

# Open Science Principles and Accessibility of Scientific Information

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**Abstract:** Science cannot exist without the exchange of information. For centuries, researchers have shared their achievements and results. At first it was ordinary correspondence, in the 17th century scientific journals appeared. In recent decades, the Internet has become a powerful and indispensable medium for the transmission and dissemination of scientific information. However, such an exchange is often difficult due to objective and subjective factors. The paper analyzes possible causes of obstacles and barriers to the free flow of information. The problems of copyright, legal restrictions, force majeure, and so on are considered.

## 1 INTRODUCTION

The movement for open access to scientific publications had originated in the 90s as an alternative to the omnipotence of scientific publishing houses. Its beginning was laid by P. Ginsparg in 1991, when he founded the arXiv open depository on the basis of the Los Alamos National Laboratory. At the moment it is the largest free archive of scientific publications in the fields of physics, mathematics, astronomy, computer science and biology. In February 2002, at the Budapest Open Access Conference, the essence of the concept of “open access” was formulated as free, immediate, permanent, full-text, online access to scientific publications (Akinshin, 2022).

Open Science has become a logical continuation of the idea of open access as a reaction to the high cost of subscription to scientific journals and a consequence of important changes in the practice of scientific work and scientific communication under the influence of new information technologies. Here are the goals of open science: transparency in the methodology of experiments, observations and data collection; open access and reuse of scientific data; accessibility and transparency of scientific communications; using online tools to support scientific collaboration (Parinov, 2015).

Consider some of the barriers to the free flow of information.


## 2 RIGHTS OF PUBLISHERS AND AUTHORS

Michael Hart, creator of the remarkable Project Gutenberg, the first digital library, has fought copyright law all his life, considering it a major hindrance to his work (Polak, 2021).

I. Gutenberg published his two-volume Bible in 1455. The first scientific journals appeared in early 1665 in London and Paris (Philosophical Transactions of the Royal Society and Journal des sçavans). In St. Petersburg in 1728, the *Commentarii Academiae scientiarum Imperialis Petropolitanae* began to be published in Latin. In pre-revolutionary Russia, an impressive number of journals were published in the field of natural science, technology, medicine, agriculture; in the humanitarian field (Akopov, 1986). By the way, as of December 2022, the scientific electronic library eLIBRARY.RU contains over 75 thousand scientific and technical journals, including electronic versions of more than 5600 Russian titles.

And the first full-fledged copyright law - the Statute of Queen Anne - came into force on April 10, 1710. It established a 14-year copyright term for all publications with the possibility of a one-time renewal during the life of the author. The first US federal law regulating copyright dated May 31, 1790, signed by D. Washington, inherited British norms.

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There have been three copyright renewals in the US during the 20th century. As M. Hart pointed out in an interview, in 1909 this was done to counter steam and electric presses; in 1976 to counter Xerox copiers; and in 1998 to counter the Internet. The 1998 Copyright Act established copyright terms up to 70 years after the death of the author, and for works for hire, up to 120 years after they were created.

In Russia, in 1830, the “Regulations on the rights of writers, translators and publishers” were published. According to it, the work was protected during the life of the author and 25 years after his death. Now in our country, in accordance with the federal law of March 12, 2014 No. 35-FZ, a work goes into the public domain 70 years after the death of the author. Regarding the 4th part of the Civil Code, the president of the Russian State Library, V.V. Fedorov, believes that “we have one of the most severe laws in the world that protects copyright. On the one hand, our Constitution states that a person is granted the right to free information, and on the other hand, that property rights, including intellectual property rights, must be respected. This balance is being sought. Now the scales have clearly tipped in favor of the authors.” M.E.Moshkov's position: “Copyright harms culture more than helps it. But it helps writers and near-publishing structures. Which of them is more worthy - universal culture or writers? I have an opinion, but I will not voice it. Ostap Bender bequeathed to us to honor the criminal code, and there is nowhere to go... With copyright, everything is very complicated and sometimes absurd.” I. Larin, the founder of the Librusek electronic library, agrees with Moshkov: “Copyright in the current version is absurd. Ideally, the author should not have the right to prohibit the use of his work, but should receive some reasonable share of the profits. Registration of rights should not be automatic, but at the request of the author, paid and for a short time” (Larin, 2010).

