European Commission

Open Science and Intellectual Property Rights

How can they better interact?
State of the art and reflections

Executive Summary

Javier de la Cueva and Eva Méndez

Research and Innovation

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European Commission
Directorate-General for Research and Innovation
Directorate E — Prosperity
Unit E.2 — Valorisation and IPR Policies
Contact Manon Prado
Email RTD-VALORISATION-POLICIES-IPR@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

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EXECUTIVE SUMMARY

Open science (OS) is considered the new paradigm for science and knowledge dissemination. OS fosters cooperative work and new ways of distributing knowledge by promoting effective data sharing (as early and broadly as possible) and a dynamic exchange of research outcomes, not only publications. On the other hand, intellectual property (IP) legislation seeks to balance the moral and economic rights of creators and inventors with the wider interests and needs of society. Managing knowledge outcomes in a new open research and innovation ecosystem is challenging and should become part of the EU's IP strategy, underpinning EU policies with the new open science–open innovation paradigm.

The usual justification for copyright and patents is the incentive and reward for inventors, resulting in benefits for society, fostering innovation and societal impact. Various organisations recognise the need to maintain a balance between the rights of authors and the larger public interest, particularly in education, research and access to information, and to consider the scope, extent and application of intellectual property rights (IPR) in relation to the equitable production, distribution and use of knowledge. However, there are cases of tacit tension in the relationship between IPR and open knowledge distribution noticed on a global scale in different contexts, initiatives and attitudes of the scientific community. This tension has been confirmed during the COVID-19 pandemic, where there is a concern that IPR may prevent public access to medicines, particularly vaccines. Governments, scientists, media and society at large are discussing new licensing provisions to circumvent barriers to human rights such as the right to health or the right to science, without preventing innovation. There is a clear need for reflections such as the one we present here, to address the necessary compatibility of some IPR with OS and open innovation.

This report provides a critical analysis of the literature on the relation between OS and IPR protection and how they might live harmoniously, by scoping the statement 'as open as possible, as closed as necessary'. The starting point for the analysis about IPR and OS in Europe is the following hypothesis.

- There are no incompatibilities between IPR and OS. 'On the contrary the IPR framework, if correctly defined from the onset, becomes an essential tool to regulate open science' (Barbarossa et al., 2017, p. 2).

- The European Commission has a role in promoting OS and its balance with IPR. This was especially important when copyright was redefined in Europe and the European Open Science Cloud was being established.

- Existing best practices have to be a source of inspiration, for example understanding how public research-performing organisations and industrial partnerships are striking a balance between IPR and open knowledge.

In general, there are very few studies, documents, reports and specific scientific works (papers, books, etc.) that directly and comprehensively address the coexistence of OS and IPR. However, various authors, stakeholders and reports point to IPR as one of the obstacles to making OS a reality without inhibiting its valorisation and open innovation. By providing an interdisciplinary analysis of economic rights and authorship, this report fills a gap, but it goes further into other components of OS and their relationship with IPR, notably data and software, as well as other aspects of digital science and online

scientific communication. We review the main literature from the last 10 years on this topic, but also provide an in-depth reflection on the state of the art.

In the Mertonian view of sociology of science, the principle of openness has been seen as inherent in academic activity and harks back to the original precepts underpinning the conduct of researchers. However, OS has different definitions, which are not always consistent with each other. For the purpose of this report, 'OS' refers to the entire process of conducting research as well as a systemic change highlighted by the European Commission that might improve science through collaborative and open ways of producing and sharing data and knowledge as soon as possible throughout the entire research cycle. A different paradigm must be created for scientific knowledge production, communication and valorisation, coherent with current technological possibilities and societal needs. The eight components of OS (i.e. the future of scholarly communication, findable, accessible, interoperable and reusable (FAIR) data, the European Open Science Cloud, next-generation metrics, rewards and incentives, skills in open science (open education), citizen science and research integrity) which have been discussed and challenged by the European Commission, have definite implications for IPR and have to be analysed with IPR in mind to guarantee their correct implementation.

OS is supported by the fundamental right to science and, on the other hand, IPR protects the rights of the creators. The five domains where transformations should be made, to evolve from the current paradigm of research to OS, are from open access (OA) to OS; from human-readable to machine-readable content; from open data to FAIR data, data sharing and data reuse; from traditional publishing to technology-driven service; and from semantic enrichment of content to semantic publishing.

This report also analyses these aspects of IPR with regard to OS components and principles.

