to the articles after publication. Google counterclaimed that a collection of headlines was not eligible for copyright protection because of lack of originality. Even if they possessed sufficient originality, the reproduction would be covered by the citation exception for press reviews implemented in Belgian copyright law. The Brussels Court of First Instance denied that Google was a "press review" in the sense of the Belgium copyright law's citation exception, because it solely provided headlines and abstracts without any further "reviewing" activity. Headlines could in the view of the court possess sufficient originality to be eligible for protection under copyright. The court therefore ordered Google to remove all articles and related material produced by the plaintiffs.³⁵ The President of the Court also held the opinion that Google's actions may infringe the publishers' database right. The significance of this decision to clarify the legal situation for the European Union is limited, because the scope of copyright law varies in practice widely across the European Union despite formal harmonization.³⁶ A similar action brought in the US by AFP has been settled between the parties by a licensing agreement.³⁷ Therefore the legal situation remains unclear. Nevertheless, the cases show that there is significant legal uncertainty on the scope of copyright law's exceptions for news aggregation on the Internet without prior consent of the original news producer.

³¹ Add Reference

³² EUCD Article 5 (3) c.

³³ EUCD Article 5 (3) d.

³⁴ Court proceeding reference.

³⁵ Philippe Laurent: Google News banned by Brussels High Court – Copiepresse SCRL v. Google Inc. – Prohibitory Injunction of the President of the High Court of Brussels *in* Computer Law & Security Report, Vol. 23 Issue 1 (2007) p. 82-85.

³⁶ See L. Guibault, G. Westkamp, T. Rieber-Mohn, P.B. Hugenholtz, et al.: Study on the Implementation and Effect in Member States' Laws of Directive 2001/29/EC on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society, Report to the European Commission, DG Internal Market, February 2007 *available at* http://www.ivir.nl/publications/guibault/Infosoc_report_2007.pdf (last visited 22/11/2007).

³⁷ See AFP, Google News settle lawsuit over Google News *available at* <http://www.reuters.com/article/industryNews/idUSN0728115420070408> (last visited 8/12/2007).

Digg News only displays the headline of a news story, a link to the original source of the information and a short explanation written by the submitting user explaining why she thinks that the article is a good read. The terms and conditions of Digg oblige users to release their posts and their further comments under a Public Domain license,³⁸ under which a creator abandons all rights to the general public. This prevents users from bringing copyright claims against Digg. In view of the Belgian Court decision presented above, it seems likely that Digg operates under the same legal uncertainty as Google. On the one hand, Digg only takes the headlines and provides a link to the article, on the other hand, the Belgian Court took a very bold position when finding that headlines were eligible for copyright law protection under Belgian law and that news aggregation, in contrast to news reviewing, would not qualify for the exception of Belgian copyright law. At this end, the question remains as to whether a court will find the accompanying posts by the submitting user and the comments of the Digg community as being equivalent to the activity of a press review.

There has been a legal controversy about the practice of "deep linking", which refers to creating a hyperlink that directly references an individual article instead of pointing to the entry point of the publishing web portal. By doing so, the navigation bar and the advertising banners of the publishing portal could be avoided, at least for web pages using "frames", which was a very popular technology for web design in the late 90s. Several court decisions have banned deep linking.³⁹ At the same time, advances in dynamic content management technologies rendered "frames" for web design obsolete.

Today most news sites offer parts or all of their content as so-called "RSS feeds". The RSS 2.0 (Really Simple Syndication) format is based on the description language XML and allows the selective subscription of parts of a web site. The subscriber of an RSS feed receives regular updates, e.g. every time a new story is posted. The RSS feed contains individual elements like the headline or the body of a story in a semi-structured format, but does not contain the advertisements and the navigation of the original page. When subscribing to an RSS feed, the subscriber usually has to agree to a license, which regulates the permissible uses of the content obtained from the RSS feed. For example, the BBC terms and conditions allow their users to include the "headlines, active links, (...) and other information or materials" obtained via the BBC's RSS feed in their own web pages as long as the BBC is identified as the source of information and a link to the original article is provided.⁴⁰

Blog aggregator sites like Global Voices⁴¹ also make use of the RSS technology to aggregate the news items published on their members' blogs and integrate them into their own site. Global Voices imports the headline, the link to the blog post, and the first paragraph of an article as an abstract. When a reader is interested to learn more, she can click on the link and read the story on the original blog's website. But Global Voices' editors also produce original content by summarizing the blog posts in a certain region or concerning a certain topic. This activity is clearly covered by the fair use exception in the US and, despite the legal uncertainty, in the European Union by the exception for news reporting under Art. 5(3)c EUCD as long as it follows established journalistic practices. Global Voices also regularly draws news stories from blogs, which release their content either explicitly under a "Creative Commons" license or which explicitly tolerate the use of their material in order to enjoy the additional publicity created by Global Voices. It has been pointed out that the "copynorms" in

³⁸ Specifically the Creative Commons Public Domain license

³⁹ Reference to decision by Munich Higher Court Mainpost vs. Newsclub on the basis of EU database law.

