Shortcomings of existing systems for registration and legal protection of software products and possible ways to overcome them

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Abstract. The paper reveals the shortcomings of the existing system of registration and legal protection of software products. The system has too many disadvantages and shortcomings. Explanatory examples are given. Possible ways of overcoming these shortcomings are discussed. The paper also gives possible prospects for the use of new digital technologies. Also in the paper, the information is provided about the modern software components for protecting intellectual property rights of State corporations.

1. Introduction

According to the Russian legislation on intellectual rights, initially the exclusive right to a software product belongs to the author (team of authors) when creating such software product. Further, this right may be transferred by the author to another person under the contract, and may be also transferred to other persons on other grounds established by the law (Article 1228, 1255 of the Civil Code of the Russian Federation).

The certificate of registration of a computer program is neither a security document (such as a patent for an invention) nor a full-fledged right-of-possession document. It only confirms the fact of state registration of the program in the register. Moreover, state registration is not obligatory and is made at will of the right holder. The main advantage of such state registration is deposited materials, which in case of legal proceedings can be requested from Rospatent. That is, the presence of a certificate of registration of the program only "facilitates" the resolution of disputes in court or in other proceedings, but does not guarantee its positive decision in favor of the owner of such document. In particular, if some physical body can prove that it is he who is the author of the software product using other means, the availability of such document does not change anything. For example, it could be an important fragment of the listing (source code, program code), the rights to which are recorded in the way other than the registration system, for example, in the presence of witnesses by a notary, and so on.

Apparently, if such person was mentioned by another co-author as a co-author in the certificate of registration and if this person signed the corresponding part of the package of documents for
registration of the program\textsuperscript{1}, where the legal body is indicated by the legal owner (which is mandatory), and if the legal body, indicated in a certificate, received some remuneration for the development of a certain software product (which is documented, for example, by a signature in a statement or by bank transfer), it will be difficult for this person to prove one’s copyright. An example of such case is claiming that only one of them is the author of such software product, or that the method of commercialization or the amount of compensation is not harmonized with it. Indeed, if co-authorship is agreed with both authors and the fact that the legal owner’s organization is commercializing, the application documents are signed and the fact of receiving the award is stated, then any actions concerning organization of commercialization of this result of intellectual actions (RIA) can already be completely independent. And this organization is not obliged to coordinate its actions with the specified author. In this case, exclusive rights belong to the employer or the customer (unless otherwise provided by the contract), and all conditions, including those relating to remuneration, should be stated in the cooperation agreement. If the person did not participate in the signing of the documents as an author or received no appropriate remuneration, then it could effectively challenge the registration if one could prove that at least some part of the program code was created by the author.

Another disadvantage of the software registration system is that, when registering, the actual codes of the software product are not checked for their originality (novelty), as well as for efficiency and utility. For registration, it is enough that the documents submitted are documented according to the required sample and they meet certain rules. Specifically, a statement, information about the authors, a short abstract, a state duty, and also deposited materials (the listing itself) should be made out. Previously, they should be printed, properly stitched and sealed. Currently, the listing on paper is not provided, but only a PDF/A file \textsuperscript{[8]} saved on disk is needed.

In this situation, apparently, one cannot exclude that the software product does not fully meet its purpose, or that it is not completely original. In particular, the software product is not checked, for example, by a system, such as anti-plagiarism system \textsuperscript{[9]}, i.e. it is not compared by originality with already known software products, primarily because they are not available, as well as because it is technically impossible at the moment, but the main thing is that it is not required. It can be assumed that there is no comparison even with existing registered domestic software products and products available in free access, distributed as free and (or) open source software. Until recently, the programs submitted for registration have not been even provided on electronic media, and only their printouts were presented, no more than 70 pages, if the product was more voluminous; only the “core” of the program or only its original part was provided for registration.

Therefore, there is not even a state archive that would store previously registered software products in the electronic form, and this is the case despite the fact that legal protection is granted almost indefinitely, or more precisely throughout the life of the authors and 70 years after the death of the latter (Article 1281, Civil Code of the Russian Federation).