• **Copyright**. In general, IPR includes rights that are related to some kind of effort or achieving the creation of a work through intellectual efforts for the common good, so affecting scientific results. This study analyses in depth copyright, patents, trademarks and trade secrets. Studies of IPR and opening scientific knowledge have most frequently been devoted to copyright and OA to research publications, but this study also covers the economic impact of IP, concluding, in line with the World Bank data analysis, that IPR have geopolitical importance and the EU does not occupy a significant place. In Europe, IP is based on the concept of territoriality, which implies that national rules govern copyrighted subject matter within the territory of a given Member State.

Several authors (Hess, Ostrom and Unger) have concluded that the concept of IP ownership is not relevant in the digital age: what are crucial are the different possibilities attached to the possession of or access to digital information. As the Budapest Declaration says, 'An old tradition and a new technology have converged to make possible an unprecedented public good' (BOAI, 2002). The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the worldwide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it for all scientists, scholars, teachers, students and other curious minds.

In the normative context of copyright in Europe, set up by the Berne Convention, from the creation of the work the author is entitled to two different sets of rights: moral and economic. Remuneration rights are directly connected to economic rights, which are configured legally in Europe as a closed list with exceptions or limitations (to copy, alter,

distribute or communicate to the public). It is in this normative context that science has to communicate its results to the public. One of the reasons why science needs to be public is because it must be falsifiable. To become public, at least two activities are needed: reproduction and distribution or reproduction and public communication. IPR and their default 'all rights reserved' rule affect one of the core necessities of science: public dissemination to allow public scrutiny.

• **Patents**. A patent describes an invention and creates a legal situation in which the patented invention can normally only be exploited (manufactured, used, sold, imported) with the authorisation of the owner of the patent. In Europe, a group of contracting states signed the European Patent Convention, establishing a single European procedure for the grant of patents on the basis of a single application, and created a uniform body of substantive patent law designed to provide easier, cheaper and stronger protection for inventions in the contracting states.

The European Commission actively promotes the implementation of the European patent with unitary effect (the 'unitary patent'). Unitary Patents will make it possible to get patent protection in up to 25 EU Member States by submitting a single request to the European Patent Office (EPO). They will build on European patents granted by the EPO under the rules of the European Patent Convention, so nothing will change in the pre-grant phase and the same high standards of quality search and examination will apply. After a European patent is granted, the patent proprietor will be able to request unitary effect, thereby getting a Unitary Patent which provides uniform patent protection in up to 25 EU Member States. Note that the new system will only apply in Member States that have ratified the Unitary Patent Court Agreement. So far, 17 Member States have done so.

However, some authors (e.g. Stiglitz, 2008) think that the patent system is not ideal for innovation, because it creates distortionary and transaction costs, and it is not the best option available for disseminating knowledge. IPR are important but they are just 'part of a portfolio of instruments'. The other elements should be strengthened, and IPR should be redesigned to 'increase its benefits and reduce its costs'. Each industrial or innovative sector has different conditions for invention, so every sector should be analysed separately, avoiding the temptation to assert general conclusions. Although different strategies are followed to gain better competitive positions, the disclosure of the invention remains central to patents. Tens of millions of patent documents can be accessed for free from various databases (e.g. the EPO's EspaceNet), as soon as 18 months after their first filing. Moreover, most of them have already expired, which means that the technologies concerned are now in the public domain.

• **Trademarks**. A trademark is an informational reference to an object. By nature, it does not play any role in the transmission of information in which the object may consist. Having (or not having) a trademark that identifies goods or services provided by any natural or moral person does not alter their reproducibility or transmissibility, although it affects public perception of the objects represented. However, perception of an object is not an element that affects its replicability.

A point of friction may appear in certain common uses of a trademark without consent of the rightholder. Nevertheless, it would not disturb the transmission of information.

• **Trade secrets**. Trade secrets, as part of IPR, consist of secrets of all kinds. They may be of a personal, commercial or industrial nature, or concern the state and its administration. Their origin may be found in the protection the guilds exercised over the practices of their members. Trade secrets are incompatible with OS.

When analysing the balance between OS and IPR, the default legal requirement for the transmission of a work is explicit consent, the use of an exception or the existence of public domain. In the event of conflict, it is the user of the work who has the burden of proof that one or more of these requirements exist. Therefore, using works for a scientific activity may produce risks that should be avoided by the correct use of the permissions designed in the IP legislation.