⁴⁰ See BBC RSS Feed: Standard license terms *available at* <http://news.bbc.co.uk/1/hi/help/rss/4498287.stm> (last visited 22/11/2007).

⁴¹ www.globalvoicesonline.org

the blogosphere, i.e. the practice of copyright law which has emerged among bloggers, are much less restrictive than in the world of commercial news production.⁴²

Open Science collaboration

The projects analyzed in the case studies on Open Content Film / A Swarm of Angels, Wikipedia, Firefox, and Atlas are different from the ones studied so far as they are undertaken by organizations which do not (primarily) pursue profit maximizing goals. But this does not mean that these networks do not actively claim and use their intellectual property rights. In order to function, these problem solving networks need to create an open space of knowledge sharing and prevent individual participants from (mis-)appropriating the material and "capturing" the benefits for themselves.

The legal paradigm represented by statutory law has not been designed with open knowledge sharing in mind, but to recreate the artificial scarcity of tangible goods in the domain of intangible assets to allow for the appropriation of benefits. Therefore the case studies discussed in the following had to find legal arrangements to create and maintain an open space of collaboration in view and sometimes in contradiction to statutory law. We have already identified the legal risk of "getting infected" with IP protected material, which poses a significant legal risk to these problem solving networks.

Wikipedia and Firefox

Initially designed to preserve the free and open mode of software development, MIT researcher Richard Stallman developed a strategy that facilitates collaboration under equal terms among an amorphous group of collaborators and users. The "GNU Public License" (GPL), which governs this particular production strategy, is based on a "hack" of copyright law, which has also been called a "legal jujitsu":⁴³ First, a creator claims copyright law for her code and then offers it under the terms of the GNU public license to the general public. Under the terms of this license any user is entitled to use and modify the obtained software for her own purposes. But if users make modifications to the obtained code or include their own code into the obtained code, and decide to distribute the results, they agree to also release their contribution under the terms of the GPL. This is called the "viral" effect of the GPL.

Based on the GPL's idea of creating a new paradigm of IPR management by claiming copyright and then licensing it under the desired terms and conditions, a variety of "GPL-derivatives" have been created. Among those is the Mozilla Public License, which is used for example for Bugzilla, Firefox's bug database, and which contains special provisions to facilitate the creation of a proprietary version based on the free code, or the Debian Public license. For the sake of simplicity I will reduce the discussion to the GPL. To discuss all variants of "Free" or "Open Source" licenses would be beyond the scope of this paper and would introduce a lot of unnecessary repetition.⁴⁴

Two important GPL-type licenses deserve explicit mentioning though: The LGPL ("Lesser GPL"), which also permits the inclusion in proprietary code and which is often used for code libraries, e.g. for the GNU C library that comes with the gcc compiler to enable coders to use gcc and its libraries to develop both Open Source and proprietary applications. The other one

⁴² See Mark Schultz: Copynorms: Copyright and Social Norms *in* Law and Technology Scholarship paper 26 (2006) at p. 26.

⁴³ See Paul David: Using IPR to expand the research common for Science: New moves in 'legal jujitsu' available at: <http://www.dime-eu.org/files/active/0/david.pdf> (last visited 6/11/2007).

⁴⁴ For a more thorough discussion see e.g. J. Feller et al.: Perspectives on Open Source Software (2005).

is the GNU Free Documentation License (GFDL),⁴⁵ which was originally developed to cover the documentation written to accompany GPL'ed Open Source Software projects.⁴⁶ The GFDL has gained importance over the last couple of years, because all Wikipedia articles are released under the GFDL. The GFDL allows the controversial "freezing" of passages of a text. Initially devised to avoid the deletion of the copyright notice at the beginning of the text, it has recently been used to protect debated paragraphs on Wikipedia from vandalism, a controversial decision currently debated in the community.