Modern publishers, as in past centuries, care primarily about their profits. Leading scientific publishers set high prices for access to publications. Authors also pay a lot for the opportunity to publish their works. PeerJ, a block of peer-reviewed open access journals in the biological, medical, and environmental sciences, has set a publication price of \$1,195. Another option: the scientist makes a payment for a lifetime opportunity to publish (“Lifetime Membership”). A fee of \$499 entitles you to publish 5 articles each year. The first scheme is more convenient if the article has many authors. The cost of publishing a research article in open access journals in medicine and biology of the PLoS family (Public Library of Science) starts at \$2100. Many traditional scholarly journals, fearful of losing profits, ban publishing articles online, forcing scholars and research libraries to pay subscription fees.

The dictates of publishers are especially intolerable in the scientific community. A scientific article is a special publication written by scientists for reading by other researchers. Articles are indispensable primary sources, often containing detailed descriptions of new results and experiments. However, “the staff of scientific journals that remain outside the open access have forgotten why these publications exist. Nevertheless, it seems that their main task is to convey scientific information to the consumer, and not at all to make a profit. Abroad, the long-term struggle over the public Internet publication of scientific papers has long formed a fairly clear “front line” between scientists seeking to convey their results to the widest possible audience, and commercial publishers who prevent free access to the full texts of scientific articles” (Gorbulnov-Posadov, 2017).

A. Elbakyan, a researcher from Kazakhstan (now a post-graduate student at the Institute of Philosophy of RAS), drew attention to the problem of the availability of paid scientific publications. In order to facilitate the dissemination of knowledge, she launched the Sci-Hub project on September 5, 2011, challenging the status quo (Murphy, 2016). Sci-Hub provides access to hundreds of thousands of scientific papers every day, effectively bypassing any paid restrictions programmatically and allowing scientists to use the necessary scientific literature for free. The digital library of the project contains about 85 million scientific articles, and it is constantly updated. Scientists call Elbakyan the “Robin Hood of the world of science”; publishing houses that lose revenue threaten lawsuits; she often had to change her place of residence and site address. Her methods are often called pirated, however, according to Mr. Gorbulnov-Posadov, “the true robbers in the world of science are, of course, publishers who block free access to scientific articles” (Polak, 2017).

### **3 VOLUNTARY AND FORCED CENSORSHIP**

#### **3.1 Scientists' Self-Censorship**

In some situations, the dissemination of information must be limited. So, confidentiality should be maintained when it comes to military secrets, commercial or medical secrets, personal data. In these cases, applicable law or moral restrictions apply. The situation is somewhat different with scientific information, the unhindered dissemination of which is one of the most important conditions for scientific progress. From the many statements of scientists on this topic, we will cite two. “We dream of such a type

of organization when all relevant information will be available to every researcher, and the amount and composition of such information will be in direct proportion to the research topic” (Bernal, 1939). “Any attempt to restrict or stop the dissemination of scientific information represents an exceptionally serious danger to the progress of science and to civilization” (Joliot-Curie, 1946).

However, there are cases when scientists deliberately refused to publish new results. The most striking examples of such self-censorship date back to the late 1930s. In 1939, several leading physicists in the USA, England and other countries decided to stop publishing papers on nuclear physics. This was preceded by the Berlin experiments of O. Hahn and F. Strassmann, which led to the discovery of the fission of the uranium nucleus and the chain reaction. This paved the way for the creation of the atomic bomb. Realizing this, L. Szilard and E. Fermi, who were dealing with the same problems in the USA, appealed to F. Joliot-Curie, who had advanced further than others, with a call to abandon publications on the number of neutrons emitted during the fission of the uranium-235 nucleus. However, in April 1939, Joliot nevertheless published his results, referring to the principle of his mother-in-law, also the Nobel laureate M. Curie: “a scientific discovery must be made public in order to benefit all mankind.” Only after the German invasion of Poland did he become convinced of the necessity of refusing such publications. Note that the studies carried out in the West were reproduced with extensions and additions at the Leningrad Institute of Physics and Technology.

