Intellectual Property Rights in Computer Science

Bujlow, Tomasz

[Link to publication from Aalborg University](#)

Intellectual Property Rights in Computer Science

Tomasz Bujlow

Section for Networking and Security, Department of Electronic Systems
Aalborg University, DK-9220 Aalborg East, Denmark
tbu@es.aau.dk

Abstract—**Understanding of Intellectual Property Rights (IPRs) is crucial in order to facilitate commercialization of academic research and research performed in private companies. Unprotected inventions are usually wasted inventions. Research and development take a lot of time and require significant amount of money spent on equipment, technology, and salaries. Therefore, it is very important to secure the outcome by restricting other people from copying and selling the invention. There are several ways of protecting our work: patents, design rights, copyrights, and trademarks. In software engineering the last two – copyrights and trademarks – are broadly used. Copyrighting computer programs is not only made for obtaining proper license fees in the future. Free software uses copyright to secure its freedom and to prohibit other users from making it proprietary and selling it for money. Making an invention must be preceded by looking at the existing market. Proper market analysis is needed to assure that we will not waste time for innovations which are already made, or for ones, for which will not be a need.**

Index Terms—**Intellectual Property Rights (IPRs), copyright, patent, trademark, design right, copyleft, free software, GPLv3**

I. INTRODUCTION

Public and private companies spend every year giant amount of money to create their new products, to make them attractive to the potential customers, and to sell them for a good price. Development is a very expensive process, so to be able to create innovations, the companies must have be in possession of means to secure the economical side of their investments. There are many different law instruments which can be used to protect the business – they are called Intellectual Property Rights (IPRs). The choice of the proper IPR differs depending on what we want to protect: the idea, the design, the form of presentation, or the brand used to attract the customers. The knowledge of the available ways of protection is crucial while someone tries to develop an innovative solution and sell it on the market. It is why the innovation cannot exist without IPRs and without appropriate marketing strategies.

The paper is structured as follows. At first, I take a look at the market analysis, as the first step in assessing if the prospective idea has a chance to be sold and pay back the money which we put into the development. Then, I briefly describe and compare various protecting strategies, as patents, trademarks, design rights and copyrights. All these possibilities are evaluated regarding their popularity and usefulness in computer science. Finally, I conclude the paper with the evaluation of different aspects of making business, which is based on an innovative idea.

II. MARKET ANALYSIS

A. General considerations

Before starting to design a new product, it is always good to see how good it fits the market. The outcome of our investment will be always dependent on the consumers. If our product does not fit their needs, the work used to invent and produce it is totally lost. Therefore, the first step of an invention should be the market analysis. It will give the inventor (and the investors) the answer about all commercial aspects of the invention. For example, if the product is needed and desired by someone (and if yes, by who), what are the sales capability. Market can be also created by an invention, if the customers will see this invention as useful, and nothing similar existed in the past. However, regardless of that, if the market for the product already exists or will be created, it is necessary to evaluate how big it is (or will be). Identifying strengths and weaknesses of the product is needed in order to be able to deal with the competitors, for example, by proper advertising, which shows the advantages of the product. There are generally 2 different customer markets: business to business (B2B) and business to customer (B2C). Focusing on the correct market can save a lot of time and money [1].

There are several methods which can be used for market analysis. They are usually divided into qualitative (as personal interviews and focus groups) and quantitative (as surveys, observation, or experiments). Personal interviews and focus groups are quite time-consuming, but they allow to obtain more deep and sensitive information than the quantitative means. Furthermore, the personal interaction avoids misunderstanding of questions. Regarding surveys, personal surveys very often give better results than telephone interviews or online surveys. Telephone surveys tend to make the people angry, as the questioning session is quite long and it requires from them a lot of patience. On the other hand, online surveys are often treated as spam and deleted without prior reading. Postal questionnaires as quite expensive and inefficient method are considered now as obsolete [1].

B. The use in computer science

In the field of computer science and software engineering there are no special considerations regarding the market analysis. All the points listed above are valid.

