Dealing with Patent Fragmentation in ICT and Genetics: Patent Pools and Clearing Houses

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Recent years have shown a remarkable increase of patents in the field of ICT and genetics. The omnipresence of patents in those areas has raised serious concerns about access to and use of ICT and genome related inventions, as the expansion of patents in those fields might result in a patent thicket. Collaborative licensing models, such as patent pools and clearing houses, have attracted great attention, as they might serve as a mechanism to deal with patent thickets in ICT and genetics and facilitate access to ICT and genomic patents. It remains to be seen to what extent the lessons from the collaborative rights experiments in ICT and genetics, can be applied in a cyberinfrastructure setting.

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Introduction

Recent years have shown a drastic increase of patents in the field of Information and Communication Technologies (ICT) and genetics. For example, up to the end of 2006, the United States Patent Office (USPTO) granted 18,215 patents containing the term 'nucleic acid' in the claims. Of those patents, 2,012 were granted in 2006 alone.

The omnipresence of ICT and genetic patents has raised serious concerns about access to and use of related inventions, as the proliferation of such patents might result in a 'patent thicket': an overlapping set of patent rights, requiring those who seek to commercialize new technology to obtain licenses from multiple patentees (Shapiro, 2001). Especially in genetics, a patent thicket may result in economic and welfare losses through decelerated technological progress in the development of cures against diseases threatening mankind. Even though the existence of a potent 'anti-commons effect' of patents in genetics (Heller and Eisenberg, 1998; Heller, 1998) has not been documented with wide concrete empirical data, as yet, some cases seem to emerge in the diagnostics field (NRC, 2005). It is therefore important and timely to reflect on mechanisms to 'clear' patent thickets in genetics. Collaborative licensing models, such as patent pools and clearing houses, may play a significant role in facilitating access to gene patents and 'clearing' the patent thicket (Van Overwalle, *et al.*, 2006).

Patent pools

Concept

One of the mechanisms which have received wide attention, both in the past and the present, to deal with patent thickets are patent pools (Verbeure, *et al.*, 2006). A patent pool is an agreement between two or more patent owners to license one or more of their patents as a package to one another or to third parties willing to pay the royalties associated, either directly by patentees to licensees, or indirectly through a new entity specifically set up for administering the pool (see [Figure 1](#)) (Clark, 2000; Klein, 1997a; Merges, 2001).

Figure 1: Comparative illustration of the different licenses needed in the absence (a) or presence (b) of a patent pool. P1–P4 represents the patent holders. L1–L4 represents the licensees. In the absence of a patent pool, licensees have to enter into negotiations with all the patent holders, which is a time consuming and expensive process. By contrast, in the presence of a patent pool licensees turn to the patent pool for acquiring the rights as one package, which results in simplification and a significant reduction of transaction costs.

Examples

Patent pools are by far not new and have been applied occasionally but regularly since the nineteenth century. The first licensing pool was established in 1856 among members of the sewing machine industry (Merges, 1999). A further prominent example for an early patent pool is the 1917 aircraft pool that was formed between almost all U.S. aircraft manufacturers (Dykman, 1964). This patent pool was crucial to the U.S. government entering World War I.

In the 1990s, several patent pools with a worldwide coverage were formed in the ICT sector. In contrast to the early patent pools, those modern pools cover the relevant patents for one particular technology only, rather than covering all patents of an industry. Further, their licensing rules are more complex than those of the early licensing pools (Merges, 1999). One of the most prominent modern patent pools is the

pool related to the digital video compression standard known as MPEG-2. The MPEG-2 pool emerged as a consequence of MPEG-2 having been established as international standard by the International Standards Organization (ISO) in 1995. The MPEG-2 technology is covered by more than 425 essential patents owned by some 21 patent holders (Futa, 1997). In the presence of a patent pool, users of the technology can acquire access to this bulk of patents with one, single license (Klein, 1997b). In contrast to the early patent pools the MPEG-2 pool has a central entity, the MPEG LA, which administers the patent pool on behalf of its members based on a set of formal codified internal rules. These rules also organize the admission of new members to the pools, after having been evaluated in detail by experts, and the resulting changes in the licensing profits among the members (Merges, 1999). A second important patent pool of the 1990s is the DVD pool. Similar to the MPEG-2 pool, the DVD pool emerged as a consequence of setting a standard for the DVD technology. In 1995, four core DVD developers decided to form a patent pool and invited secondary parties to claim rights to DVD-related patents. After failed negotiations a first patent pool emerged among two of the core members. In response, a second patent pool was founded around the two remaining members of the initial group of core developers.