It is a wide-spread (although erroneous) belief that by incorporating a piece of Open Source Software into a proprietary piece of software, the proprietary piece would lose its copyright protection or even render void any patents related to the piece of software. As a result many software producing companies have initially shied away from allowing the use of GPL-licensed software by their employees. This interpretation does not hold, because the need to license a contribution under the GPL to the general public arises only if one includes her own software in the GPL-licensed code and releases both as a distribution. There is no provision in the GPL to force a user to publish the changes made to the source code as long as it is not distributed.⁴⁷ Also, the GPL is only a license and can therefore not overrule statutory law. The legal effect of incorporating a piece of Open Source Software⁴⁸ into proprietary software and releasing both in a distribution results in a breach of contract, which entitles the copyright holder to claim damages from the breaching party. But the breach of contract does not affect the existence of patents or force the distributor to grant a compulsory license, as is sometimes claimed.

The licensing arrangements defined in the GPL and its derivatives are in particular useful for large-scale software projects developed by a distributed community, in which hundreds if not thousands of collaborators contribute major or more often also minor pieces to the project. The use of one standard license across the project avoids tedious negotiations among the community members. Most licenses are backed by strong organizations, e.g. the Free Software Foundation (FSF) for the GPL, which maintain and develop the license and represent their users.

Emerging case law in Europe seems to indicate that the courts are willing to enforce the terms of the GPL like any other license.⁴⁹ In the US, no precedent has been set so far by a court, but the software industry seems to respect the terms of the GPL, and violators have tended to give in when being contacted by the FSF.⁵⁰

Firefox and Wikipedia produce copyrighted products: software and articles. Wikipedia as a whole is also protected by database protection law in the European Union. In both the Firefox and the Wikipedia communities, the individual contributors keep the copyright to their creation and license it to the general public under the Mozilla Public License or the GFDL, respectively. They do not only grant others the right to use their creation, but also to change it and produce derivative works based on it. Therefore no creator can protect the integrity of

⁴⁵ http://en.wikipedia.org/wiki/Wikipedia:Text_of_the_GNU_Free_Documentation_License (last visited 23/11/2007).

⁴⁶ See <http://en.wikipedia.org/wiki/GFDL> (last visited 23/11/2007).

⁴⁷ See John Viega and Bob Fleck: Dispelling Myths about the GPL and Free Software Cyberspace Policy Institute working papers available at http://www.cpi.seas.gwu.edu/oss/cpi_rebuttal.pdf (last visited 24/11/2007).

⁴⁸ Although there are some fundamental ideological differences between "Free software" and "Open Source Software" (see <http://www.fsf.org/licensing/essays/free-software-for-freedom.html>) I will treat these terms as interchangeable in this paper, because the difference does not change the results of the analysis.

⁴⁹ See Christian Ahlert: Introduction to the GPL and Creative Commons in OII Resources available at http://www.oii.ox.ac.uk/resources/feedback/OIIFB_GPL1_20040903.pdf (last visited 23/11/2007).

⁵⁰ See id at p.4.

her writing or coding. The social organization underlying the network controls the integrity and consistency of the pieces of code or the articles. While the integrity of software can be judged – does run or does not run – the integrity (let alone the quality) of an article is harder to judge. In Wikipedia, designated administrators watch certain subject areas for vandalism. The Flesch readability score is used to identify difficult to read articles. To become an administrator, a member of the community must have contributed strongly for a substantial period of time and thereby have gained the trust of her peers in this particular field.

The GDFL contains a controversial clause which allows a "freeze" on certain parts of an article. While originally Wikipedia relied solely on the social network to correct error, recently a hierarchy of rights and write controls was installed to allow only registered users or in extreme cases only the administrators to edit certain articles. The purpose of using technical means is not to appropriate the content, but to protect the integrity and reputation of Wikipedia, which had suffered from spectacular acts of vandalism, e.g. the defacing of the article on Kazakhstan after the release of the (in)famous movie "Borat". Another incident was the allegations that some members of the U.S. Senate were editing their own biographies on Wikipedia to suppress unwanted facts about their past. The result of these cases were "editing wars", in which articles oscillated back and forth between two versions without reaching a steady state.

Wikipedia does not have a consistent check against "infection" with copyrighted material. So far, there have been no cases in which contributors have posted major amounts of copyrighted material on Wikipedia. Given the vast number of contributors and the relative openness of this production paradigm, it seems astonishing that such incidents resulting in potential claims by copyright owners against misappropriation of their copyright by the community have been rare so far. For Open Source Software, the case of SCO vs. IBM on the Linux source code⁵¹ and the case concerning the sourcecode for Digg's CSS page show that this risk is real. But the social network and the peer review mechanisms underlying both Wikipedia and the OSS community seem to provide sufficiently effective means of protection.