III. PATENTS

A. General considerations

Patents are generally used to protect new ideas from being commercially used by others. The original producer often spends a lot of money (as 100 M$ in the medical field) for research and marketing [2]. In exchange for the complete disclosure of the invention, the inventor is granted the permission to stop other people from using his product, technology, or processes, without his permission. According to the European Patent Convention, patents shall be granted for inventions, which are *new*, involve an *inventive step*, and which can have *industrial application*. An invention is considered as novel, if it is not identical to an already existing one. The absolute novelty of an invention can be destroyed by any kind of publication, lectures, presentations, posters, exhibitions, or even a discussion, if it was performed in an indefinite group of people. The second of the necessary features which make the invention patentable was the inventive step, which is a subjective quality – it means that the invention must not be obvious for a person skilled in the art [3].

It is worth remembering that the patent application must be filled in and submitted for every country in which we want to have the patent. A potentially patentable invention must be described in a way, which enables a skilled person to reproduce the invention. It means that all necessary details must be fully disclosed in the patent application. Otherwise, the patent, even if issued, will be invalid. At the same time, the patent claim should be as broad as possible – description of all the details, which are not needed to reproduce the patented work (or which can be replaced with other steps), should be avoided. A patent has only the commercial effect; research and development is still permitted. However, the patent prohibits commercial use, production, sale, import, and offering of the patented goods [3].

Patent databases are also a very valuable source of information, which should be used and browsed, before someone starts working on finding a solution for an existing problem. It is assessed that 80 % of technical information worldwide is available only in patents. Because of incorrectly performed search (very often omitting the patent databases), around 25 % of all research and development is wasted on inventions, which are already made [4].

B. The use in computer science

The use of the patenting technology in software engineering in quite limited. In the European Union it is not advised (and not easy) to patent computer programs. There is one exception when software can be protected – we can protect a piece of software if it directly deals with some innovative hardware feature, as a part of that feature. It is, however, a kind of hack, which gives a possibility to exploit the law, but it is not which was the intention of the creators of the patent law.

Nevertheless, patent claims are one of the most often discussed issues in the hardware field of computer science. Patent fights between Apple and Samsung, and sentences in court trials between these two companies are the best evidences that the patent law is somehow broken. Patents were created to secure and stimulate innovations. Unfortunately, in these cases we can see that patents are often used to stop new inventions. Trading patents leads to the situation, when a big company with strong economy is buying patents for innovations which were never even partly developed by the company. These patent-buyers are not even interested in the technology described in these patents – they just want to use their power to prohibit other companies to use this technology, for example, by imposing giant license fees. This makes the patent technology unavailable to anyone. Lets consider the following example. There are companies A, B, C, D, and E. Company A is a big corporation with a very good economy. Companies B, C, D, and E are small-size enterprises. Company A has a technology for developing a product X. The technology and the product are quite old, inefficient, and they have lot of drawbacks. But the company invested too much money into development of this technology and the product, to switch to another one. Company B developed a new technology and a new product, which are much better than the technology and the product of company A. Unfortunately, company B does not have money and resources to develop the product. There are, however, companies C, D, and E. All of them have necessary resources, and they can start the production as soon as they get license to use the technology and produce the product from company B. However, the company A (as it is big and can afford bigger expenses) offers the company B buying the patent for a big sum of money. Company B agrees and the patent is sold to company A. Then, company A put the patent into the wardrobe and it is happy from the result: nobody will be able to produce anything better than the company A itself. And company A is not going to make use of the patent either, because switching to the new technology would generate huge costs. The result is really very bad and sad: the patent – an instrument, which was created to protect small innovators from big companies – starts to work against the idea. Everything according to the law... The only solution, which I can see to solve that problem, is to change the patent law by introducing a new rule: if a patent is not used for a certain amount of time, it automatically expires. As it can be read in the next paragraph, such rule exists regarding trademarks. Then, the law would prohibit people from buying patents, if they are not going to make any use of them.