A valuable effort has been reported to establish patent pools in the biomedical field as well, namely the Severe Acute Respiratory Syndrome (SARS) corona virus pool. In response to the outbreak of SARS, the World Health Organization (WHO) set up a network of laboratories to help control the disease, which led to the isolation of the causative virus and the sequencing of its genome. Two groups are credited with discovering the SARS genome, independently from each other, and several of the contributing laboratories filed patent applications incorporating SARS genomic sequence data. Further research then led to the filing of additional patent applications by a multitude of public and private sector entities. The WHO set up a SARS consultation group, who proposed "that a strategy be developed, in consultation with stakeholders, to address potential SARS corona virus related intellectual property issues and, thus, enhance development of intervention approaches." At present, the relevant parties have been identified, and principal agreement has been gained, officially, by the signing of a letter of intent. Highly qualified technical and legal experts have assisted the parties during the chain of negotiations. The resulting pool, should the parties conclude a full agreement, will be set up in the U.S., followed by attempts to set up pools elsewhere (Verbeure, *et al.*, 2006; also see Simon, in press).

Regulations

In an attempt to deal with potential anti-competitive effects of (multiparty) licensing agreements such as patent pools, the United States (U.S.) antitrust agencies, the European Commission and the Japanese Fair Trade Commission (JFTC) have established guidelines. In 1995 the U.S. antitrust agencies have developed the *Antitrust Guidelines for the Licensing of Intellectual Property (IP Licensing Guidelines)*. In the European Union the major competition rules related to technology licensing are laid down in the *Commission Block Exemption Regulation (EC) No. 772/2004 on Technology Transfer Agreements* and the *Guidelines* on the application of Article 81 of the EC Treaty to technology transfer agreements. More recently, the JFTC issued its *Guidelines on Standardization and Patent Pool Arrangements* that apply the same general principles.

Close examination of foregoing guidelines, regulations and related decisions provides valuable information on the attitude of the competent U.S., European and Japanese authorities towards patent pools. In short, patent pools should avoid causing anti-competitive restraints and will most likely be accepted if they meet a series of conditions (see [Figure 2](#)).

☒ Validity of the patent	A patent is valid from the date of grant until the date of expiration defined by law, which usually is 20 years from the date of filing.
☒ Essentiality of the patent	A technology or patent is deemed to be essential if there are no substitutes for that technology inside or outside the pool and the technology in question constitutes a necessary part of the package of technologies for the purposes of producing the product(s) or carrying out the process(es) to which the pool relates.
☒ Independent expert	An independent expert identifies and values the essential patents related to the technology.
☒ Non-exclusive licenses to the pool	A license is non-exclusive when one or more licensees are granted the right to use the licensed technology covered by the patent(s) during the term of the license and when the licensor retains the right to use the licensed technology and associated patent(s) as well.
☒ Alternative technologies	Licensees are free to develop and use alternative technologies.
☒ Grantback provisions	A licensee should grant the licensor non-exclusive licenses for improvements of the licensed technology. This should be limited to essential patents and be settled on reasonable terms in order not to discourage further innovation.
☒ Royalty allocation formula	Royalties are distributed amongst the licensors according to an agreed allocation formula set forth in the patent pool arrangement.
☒ FRAND-terms	Royalties paid to the pool by the licensees should be fair, reasonable and non-discriminatory (the so-called "FRAND-terms"), and licenses granted by the pool should be non-exclusive.
☒ Safeguards for sensitive business information	Competitively sensitive business information on the licensee is safeguarded in case auditing mechanisms for the management of the royalties are established.
☒ Dispute resolution mechanism	An independent and therefore neutral dispute resolution mechanism in the agreements setting up the pool is desirable.

Figure 2: Checklist for a patent pool arrangement based on the indications laid down in U.S. *IP Licensing Guidelines* and *Business Review Letters*, the *EU Transfer of Technology Guidelines* and individual decisions and Japanese *Guidelines on Standardization and Patent Pool Arrangements*.