A Swarm of Angels

Another approach, which aims to strike a balance between the proprietary and the general licensing approach, has been developed by the Creative Commons (CC) movement, started by a group of academics around law professor Lawrence Lessig in 2001.⁵² CC provides a modular licensing system, which allows every creator to selectively grant "some rights" to the public. We have already seen one example of a CC license in the News aggregator example. The content produced by Global Voice editors is licensed under a Creative Commons Attribution Only License, which allows others to copy, distribute, transmit and adapt the work provided it is attributed to Global Voices.⁵³

On the CC homepage, a creator can select the permissible uses and a tool on the CC web site "generates" the appropriate license in the form of a legal document. The dimensions of the CC licenses include among others the permission to modify a work, to create derivative works, or to use the work for commercial purposes. Since CC has recently expanded to several major jurisdictions, localized versions of the CC license have been made available, which makes licensing across different legal territories reasonably easy.

A very complex project using Creative Commons licenses was analyzed in the case study on "A Swarm of Angels". Of all cases, film production is the most challenging for a couple of reasons:

⁵¹ See Pamela Jones *supra* fn 23.

⁵² <http://creativecommons.org> (last visited 22/11/2007).

⁵³ See <http://www.globalvoicesonline.org/global-voices-attribution-policy> (currently unavailable); see <http://creativecommons.org/licenses/by/2.5/> (last visited 22/11/2007).

(1) The legal complexity of film production is the highest of all cases studied, because of the multitude of rights and the multitude of players involved. Performers, screenplay writers, producers, and musicians hold rights on their creation and their appearance respectively.⁵⁴ While under the "work for hire" doctrine the copyright is automatically assigned to the employer (the hiring agent) or assigned by contract (in the EU), the copyright of the work of free collaborators remains with the individual and must be licensed separately.

(2) The degree of organization seems to be the lowest of all case studies. While organizations like the FSF for free software development, the Wikimedia foundation for encyclopedia production, and the private actors Digg, Sermo, etc. in news and information production are powerful organizations, which shape the space and create effective legal tools, there is no such group in the Open Content Film Case. The "Swarm" is a loosely coupled network of collaborators with no apparent internal organizational structure. The "traditional" film industry solves the issues surrounding the multitude of creators and rights by broad contracts, which assign all rights to a central authority, normally the production company, which acts as the licensor of the completed film. The low degree of organization at A Swarm of Angels prevents this model, because of the lack of a clearly identifiable entity which could act as a central copyright holder and as a licensor respectively. A "Swarm" or a partnership in legal terms is not a juristic person and can therefore not be the holder of rights.

The governing legal framework for the production of "A Swarm of Angels" is the Creative Commons license. The Creative Commons license is a toolkit to build a license between an individual licensor and a licensee. In contrast to the GNU-style licenses, it has not been adjusted to cope with a multitude of creators. But also in contrast to Wikipedia or Firefox, ASOA is not a fully open community. In order to collaborate, a collaborator needs to "join the Swarm", i.e. to become a member of the ASOA partnership. In the membership agreement, the new member agrees to the use of a Creative Commons License to govern the production of all major creative assets of the project. The Swarm has decided to choose a specific license ("CC-NC-SA") as the CC license of choice, which permits all non-commercial screenings and copies and the creation of derivative works as long as they are also non-commercial and attribute the "Swarm" as the creator. In the second IP-related clause of the membership agreement, the member agrees not to exercise "any control over the copyright (...) of any Project asset", including his own contribution to the project. This contract between private parties creates an open space of collaboration, which is not free of copyrights. On the contrary, a network of rights governs all contributions and jointly created products, but the members mutually agree not to exercise these rights.

Decisions within the Swarm are taken by popular vote. A recent decision was to generate further revenue by licensing the right of commercial use separately. But with whom would a potential licensee negotiate a license? The rules of the partnership empower every "partner" to act on behalf of the partnership. ASOA founder Matt Hanson recently suggested the creation of the position of "swarm representative", who would be entitled to represent the Swarm in such issues and would act as a first point of contact. The Swarm representative would also have to bring legal action against infringers of the Swarm's copyright, e.g. by using an ASOA product commercially without having obtained the appropriate license. The Swarm by itself could not bring legal action, because it is not a legal person.