IV. TRADEMARKS

A. General considerations

Trademarks were created in order to distinguish goods and services provided by one company from ones provided by another company. So the trademark is a kind of graphical signature, business identifier, which can consist of words, logos, color, slogans, and nowadays also of sounds, smell, and taste. The logo should be done in negative print, as it is better distinguished by the customers. Also, it is worth investing some money to create a good symbol from the beginning – changing the logo is a very expensive operation, since it takes

a long time for users to associate the new logo with the already known brand. It is true especially for big businesses (as Coca-Cola), which stick to the same logo all the time. Trademarks are usually valid only in the relevant market (e.g. food, shoes, or cars), but an extra protection (covering the whole market) is made for well-known marks, as Kodak. There are two ways to obtain the trademark protection: by use or by registration, which needs to be renewed every 10 years (but there is no maximum protection time limit). Registration gives a stronger point in case of court trails, and it is also easy to sell and license. The new trademark must not confuse customers which product or service they are buying, so it cannot be similar to trademarks, which are already present on the market. It is worth to add that the trademark must be registered for every relevant type of business. After 5 years of non-use, the trademark registration can be withdrawn. It is quite important to inform the public that the word / sign used is a trademark. It can be done by using ® (for registered trademarks) or ™ (for non-registered trademarks, protected by the use). If someone else starts to use the trademark, he should be informed about that fact and warned. In case if that entity does not stop using the trademark, the legal owner is obliged to sue the infringing person to the court – lack of any reaction from the side of the trademark owner leads to loss of the trademark. A trademark can be licensed or sold to others – also as a total concept design (as gas stations have), what is called franchising [5].

B. The use in computer science

Names and logos of computer programs can be trademarked. As for other products, the program must be separately trademarked in each relevant class (what of course cause the need to pay a fee for each particular class). The trademark registration for software-based names and logos is valid for 10 years; after this period the registrant must prove that the trademark is still in use, what allows to renew the registration for the next 10 years. There is no maximum lifetime limit for the trademark – it can be renewed indefinitely [6].

It is worth mentioning that using the same name for a program as already existing one is an infringement, only if the second program belongs to the same class as our application. Therefore, if we think that we should be able to use the selected name, we should use it. There is only a minimal risk combined with that – if someone will detect that we use the name which is already used by his program (and the programs are in the same class), we will at first obtain a letter. The letter will describe the infringing case by providing information which will allow us to judge if we should give up the program name or not. If we decide to rename the application, it will cost only replacing few labels in the program and in few other places where the name was used [6]. Such situation took place with the widely known file manager Total Commander, which was previously known as Windows Commander. The owners of that application got a letter from the owner of the *Windows* trademark, which suggested, that the program name is confusing since it implies some association with the *Windows* trademark. Therefore, the owners of Windows

Commander were asked to change the name of their program to something else [7]. Finally, from not so long time it is possible to register Internet domain names as trademarks [6].

V. DESIGN RIGHTS

A. General considerations

Designing a new product is very expensive. On the other hand, it is very easy to copy something designed by someone else, especially, if that design was a big success on the market. For that purpose design rights were invented – their task is to protect the appearance or the shape of a product (or its part) and prevent copying it without payment of a fee to the inventor. Registration of design rights gives protection for the next 5 years, and it can be renewed 4 times more (what gives a maximum time of protection of 25 years). To be protected, the design must be considered as new (which means that it must not be made available to the public more than 1 year before the registration) and the overall impression made on users must be different than made by other products. The items which can be protected include a shape of a physical product as well as non-physical items (web picture, fonts, symbols), ornaments, and interior design (as gas station design) [8].

B. The use in computer science

Design rights usage in computer science is limited strictly to the hardware related issues. An excellent case of use and misuse of this kind of IPR are continuous fights between Apple and Samsung. The aggressive strategy of Apple disappointed many smartphone users during the last few years. Apple shows itself as a company which does not have enough power and will to think how to improve the devices and make them better for the users. But instead of that it concentrates on making its market position stronger by issuing new and new trails about various design rights in courts across the whole world. The last news show that many claims made by Apple against Samsung are completely groundless and unreasonable, and they have character of intimidation of Apple's competitors. Few days ago Apple has lost its appeal against a UK ruling that Samsung had not infringed its design rights. Apple still needs to run ads saying that Samsung had not infringed its rights [9]. Apple was recently ordered by a High Court judge to publish a public notice on its website after it was found its design rights were not infringed by Samsung's Galaxy Tab [10].