- Although OA to scientific publications is the cornerstone for OS regarding IPR, in the last 20 years, new strategies and approaches to OA have tried to obtain immediate OA to all scientific publications coming out of publicly funded research by having the researchers retain the necessary IPR, allowing them to license their works with open licences.

- When it comes to data and IPR, it could be summarised that data and facts do not have protection under copyright, but databases do. In the digital world and economy this is no longer acceptable. Working with FAIR data challenges IPR in the reuse of data sets, which bears an inherent risk of IPR infringement. Hence, in order to guarantee interoperable and reusable data, it is necessary to check the validity of the consent of the rightholder or whether an exception/limitation applies.

- Regarding free software, there is a general misunderstanding that it is not under copyright. Free software is another way authors have to exercise their copyright and then manage their intellectual assets. Free software advocates use copyright to force the openness of their creations, which is a legitimate way to manage IP, often based on ethical considerations. In OS, access to source code is not only a matter of IPR but also the necessary requirement to operate at all knowledge levels. Access to and operability of source code (for copying, modification, dissemination) are among the core aspects of OS that are not because of IP.

- IPR have also an impact in daily activities held by scientists when managing data (application programming interfaces, taxonomies and ontologies; hyperlinks, and text and data mining). Awareness of these points would avoid the risk of IP infringement faced by scientists or the organisations they belong to. In this sense, current European legislation should be adapted to include exceptions for OS, including levies on remuneration rights.

One of the big issues to address for a better shared understanding of OS and IPR and for their better interaction is to scope the principle 'as open as possible, as closed as necessary'. Few studies attempt an analysis of that expression in reference to OS and, when it is tackled, they only occasionally refer to the reusability of the data and their licences. The limitations to the openness of the information based on the nature of the content could be imposed by the normal limitations that exist in a democratic regime, and the exceptions to the limitations could be decided, by local, national or regional pertinent governing instances. However, when the scope of the expression 'as open as possible, as closed as necessary' is analysed under IP norms, then the decisions to close scientific knowledge on publicly funded projects should be analysed, scrutinised, rejected by default and only accepted if a closed catalogue of reasonable conditions is met. OS categorically does not mean indiscriminate openness, but the default rule is that any reason for making it closed should be made evident and that the limits based on the nature of the information already serve as a reasonable scenario.

The main remarks and lessons to be learnt from this report are classified in three sections: general findings, recommendations for policymakers and recommendations for practitioners/users.

Findings

- Although it is acknowledged that managing IP requires particular skills and incurs costs, there is a need to achieve a balance between the need to protect and to disseminate knowledge. Therefore, based on the notion of "as open as possible as close as necessary", the protection of knowledge is an important step for the achievement of the Union's policy goals, such as strategic autonomy and green and digital transition.

- The scientific literature and main reports on OS do not systematically address IPR issues as a key element in reviewing the establishment of a new OS paradigm. It appears that the assertion that better IPR management promotes innovation is not the common understanding in the research and innovation community. Although Commission's new EU IP policy is clarifying the crucial role of IP for the Union's growth[1], more studies on the cross-section of IP and open science are needed.

- The idea that a stronger IPR system produces more innovation and creativity could benefit from more data and quantitative analysis. Although the implementation of the EU IP Action Plan provides data on the use of IP, data on open innovation needs to be further collected and analysed at Union level.

- There is an epistemic blindness regarding the existence of free IP works. This leads to the absence of analysis and data about the wealth they represent and produce. The status of the internet as a free IP work composed of the set of more than 9 000 requests for comments is simply ignored by the literature.

- Government funding, prize systems and the IPR system are tools to incentivise more and better inventions that can later be transferred and become innovations to solve serious problems such as the global COVID-19 pandemic. Distortionary and transaction costs of patents should be further analysed.

- If a researcher wishes to place their research results in the public domain, no IP-related formalities are required. Therefore, there is no additional burden on the researcher. However, if the researcher wants to protect their results, current IPR regulation can impose a burden in at least two ways. Firstly administrative, when it comes to allowing access to and use of the research results with the proper IPR; and secondly, financial, as regards the payment of levies to remunerate literary or artistic authors.

- Basic science opens unforeseen pathways. It is both essential and incalculable. Its value cannot be estimated because its results are unknown.

[1] https://www.epo.org/about-us/services-and-activities/chief-economist/studies.html

- The term 'IP' comprises two main areas: (1) literary and artistic property, which is mainly covered by copyright, and (2) industrial property, which mainly includes patents (as well as utility models and supplementary protection certificates), trademarks, industrial designs, geographical indications and trade secrets. Each one has a different impact on OS.