There is also some feature of the listing - due to comments or other non-executable lines; one can make a functionally complete copy of a product completely different in a textual sense. This is analogous to actions of hiding plagiarism in someone else's text by replacing words with their synonyms, permuting words and so on. At the same time, the product by executable commands can be completely identical, and the listing formally will be different. Of course, a specialist will be able to identify this feature, but a formal comparison of the text by formal algorithms such as the anti-plagiarism system \textsuperscript{[9]} may not be able to cope with this task. Even worse, a formally revised or compiled literary text is also an object of copyright (Article 1259 of the Civil Code of the Russian

\textsuperscript{1} Authors, in particular, must sign an agreement to indicate information about the author in the application for state registration of the computer program and consent to the processing of personal data, to provide passport data, data on residence, and contacts.
and the same standards apply to computer programs as to works of literature (Article 1261 of the Civil Code of the Russian Federation).

During the State registration of the program, short documents are required for the document “Abstract”. For this reason, it is sometimes impossible to describe fully the properties of the software product, the conditions for its effective use, hardware requirements, and so on. It is not clear with what the requirement of brevity of the description of the software product is connected. It is, of course, simpler for authors if they are only interested in obtaining a registration document, but for a qualitative examination of the value, adequacy and originality of a software product, the requirement of a short abstract may be causing considerable damage.

At present, according to the Higher Attestation Commission (HAC) regulations on scientific degrees, the software product is equated to publication in journals from the list of HAK. The document for registration of a computer program is also equated with a patent for an invention, since they refer to a RIA, i.e. results of intellectual activity. Also, the requirement to obtain titles of protection on RIAs (patents or software products) are often included in the list of indicators for achieving the goal when placing tender documents for obtaining state financial support. In this situation, it does not matter what the essence of the RIA is, the recipients of the grant are interested in the very fact of having a document on the RIA.

Thus, a large number of people are interested in obtaining a document on the RIA or in taking a degree on PhD, or in a successful report on the funds (sometimes considerable) received. And at the same time, they are not interested in any use of these RIAs that are not interested in any legal protection, commercialization, or implementation of these RIAs; the very fact of RIAs existence is important for them. At the same time, the substantive examination procedure, for example, of the invention, is very long and serious, the issuance of patents takes more than a year, while the issuance of a certificate for a computer program can take up to three months due to lack of substantive examination. Only formal correspondence of the directed documents with the required rules is checked, the program codes themselves are not checked.

Under these conditions, it is possible that the code contains fragments from open or free software products or proprietary products, which cannot be detected if the detection procedure does not take place.

Therefore, the legal protection of software products is very weak, since it appears to have these flaws.

This can lead to the following undesirable results.

1. Registration of empty software products that do not have any value and (or) contain fundamental errors

2. Registration of products that are not new neither from the point of view of the ordinary inhabitant or from the position of legal subtleties. For example, they can contain fragments of other programs that can be very significant. They can also contain such fragments of programs that the authors received on the basis of contracts for freely distributed software, i.e. they agreed that using these fragments to obtain new software products, they would not commercialize the new products they received. Formally, the authors in this case do not have the right to register these new products as exclusively their own new products, and legally it is possible by virtue of paragraph 2 of Art. 1259 of Civil Code of the Russian Federation. Moreover, each new version of the same program, which differs from the previous one, is regarded as new and requires a new registration.

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2 This to some extent also applies to inventions and useful models.

3 However, no one has established how much "new" should be in the next version so that it could be considered a new independent product. What is to be done, for example, if the "new version" contains 95% of the old and only 5% of the new, or there maybe a ratio of 99: 1 or 99.99: 0.01?
3. Insufficiently reliable protection of the rights of authors and rights of holders of really valuable software products with significant commercial potential.4

2. Explanatory Examples

If there is only one command line in the two programs, this clearly does not mean any "plagiarism".

If there are several lines in the two programs, this is also very far from "plagiarism". Indeed, there are standard command sets for organizing a loop and so on.

If the second program repeats the first by 99.9%, it seems that one should admit that it is at least not original.

The question is: where to put the limitations? The legislator not only did not establish such "borders", but also, apparently, did not even attempt to establish them. Perhaps mathematicians would recommend using the fuzzy logic apparatus in this case, but this device, being recognized by modern mathematics, is completely inappropriate for legal spheres. Therefore, now there is total absence of such criteria, which gives a wide field of action to any arbitrariness, both unintentional and willful.

For those who are not too immersed in the theme of the software product, one can give other examples that are understandable at the everyday level.