During this period of increasing isolation, Soviet physicists were banned from almost all contacts with Western nuclear scientists; they were left to follow the work of their foreign colleagues through articles in *Naturwissenschaften*, *Nature*, or the *Journal de Physique*. Research not related to rapid industrialization or militarization was difficult. At that time, the authorities saw no practical use in nuclear physics. When the disappearance of publications of works on physics with the mention of nuclear fission was noticed in the country, it was concluded that this topic is classified, in America work is underway to create devices that use the energy released during the fission of uranium nuclei and, possibly, a new type of weapon is being developed. . Appropriate measures were taken - for example, the second part of the article written in Leningrad in 1941 for *Uspekhi fizicheskikh nauk*, was published only in 1983 (Zeldovich and Khariton, 1983). The Department of Science of the Central Committee of Communist Party considered that the paper “Nuclear Energy” by P.L. Kapitsa is inappropriate to publish. The wave of publications on various aspects of the problem of using nuclear

energy began after August 8, 1953, when the head of government G.M. Malenkov announced that “The United States is not a monopoly in the production of the hydrogen bomb”. The prohibitions concerned not only articles on physics. In this regard, we point out the secret decree of the Council of People's Commissars of the USSR and the Central Committee of Communist Party of September 11, 1939 “On the termination of the publication in the press of data on the output of individual industries and transportation”.

### 3.2 State Regulation

There are a wide range of penalties for violating confidentiality in the dissemination of information. Article 13.14 of the Code of Administrative Offenses of December 30, 2001 No. 195-FZ is called “Disclosure of Information with Restricted Access” and threatens with considerable administrative fines. Government decree of October 30, 2021 No. 1868 “On Amendments to the Rules for Classifying Information Constituting State Secrets as Different Degrees of Secrets” is devoted to significantly more serious realities. It entered into force on January 1, 2022. Information to be classified falls into three categories. Information of *particular importance* includes information in the field of military, foreign policy, economic, scientific and technical, intelligence, counterintelligence and operational-search activities, the dissemination of which may harm Russia's interests in one or more of these areas. Dissemination of *classified information* constituting a state secret may harm the interests of enterprises, institutions or organizations in the above areas of activity. *Top secret information* should include information, “the dissemination of which may harm the interests of a state body or a sector of the economy of the Russian Federation”.

An exhaustive list of information classified as state secrets is determined by presidential decree No. 90 dated February 11, 2006. It contains 113 positions: information in the military field - 28; information in the field of economics, science and technology - 39; information in the field of foreign policy and economics - 15; information in the field of intelligence, counterintelligence and operational-investigative activities - 31. Another document is devoted to similar issues: Order of the FSB dated September 28, 2021 No. 379 “On approval of the List of information in the field of military, military-technical activities of the Russian Federations that, upon receipt by a foreign state, its state bodies, international or foreign organization, foreign citizens or persons without citizenship can be used against the security of the Russian Federation”. The 9 sheets list 60 types of data that are not considered state secrets

or secret information, but, according to the FSB, can potentially be used against state security, and for the collection of which one can get the status of a foreign agent. At the stage of public discussion of the order, it was pointed out that the document contradicts the law on the media, criminalizing the collection of even the most harmless information. So, it complicates the work of scientists, journalists, popularizers of science; in particular, it makes impossible a sociological survey on the topic “did you do military or contract service?”, jeopardizes discussions about defense, the publication of data on crimes in the army or Roskosmos’ financial problems. Professor M.A. Fedotov: “Imagine that you are writing an article about the exploration of the Moon, you have requested a comment from NASA or UNESCO, and have received an answer by e-mail. Thus you have received information and methodological assistance from a foreign source. Or your Belarusian grandmother transfers a thousand rubles for your birthday, and here you become a foreign agent receiving money from abroad. And the very concept of “information that can be used against security” is not legally defined and allows for arbitrary interpretation. But, according to the FSB, “the list in no way violates the right to freedom of speech and expression of citizenship.”