ASOA is following a dual licensing strategy, which provides a CC license to the general public for non-commercial use without remuneration, and sells the license for commercial use separately for remuneration. The Swarm exercises its right selectively to capture the benefits from commercial use and achieve its goals of wide distribution in noncommercial settings.

⁵⁴ See Lessig *supra* fn. 13.

Trademark law and domain names

Sometimes neglected, but nevertheless of legal importance, are the domain names under which every network operates on the Internet. In particular in the early days of the Internet, there were several cases brought by companies who had found that their names had already been "taken" by somebody else as a domain name on the Internet. The legal practice that has been established since then in principle follows the rules of trademark law, which prioritizes legal certainty for the consumer over the older right of a registrant. The exception to this rule is names of persons or cities - but this exception has not been applied as a general rule in all cases.

The domain name system is administrated nationally by local domain registering organizations. Possession of a domain name in one country does not imply an entitlement to the same domain name in any other country. Domain names are allocated on a "first come - first served" basis. For example, "Sermo.fr" is not the French domain of the US-based health information company Sermo, Inc., but a French manufacturer of car parts. "Sermo.de" is owned by a domain merchant which is currently featuring advertisements for dubious credit institutes, but also indicates on the top of the page that he intends to sell the domain name. The failure to secure the appropriate domain names means that Sermo, Inc will have to pay a considerable amount of money to obtain the domain or, in the French case where a company with the same name is maintaining its business under the domain, acquire a new domain and invest in promoting the new domain name in France.

BBC and IHT have carried their strong brand names achieved by producing news in the offline world to the online space. All other networks are using fantasy names (Wikipedia, Sermo) or acronyms (FSF.org, gnu.org). Creativecommons.org is the exception to this rule, because it uses a domain name that is composed from two words which can be found in the dictionary. To claim protection as a trademark, a sign must have been registered as a trademark. Sermo, Seriosity, Digg, OhMyNews, Wikipedia, Creative Commons and Innocentive have registered trademarks and claim trademark rights in the legal fine print on their homepages. Creative Commons has filed an exhaustive set of trademarks, which do not only protect the name "Creative Commons", but also the "double C" logo and any of their other icons representing the elements of the CC license.

Emerging patterns and conclusion

During the analysis of the different types of Distributed Problem Solving Networks we have identified two different basic strategies for using intellectual property law: Proprietary and Open strategies. Digg, Sermo, and OhMyNews use copyright law to appropriate the contributions of their contributors and/or the created end-products. In Firefox, Wikipedia, ASOA the contributors "own" the end product collectively.

Both strategies are based on intellectual property rights. The "copyleft" rhetoric often employed to describe the Open Source paradigm may lead the layperson to think that the "open" collaboration was a space without Intellectual property rights. In fact, the opposite is the case: IPR is actively used in these networks to keep the space of collaboration and the end-products "open", i.e. to avoid appropriation of the end-products by individuals. In the proprietary strategy the contributor assigns her rights to a right-holding organization, e.g. the intermediary like Sermo, Digg, or OhMyNews, which selectively releases the contributions and the created products to the network and the general public. In "open" strategies, e.g. in Firefox, Wikipedia, ASOA, or Global Voices, copyright remains with the creator, but its exercise is restricted by the terms of the mutual agreement between the collaborators.

In the proprietary strategy, the degree of access a contributor will have to her contribution and the resulting product after assigning her copyright to the intermediary is determined by the intermediary in view of the contributors' motivation to contribute. It is in the intermediary's interest to appropriate as much information as possible *and* to attract as many collaborators as possible at the same time. Hence the intermediary is restricted in their attempt to fully appropriate the contributions by the utility function of the members of the network. Since Problem Solving Networks are, like most networks, characterized by high network effects and the individuals face high switching cost, intermediaries will be able to increase the degree of appropriation over time without losing their members. Members will only leave if the utility they get elsewhere minus the switching cost is higher than the perceived utility they currently get from contributing to a particular problem solving network. In the "open" strategy, each contributor has full access to her contribution, and the contributions of the other collaborators as well as the end-products, and is free to use them under the terms of the contract.

The degree of access and the permissible uses are clearly regulated in all case studies.

Digg, Sermo, OhMyNews, and A Swarm of Angels ask their contributors to accept the terms of use or of membership respectively, before allowing them to start contributing. The specific terms are set by the intermediaries in Digg, Sermo, and OhMyNews. The "Swarm" of ASOA has decided on the details of the license during the development of the project. One could say the terms of the license are "peer-produced". In Firefox and Wikipedia, there are strong foundations governing the license. But since there is no formal "membership", a contributor "joins" the community by contributing something under the license agreed for the project.