Lessons from ICT?

As the patent pool model proved to be quite successful in the ICT sector, the question arises whether the patent pool mechanism can be applied to genetic inventions on a large scale. The Organization for Economic Co-operation and Development (OECD) considers the patent pool concept to be interesting for biotechnology but has some doubts as to whether the technologies and markets for genetic inventions are amenable to pools (OECD, 2002). The medical biotechnology industry is perceived as fundamentally different from the electronics and telecommunication sector. Especially the generation of standards as used in electronics and telecommunications for interoperability of electronic devices is seen as a strong incentive for setting up a patent pool. However, in the field of genetics, standards can prove to be an incentive as well. A genetic standard should not necessarily be looked at in terms of a technical specification, but could present itself as a set of mutations, recognized by the international scientific community, or reflecting national or international best practice guidelines for genetic testing for a

particular disease such as the standards and guidelines issued by the American College of Medical Genetics for Cystic Fibrosis or Huntington's disease (Ebersole, *et al.*, 2005a; Ebersole, *et al.*, 2005b; Verbeure, *et al.*, 2006). Such guidelines could have a start-up role in the establishment of corresponding patent pools.

Clearing Houses

Concept

An alternative mechanism supporting licensing negotiations is the clearing house model. The term clearing house is derived from banking institutions and refers to the mechanism by which cheques and bills are exchanged among member banks in order to transfer only the net balances in cash. More recently, the concept has acquired a much broader meaning and is used to describe almost any mechanism whereby providers and users of goods, services and/or information are matched (Krattiger, 2004) (See [Figure 3](#)). The platform may provide information on patented technologies, bring together potential providers (licensors) and users (licensees) of patented technologies and may provide additional services, e.g. negotiating licensing conditions, developing standard licenses, collecting and distributing royalties.

Figure 3: Comparative illustration of the different licenses needed in the absence (a) or presence (b) of a clearing house. P1–P4 represents the patent holders. L1–L4 represents the licensees. In the absence of a clearing house, licensees have to enter into negotiations with all the patent holders. In the presence of a clearing house licensees turn to the patent pool for acquiring the rights.

Various clearing house models can be distinguished (see [Figure 4](#)). A first model is the *information* clearing house, which provides a mechanism for exchanging technical information and/or information related to the patent status of that information. A second model, the *technology exchange* clearing house, is inspired by the Internet-based business-to-business (B2B) model. This model provides an information service that lists the available technologies to allow technology owners and/or buyers to initiate negotiations for a license. Unlike disclosing pure information, potential buyers already know that the technology is indeed available for licensing if offered in such a clearing house. Technology clearing houses thus aim at initiating licensing negotiations, but generally these negotiations will take place

without the actual interference of the clearing house. Nevertheless, it may provide more comprehensive mediating and managing services (Graff and Zilberman, 2001; Krattiger, 2004). The third and the fourth clearing house model are more advanced types aiming not only to provide access to but also to standardize the use and remuneration of the (patented) inventions. In a *standardized licenses* clearing house access and use are offered via standardized licenses (van Zimmeren, *et al.*, 2006). The *royalty-collection* clearing house comprises all the features of the previous models, but also cashes in license fees from users on behalf of the patent holder in return for the use of certain technologies or services. The patent holder is being reimbursed by the clearing house pursuant to a set allocation formula. In addition, a royalty collection clearing house may offer monitoring of the patents transferred to the clearing house and an independent dispute resolution mechanism.

A rather unique type of a clearing house is the *open access* clearing house. This type of clearing house does not only foster free access to (information about) inventions, as its name may suggest, but also standardized *free* use of inventions (van Zimmeren, *et al.*, 2006).

Figure 4: Five types of clearinghouses can be distinguished: The first two models merely provide access to (protected) information. The remaining three types aim at providing both access to and (standardized) use of the patented genetic inventions. A royalty collection clearinghouse may offer monitoring and independent dispute resolution on top.