- Under the current copyright regime, works are closed by default. Therefore, to foster openness in science, consent must be given by the author or an exception/limitation must apply. Consent of the author must be proactive.

- Dynamic processes (such as science production) require IP licences that do not hinder changes or burden the process with unnecessary bureaucracy. A community's ability to sustain dynamic processes depends on this.

- Under international treaties and legislation, it is not possible to create an autonomous scientific author whose works would merit different IP conditions from the 'all rights reserved' default rule. Exceptions related to scientific IPR should be legally maximised, avoiding as far as possible the risk of legal proceedings.

Recommendations for policymakers

- It is urgent to address new copyright and IPR regimes to guarantee better IP protection responsive to the needs of open, transparent and collaborative science. The international pragmatism resulting from COVID-19 and the positive reactions to OS-OA paradigms should be taken advantage of. COVID-19 suggests that the incentives generated by IPR might be improved by global solidarity or, in the EU context, by subsidiarity.

- Current IPR standards and regimes should keep up with rapid technological developments, with legal provisions that offer online protection. A new IPR framework for OS should be created at global level, adapted to the new digital technologies, the new requirements of science, and modern scientific communication needs and facilities, in order to find the right balance between OS and IPR.

- Basic science should be promoted on account of its essential importance for applied science. Evaluation of basic science through IPR (copyright or patents) indicators should be further analysed. Awareness of the value of basic science and free intellectual works needs to be raised, taking the request for comments model as an example. The more basic science and the more requests for comments, the more opportunities for small and medium-sized enterprises to build on free components and appropriate the results. Special attention must be paid to avoiding appropriation of the basic science and the IP under free licences.

- The right of an author to provide for the openness of his or her work must receive from the EU and the Member States the same support as the right of an author to keep his or her intellectual work closed. Authors of free works should be treated at least equally to authors of closed works.

- An Office for Free Intellectual Property Rights and Open Science should be created. This office can be inspired by the functioning of the Office for Harmonization in the Internal Market and the European Observatory on Infringements of Intellectual Property Rights (EU 386/2012) and should be aligned with the EU IP action plan. It could be piloted through the Horizon Europe Framework Programme.

- EU IP legislation should be reviewed and amended to define hyperlinks as a mere linguistic reference, to expand the text and data mining copyright exception to match the United Nations Educational, Scientific and Cultural Organization's diversity and inclusiveness values, to include clear and stronger exceptions for OS not affected by levies to remunerate rightholders of closed copyright works.

Specific recommendations on intellectual property for practitioners

- All organisations, when using data, should analyse the terms and conditions of each data set. If these are not clear or no consent has been given, then it should be treated as an 'all rights reserved' piece of information.

- Lessons can be learnt from the free software communities:

    - licence diversity: the possible activities that the creator may allow the users to exercise are innumerable, although a side effect of using different licences is that they may be incompatible;

    - awareness of the necessity of including a licence to avoid the 'all rights reserved' by default system;

    - inclusion of licences within the source code: the licence should be included as a text file in the source code trunk, which raises an author's awareness of the necessity for a licence;

    - awareness of the necessity for the licence to be updated because of changes in the technological or legal context;

    - building tools to standardise the references to licences and to make them readable by both humans and machines;

    - existence of communities that take care of projects' sustainability;

    - the ethos of 'release early, release often'.

We are in a new research and innovation paradigm in which digital technologies, particularly the World Wide Web, enable distributed behaviour in collaborative research and the possibility of communicating knowledge immediately, openly and at scale through the network. Opening up research processes and science leads us towards a promising transformation of the way we do science. Despite this, we continue to carry out, publish, finance, attribute and evaluate research in the same way as in the last

century. In the more than 30 years of coexistence with the web, we have undergone various paradigm changes in the creation of a new digital society, challenging old regulations, including the traditional IPR.

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This report presents the result of a study that explores the interactions and the balance between Open Science and Intellectual Property Rights. The report presents the state of the art and reflections to scope the statement 'as open as possible, as closed as necessary' in the context of an evolving and open Research and Innovation ecosystem. Furthermore, the report identifies concrete recommendations for policy makers and for IPR practitioners on the promotion of Open Science and its balance with IPR for better knowledge dissemination to the benefit of all.

The full study report is available at https://ec.europa.eu/info/publications/open-science-and-intellectual-property-rights_en.

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