Although between the product of A.S. Pushkin's "The Tale of the Golden Cockerel" and the work of the "Alhambra" by Washington Irving, there is some plot connection, as well as between "The Tale of Tsar Saltan" and "The Story of Constance" from the collection of "Canterbury Tales" by Chaucer. At that, no one thinks of blaming A.S. Pushkin in plagiarism. And what will happen if someone uses Pushkin's work "Eugene Onegin", replacing everywhere "Onegin" with "Konyagin", "Lensky" with "Zemsky", "Larina" with "Starina", "Tatiana" with "Maryana", "Eugene" with "Arseniy" and so on? And if there are limitations, will this "work" be new and original? Apparently, a reader will answer with "no". But what will be the law answer to this? Perhaps the reader will propose introducing a quantitative measure. Well, if the product is short, and the number of meaningless substitutions will surpass some predefined value, what will happen then? Everything boils down to the question "where the border is for shamelessness".

Let us discuss an example from another area. The artist, who redraws the picture, is the author of the copy, but he is not the author of the picture. If the artist, drawing the Giaconda, draws other face, other clothes and other background - will this be another picture, and will one be the author of the picture? Well, if one only changes the colors of clothes and the background and leaves the face unchanged, what kind of work will it be - a copy or original painting? Here completely different answers are possible from the position of "common sense" and from the legal position.

This is just an illustration of the problem; there is no intention to go far into areas related to these illustrations. Let us return to the topic of ownership of software products and registration of these rights.

3. Possible Ways of Overcoming These Disadvantages

Presumably, legal support in the field of digital technologies and related RIAs needs new adequate amendments to remove these shortcomings.

One of the main points in solving this tangle of problems is, first of all, to technically ensure a reliable fixation of all types of borrowing, use of other people's fragments and subroutines. After that, it will be possible to talk about what minimum level of borrowing should not be considered "plagiarism", and what maximum level of such borrowing can be set so that its excess already explicitly indicates the illegality (or at least unethical) of the emergence of rights of the new right holder.

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4 If the competitor uses somebody else’s program, having modified it for one’s own needs, what can prevent one from doing this, if one formally registered this as a new product?
4. Possible Prospects of Application of New Digital Technologies

One of the technologies of immutable registration of certain facts that require exactly the reliability of such registration is the Blockchain technology [1].

This technology allows one to fix the fact of the priority of some actions from, for example, the authors of RIA. Of course, all the materials associated with this software product or this technology is not easy or even impossible to protect. This technology fixes the priority of short messages, without revealing their content and authorship. Its application in the financial sphere generates many problems; different states treat it differently for this reason. Indeed, anything can be performed by unknown persons for unknown purposes and unknown recipients. This creates undesirable prerequisites for financing the activities of those organizations that are prohibited by law on the territory of that state. The result is the natural prohibition of such actions.

In the field of legal protection of the authors of the RIA, there are probably no such dangers for the state. In any case, this issue must be thoroughly investigated. For example, this technology can be used to protect the rights for some key decisions that can be formulated briefly, but at the same time contain the whole essence of this technical solution. First of all, it suits best the task of registering inventions or utility models, where key decisions are formulated in the form of formulas, i.e. the whole essence (essential features) should be fully represented by these formulations. Apparently, the registration of software products should move towards the actual protection, first of all, of program action algorithms that can be formulated extremely briefly, formally and in a single international language understood by all readers equally regardless of the language of their speech. For example, "serial switching of the amplifier, an analog-to-digital converter and a digital frequency filter and a digital-to-analog converter" should be understood by all readers in the field of digital signal processing equally, regardless of the language in which it is written. Synonyms "scale amplifier", "primary amplifier", or "power amplifier", "signal amplifier," and so on, should not mislead anyone, all formally one and the same. In this case it would be necessary to require the adoption of a single terminology. Also, the "analog-to-digital converter" can be replaced with a "quantization device by level", or even a "transformer by level and time", a "voltage-code converter" and so on. The digital-to-analog converter can be replaced with a "code-voltage converter" and etc. It is only in such simple device that one can just "put a shadow on the fence" and create a non-existent "novelty". A competent expert will certainly understand what is what, but, as it was mentioned above, computer programs are not subjected to expertise in terms of the registered RIA.

5. Program Components for Protection of Rights of Intellectual Property of State Corporations

Novosibirsk Institute of Program (Software) Systems (NIPS) is keenly interested in solving the raised problems, first of all, as an active participant in technological processes in the market of software products [5]. It developed the PREMIS platform in the corporate structure of the corporation managing assets and intellectual property [6]. It is used in more than 300 enterprises, at more than 1000 workplaces. The subject area of this product is asset register management. The history of its implementation and use begins in 2010 and does not end in 2017. By the decision of the management of the holding “RusTechnologies”, it is implemented at all enterprises of this holding.