VI. COPYRIGHTS

A. General considerations

Copyright, as the strongest form of protection, is used commonly in literature, art, and computer science. Copyright means that the author of literature, scientific, or artistic work, has an exclusive right for reproduction, publishing, sale, lease, or rental of the work. The requirement for obtaining the copyright protection is that the work must be new, original, and it must have an artistic merit or quality. It means that we can copyright different writings, lectures, music, data programs, etc [11]. The form of presentation can be protected, but we are not able to protect the substance: ideas, algorithms, or
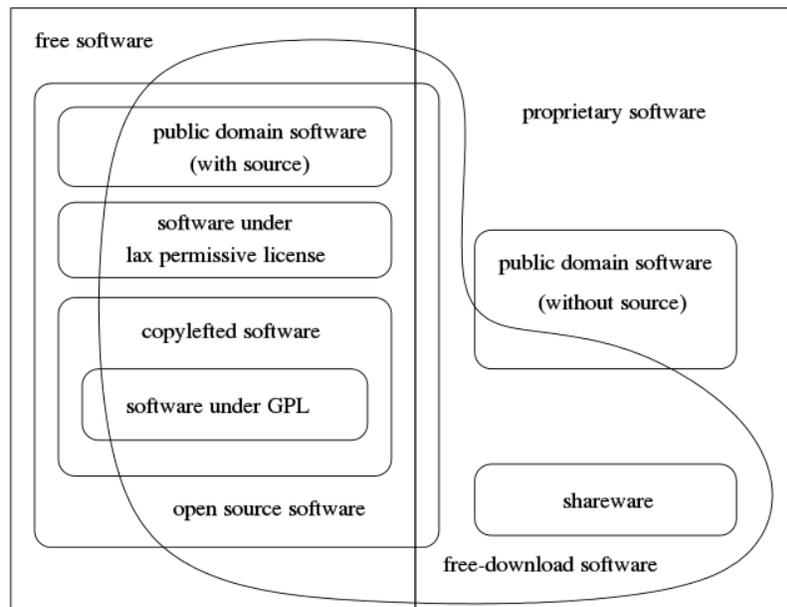
Figure 1.   Different categories of free and non-free software [14].

methods [12]. The copyright protection cannot be applied to a trivial work, as a phone book. It also cannot be applied to some works, where there is a limited number of choices of presentation of the idea – it concerns, for example, projections and tables. The strength of the protections lies in its duration (it expires 70 years after death of the last creator), universality (it is worldwide) and lack of the need of registration (by creating a work we obtain the automatic copyright to it). The protection is often assigned to the company, if the work was done by an employee [8]. In European Union it is always the rule when it concerns computer programs – the copyright for them always belongs to the company. Copyright imposed on some works often is signalized by the symbol ©.

B. The use in computer science

Copyright is the most common form of protection used in computer science. All software is copyright protected, except material placed in the public domain. Computer programs are automatically subject to a copyright, and if the author would like to put the software to the public domain, he must explicitly disclaim the copyright. Public domain means that there is completely no ownership, as copyright, trademark, or patent [13].

Different categories of software regarding licensing are shown in Figure 1. The software generally is divided into two main categories: *free software* and *proprietary software*. The adjective *free* refers to that if the source code is available or not, it does not refer to the price. It means that the *free software* may be available for a fee (even a very huge fee, exceeding the average licensing fee for the proprietary software), as long, as the source code will be available. The term *open source software* refers almost to the same as *free software*, but it allows some kinds of licensing which are not allowed for the

free software. *Copylefted* licenses ensure that all copies of all versions carry more or less the same distribution terms, for example, they can prohibit the software to become proprietary. If we create a computer program and we would like to be sure that it will forever stay free, we can prohibit someone from making his own branch of the program and selling it, by imposing one of copylefted licenses. It is worth mentioning that if we will not copyleft our free software, someone can just take a copy of it, change the name, and sell it for money (even without making any additional changes) [14]!

One of the strongest copylefting licenses is the GNU General Public License (GPL) [15]. Version 3 of the license (GPLv3) to, better protect the freedom, forbids tivoization. It means that the hardware on which the software is run must not prohibit the user from running a modified version of the software on it. There were companies (e.g. Tivo), which used a self-modified version of a copylefted software in their hardware, but at the same time they made the hardware incompatible with the original software, or a software modified by someone else. These kinds of unfair practices are now explicitly prohibited by GPLv3, what protects freedom of the users. It is no longer possible to take a free software under the GPLv3 license, add some nasty features, and make the hardware only run with this nasty version of the software.