The different degrees of freedom to access are also reflected in the tools provided to access the end-products. Digg, Sermo, and OhMyNews provide their users with user interfaces, which allow only partial extraction of data from their database. News aggregator Digg decides which statistics about the activity of its users they provide. The tools used by Firefox and Wikipedia, CVS and Wikis, allow each member to access and modify all individual parts and the end product.

In the case studies we could not observe a connection between the IP regime and the willingness to share. While the "public good motivation", i.e. the decision to contribute something to a shared resource, plays an important role for the contributors of ASOA, OSS and Wikipedia, in Digg, Sermo, and OhMyNews users seem to be motivated by the utility they get from participating in the community. Therefore the users of the latter networks do not mind that they do not own the copyright.

This conclusion has two important implications: Both the network and the intermediary derive benefits from the collaboration, and appropriating the contributions and the end products is not the only way of capturing benefits: Digg, Sermo, OhMyNews own the products, but their users seem to derive sufficient benefits to invest their time and effort and contribute to the platforms. In Firefox, Wikipedia, and ASOA the end products are owned collectively by the community. Again, every individual seems to derive sufficient benefits to be motivated to contribute.

The difference between these two groups is that in the Digg, Sermo, and OhMyNews cases, the intermediary also captures significant monetary benefits from offering services like advertising or provision of privileged access, while in the Firefox, Wikipedia, and ASOA cases, the organization itself does not primarily attempt to monetize the created assets. The efforts to sell licenses for commercial use at ASOA reflect rather the attempt to raise more capital for further productions than to satisfy the demands of the shareholders.

The decision to appropriate or open up is not a binary decision. Digg, Sermo, and OhMyNews hold monopoly power over a required productive resource, the database, and therefore access to the end products of the network, but do not claim copyright for the contributions of the members (Digg) or grant their users a license to publish their contributions elsewhere (Sermo and OhMyNews). The decision on what to appropriate and

what to open up is a strategic decision governed by the network's business model, the motivation of the collaborators, and an assumption on what will be the valuable assets of the network in the future. We have seen in the case studies of Digg and the discussion at Sermo that intermediaries are not totally free to set the rules, but need to balance their interest with the motivation of the collaborators.

DPSNs do not only rely on the contributions of their members, but also on the interaction with other sources of information, i.e. a flow of material between the network and the outside world. All DPSNs, regardless of their IP strategy - appropriation or open collaboration - need to have appropriate checks in place, which protect the network from the legal risk of being infiltrated with copyrighted (or potentially even more harmful: patented) material. In some instances it is difficult to judge what is legal and what not, because of the fuzzy scope of the copyright law exceptions, in particular in the European Union, as seen in the news aggregator case. Although the primary infringer of copyright law is the individual member, the network may be liable for secondary / contributory infringement if it has not bothered to install appropriate checks or has no process in place to act on receiving notifications of copyright law infringements. Most networks (for example: Digg, Innocentive,⁵⁵ Creative Commons⁵⁶) offer and publish therefore a process for copyright owners to raise their concerns about a certain piece published on their web sites.

We have also seen that freedom of contract allows the creation of alternative regimes of intellectual property law. Claiming copyright, and licensing it under own terms to the general public, is a powerful tool for creators to shape the permissible uses of her work in accordance to her beliefs or business needs. The lack of a unified standard of copyright law across different legislations creates significant transaction cost, in particular when working with such licensing arrangements, and creates risks when expanding a Problem Solving Network to different jurisdictions. This is particularly painful in the European Union with their small legal territories, where despite the attempts to harmonize copyright law, in practice no common legal standard has been established yet. Organizations like Creative Commons can offer valuable support by providing "translations" of their licenses for several jurisdictions, although so far no cross-border case has been litigated on the grounds of a CC license to see if courts in different jurisdictions really have a similar reading of the translated license.

Open questions for further research

- How do networks decide to open or appropriate a particular aspect of their intellectual creation? (Is there a formula to find the appropriate strategy as a result of business strategy, motivation of members, assumption of future value of assets?)
- Is there a dominant IP strategy / paradigm for each category of the taxonomy or ontology?

⁵⁵ See <http://www.innocentive.com/copyright.php> (last visited 22/11/2007).

⁵⁶ See <http://creativecommons.org/dmca/> (last visited 22/11/2007).

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All the papers and case studies are available on the project website at:
<http://www.oii.ox.ac.uk/research/project.cfm?id=45>