■ Examples

At present, a variety of instructive examples of clearing houses exists. A well-known example of a general patent *information* clearing house is Espacenet from the European Patent Office (EPO). This

online portal provides free information on every technology, for which a patent application has been filed at the EPO, including technical information as the patent abstract and the full patent as well as information on the patent applicant and the inventors (names and addresses). Espacenet hence allows potential patentees to check for relevant patents in their technology field and helps avoiding unwilling patent infringement. There are also specific patent biotech search platforms, such as Patent Lens. Patent Lens is established in the framework of the CAMBIA BIOS Initiative (Biological Innovation for Open Society) and offers a free, fully text-searchable database of U.S., European and Australian agricultural and life science patents, as well as complementary advisory and educational services.

An example of a global *technology exchange* clearing house is BirchBob — named after the first names of the authors of the Bayh–Dole Act — which is an Internet-based platform that brings together offers and demands for innovations, and provides services dedicated to finding and facilitating contacts between technology holders and technology seekers. Currently, there are more than 40,000 inventions available at BirchBob. Another example is yet2.com, a virtual marketplace for technology, which offers besides patent information also a variety of services that aim at maximizing benefit from intellectual property. Yet2.com claims that their clients represent 40 percent of the world's R&D capacity because big firms like Procter and Gamble, Canon, Siemens and Bayer can be found among their clients. Specific health care technology platforms include Pharmalicensing and TechEx, which provide online support for partnering and licensing in the biopharmaceutical and biomedical industry. Specific biotechnology platforms include the Public Intellectual Property Resource for Agriculture (PIPRA).

An example of an upcoming, worldwide *standardized licensing* clearing house is Science Commons (Van Overwalle, *et al.*, 2006; van Zimmeren, *et al.*, 2006). This organization aims to encourage data sharing, technology transfer and intellectual property licensing, by stimulating stakeholders to adopt standardized licenses in order to create greater transparency. Its sister organization, Creative Commons, has already been in operation for a couple of years facilitating the use of copyrighted material (such as music, movies, photos, books, course materials, scientific and medical literature — *e.g. PLoS Biology*) by way of standardized, simplified licenses and has been very successful.

Classical examples of *royalty collecting* clearing houses include copyright societies for playing music on air and during public performances, such as the American Society of Composers, Authors and Publishers (ASCAP), the Authors Licensing and Collecting Society (ALCS) in the United Kingdom and other national agencies, such as the Belgian SABAM (Belgian Society of Authors, Composers and Publishers).

A well-known example of an *open access* clearing house in the life sciences is the SNP Consortium. The goal of the non-profit SNP Consortium is to identify and collect single nucleotide polymorphisms (SNPs) and create and make the SNP map of the human genome publicly available, without any proprietary rights, in order to enable further drug discovery (van Zimmeren, *et al.*, 2006).

Lessons from copyright

It has been suggested that royalty collection clearing houses, which are quite successful in copyright, would be set up in the field of patents and genetic inventions (ALRC, 2004; Gold, 2002; Graff and Zilberman, 2001; NCBe, 2002; OECD, 2005; HUGO, 2003; Krattiger, 2004). However, no working examples exist in genetics at present. One of the main reasons for this lacuna is that the establishment of a royalty collection clearing house is a long and expensive process and only worthwhile if many patent holders or an entire branch of industry participate (van Zimmeren, *et al.*, 2006). It remains to be seen whether patent proprietors with a strong portfolio would be willing to voluntarily participate in such a far reaching model, where patent holders no longer have ultimate control over all transactions with regard to their patented technologies managed by the clearing house.

Conclusions

Quite recently, collaborative licensing models, such as patent pools and clearing houses, have been explored in the field of ICT and genetics, to examine to what extent these models are helpful in solving potential problems resulting from the patent thicket. Both patent pools and clearing houses have major

advantages, as they make the existing technology landscape more transparent and may reduce transaction costs for the participants. Various lessons can be learned from the experience in the ICT and the genetic sector. First, standards may act as a valuable (and necessary) incentive to set up patent pools. Second, the establishment of collaborative licensing models is probably only worthwhile if many patent holders or an entire branch of industry participate. Third, the establishment of a pool or clearing house is a long, complex and cumbersome trajectory, as agreements on valuation of (patented) technology and redistribution of royalties is at stake. But, on the other hand, the pool and clearing house model might be used by governments, as an instrument to foster accelerated technological progress and open forms of innovation.

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Relevant Web sites

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Authors Licensing and Collecting Society: <http://www.alcs.co.uk/>.

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Creative Commons: <http://creativecommons.org>.

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