Proprietary (non-free) software term is used for a software which source code is not available. It is divided into the following categories: freeware, shareware, private software, and commercial software. *Freeware* permits redistribution without any license fee, but not modification. *Shareware* permits redistribution, but anyone who uses the software must pay a license fee. *Commercial software* is software developed by a business as part of its business, and *private or custom software* is software developed for one user [14].

VII. Conclusions

Making a big life success based on research and innovation is a challenging task. However, being the first with the idea which has a large market potential can be a huge advantage. It requires us to be in the scientific front, but also to realize when we need help from other people (as patent attorneys) or organizations (as Patentstyrelsen). Giving yourself realistic time lines assure that the potential customers or contractors will not be disappointed when the project work will not move as fast as it was assumed. People who were asked about their impressions of making innovative businesses always tell that it is a big fun, which enables people to improve and find new sides of themselves, do top edge science, and focus on their work [16]. Due to extremely large costs of developing and patenting new ideas, the financial outcome of such entrepreneurship can be risky. During the last 10-15 years it was a growing assumption in the innovation policy that patenting is a precondition and the golden standard for successful commercialization of research for all types of companies, in all types of markets. Unfortunately, too many patents are written too early in the development process and they are handed in before doing a reasonable market analysis. Another often made mistake is creating a patent which offers too narrow protection of the work. Additionally, some inventions have so short life cycle that patenting of them is just a waste of time and money [17]. It does not mean that we should not patent our work, but we should be very careful what we are patenting and why we are doing that. Otherwise, we can end up in a position of financial bankrupt, without any possibility to develop our idea in the future.

In computer science, especially in the field of software engineering, the most popular way of protection is copyright. In this paper, I tried to thoroughly describe different types of licenses, which can be useful for protection of the developed software, regardless if it is intended to be used for commercial purposes, or published as an open-source project. I hope that this paper will be a valuable source of information for people who want to improve their knowledge from the IPR field.

Acknowledgements

References

[1] Elin Kubberød. *Introduction to market analysis: why, what and how*. Consumer Behaviour and Market Research, October 2012.

[2] Yngve Stenstrøm. *Experiences as expert judge and expert witness in patent cases.*. Some examples from court, January 2003.

[3] Peter Horn Møller. *Patents why and how*. Ventac Partners, October 2012.

[4] Olav A. Aasen. *In need of patent information? – databases and search strategy*. Patentstyret, October 2012.

[5] Arne Alnæs. *The world of Trademarks.*. Norwegian University of Life Sciences (UMB), Ås, Norway, pp. 1–5, October 2012.

[6] Trademarks and Software, MacTech | The journal of Apple technology, 2012. [Online]. Available: http://www.mactech.com/articles/mactech/Vol.12/12.10/TrademarkIssues/index.html

[7] Windows Commander is now Total Commander!, 2002. [Online]. Available: http://www.ghisler.com/name.htm

[8] Arne Alnæs. *Design and Copyright. Protection against unfair trade practices.*. Norwegian University of Life Sciences (UMB), Ås, Norway, pp. 1–3, October 2012.

[9] BBC News – Apple loses UK tablet design appeal versus Samsung, 2012. [Online]. Available: http://www.bbc.co.uk/news/technology-19989750

[10] Apple Issues 'Acknowledgement' Of Samsung Design Infringement Ruling, 2012. [Online]. Available: http://www.huffingtonpost.co.uk/2012/10/26/apple-issues-acknowledgement-samsung_n_2021733.html?ncid=GEP

[11] Jon Bing. *History and Purpose of Intellectual Property Rights*. Norwegian Research Center for Computers and Law, Lecture 11, October 2012.

[12] Jon Bing. *Copyright and new technologies*. UMB, October 2007.

[13] Public domain software, 2012. [Online]. Available: http://en.wikipedia.org/wiki/Public_domain_software

[14] Categories of free and nonfree software, 2012. [Online]. Available: http://www.gnu.org/philosophy/categories.html

[15] The GNU General Public License v3.0, 2012. [Online]. Available: http://www.gnu.org/copyleft/gpl.html

[16] Anders Lönneborg. *Entrepreneur*. INN 410, Ås, October 2012.

[17] Kasper Birkeholm Munk. *Commercialization of Research – A Practical Approach to Identifying, Qualifying and Realizing the Value of Your Research*. UMB IPR & Innovation Course 2012, October 2007.