Indeed, the holding has all the prerequisites for this:

1. The Holding registered more than 10 000 RIAs (inventions, utility models, industrial designs and software).

2. In addition, it is planned to transfer more than 100 technologies (2 thousand results of R & D).

The purpose of implementing the platform is a qualitative improvement in the effectiveness of the RIA. This puts forward the following main tasks:

• Audition and evaluation of the results of intellectual activity of the corporation.
• Commercialization and promotion of RIA to the market.
• Reduction of internal competition and an increase of domestic production cooperation.

At present, work has been carried out to expand the functionality of the platform. The new release of the system was developed with all the advantages of Blockchain technology.
Table 1 shows the possibilities of expanding the functionality of the PREMIS platform on Blockchain technology. Table 2 shows the prospects for the applicability of Blockchain technology in the field of intellectual property.

**Table 1. Expansion of functionality of the platform on Blockchain technology**

| Increasing the effectiveness of operating activities in the field of managing the results of intellectual activity | The transition to a qualitatively new level of promotion and commercialization of the results of intellectual activity |
| Problems | Problems |
| Deviation from standards when entering information into the register | Weak awareness of the results of intellectual activity (internal and external) |
| Infringement of terms of carrying out of the information | Internal competition and cloning of the results of intellectual activity |
| Insufficient level of information protection and other | Insufficient internal cooperation |

| Decision | Decision |
| Input and verification of data | The task of the expert group is to develop a standard for the design of knowledge according to the criteria |
| Identifying Users | It is required to create a specialized infrastructure on the theology of Blockchain: storage systems, electronic document management systems, ontological repositories with powerful search tools |
| Access control | Required transfer of accumulated knowledge (R & D and R & D reports, results of intellectual activity) in the ontology in accordance with the approved standards |
| Synchronizing databases | A convenient and accessible search for knowledge is needed |
| A digital imprint of the time of entering the register | The concept based on the principle "Proof of knowledge" |
| Document version control system (digital signature) | |

The concept based on the principle “Proof of work”

**Table 2. Prospects of Applicability of Blockchain Technology in the Sphere of Intellectual Activity**

| Prospects | Related technologies and their functions: |
| Availability of the results of intellectual activity in the internal and external contour | The “Premis” platform as a toolkit of the electronic document management system intended for storage, which is associated with a distributed registry. |
| Commercialization and increase of income as the results of intellectual activity | Distributed Register on Blockchain technology, in which the registered results of intellectual activity are recorded. |
| Solution of the problems of optimization of labor resources, redistribution of budgets with the purpose of creating and managing the results of intellectual activity | Ontological storage: intended for the storage of knowledge, providing search for opportunities for this knowledge |
| Reducing internal competition in corporations and improving production cooperation | |
6. Peculiarities of registration of results of intellectual activity in the form of patents

The team of authors has a sufficient number of patents and registered software products in the field of information technology, electronics, automation, robotics, and measurement technology. However, experience has shown that the reference to these RIDs in international publications is difficult, at least for the reason that these patents are not translated into English, the English-speaking scientific audience is not aware of these results. Also even the publication in English in journals that are not part of the basic science-metric databases does not give anything in practice. The only publications that can be found by English-speaking readers are in the main databases, such as Scopus or Web of Sciences [10-28], and one can judge the competence level of the authors only by these publications. Therefore, in this article, the authors do not provide references to registered software products and Russian patents.

Conclusions

The severity of the problem is as follows. Either the scientific or technical community will be able to come to an agreement on some boundaries between the "new" and the "borrowed," and find a way out of the situation when, formally, the number of RIAs in this area can be, if necessary, produced without restrictions or this community will face one of the following problems:

a) unjustified growth in the number of legal bodies and individuals who have rights to RIAs that are of no value or are not actually new RIAs (foreign RIAs, cosmetically transformed into domestic);
b) approaching the situation "a" will force the attestation of scientific employees (including HAC), accreditation, monitoring, audit, etc. and (or) state and other funds that allocate finance to individuals or legal bodies for scientific research or technological projects, taking into account developments in the field of RIA. It is possible to decide to stop accounting software products.

In the first case, unprincipled juridical and physical persons will unreasonably benefit; in the second case, honest conscientious legal bodies and individuals will be unjustly hurt. Both cases are extremely undesirable. Therefore, there is a necessity to look for a solution now.

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