Note: the status of a foreign agent is clarified by the federal law “On Control over the Activities of Persons Under Foreign Influence” dated July 14, 2022 No. 255-FZ, which entered into force on December 1. However, from the quoted order it follows that even the use of only open sources does not guarantee against trouble.

### 3.3 Researches' criminal prosecution

The scientific community cannot but worry about the increasing cases of persecution of scientists by law enforcement agencies. This campaign undoubtedly hinders and slows down the exchange of information; it has been called “malignant spy mania”. Ecologists were among the first to face it more than a quarter of a century ago. Doctor of Chemical Sciences V.S. Mirzayanov reported in the 1990s about existence in the USSR and Russia of a secret program for the development of chemical warfare agents of the Novichok family (in 2008, he cited some formulas in his book “State Secrets: The Russian Chemical Weapons Program from within”). In 1992, he was accused of disclosing state secrets, and until the case was closed “due to the lack of corpus delicti”, he spent several months in the Lefortovo prison. Since 1995, the scientist has been living and working in the USA.

Metrologist N.A. Shchur was engaged in environmental monitoring in the closed city of

Snezhinsk, where he led the city environmental fund. In 1994, it became known about the extreme contamination of residential areas and the former territory of the federal nuclear center with radionuclides. In the same year, Shchur was arrested for “abuse of office”, and then other charges were added. The scientist spent several months in the Chelyabinsk pre-trial detention center and was released thanks to the support of the deputies and the “For Nuclear Safety” movement.

In the late 90s, the prosecution of two naval officers received a wide response. Captain A.K. Nikitin was accused of treason and disclosure of state secrets for preparing the report “The Northern Fleet is a potential risk of radioactive contamination of the region.” The investigation lasted five years, during which Nikitin spent a year behind bars, and three years with a written undertaking not to leave. 13 times he appeared before the courts of various instances. In 2000, he was acquitted by the city court of St. Petersburg. The case of Alexander Nikitin was called the loudest espionage trial of the decade. Military journalist, Captain G.M. Pas’ko wrote about environmental crimes in “Combat Watch”, newspaper of the Pacific Fleet, and other publications. In particular, he wrote about the discharge of radioactive waste into the Sea of Japan. In November 1997, he was charged with article 275 of the Russian Federation Criminal Code for “high treason”. The Minatom's examination established that the seized documents did not contain any information constituting a state secret; they did not even have a stamp “for official use.” In July 1999, the military court of the Pacific Fleet sentenced Pas’ko to three years in prison under the article “abuse of official position.” He spent ten months in solitary confinement, later more than six months in the Ussuri colony and was released on parole.

These sentences at one time caused mass indignation, but they look “vegetarian” compared to the current situation, when “people go to prison for terms that even serial killers are not given” (academician Y.A. Ryzhov). Opinions are expressed that the trials of scientists are fabricated and often have the character of political persecution, that “everyone is well aware that the methods of the special services have always been provocative and recruiting”, and their employees “are driven by the most primitive mercantile interest, and desire to saddle cash flows”. The director of one of the institutes of Academy of Sciences, S.A. Dziuba, cites numerous examples of blackmail, provocations, and “commercial offers” by FSB officers. Since 2017, in the Siberian branch of RAS alone, criminal prosecution has been initiated against 13 employees. According to Novaya Gazeta, in Russia over the past 20 years, more than 30 scientists have been

persecuted and arrested; they were accused of espionage and treason. At the same time, since 1999, not a single verdict of acquittal has been issued under these articles.

Repeatedly accusations of disclosing state secrets were based on the use by scientists in lectures and publications of information from open sources that are not classified. The following examples are illustrative in this regard. In 1999, I.V. Sutyagin, head of department of the Institute for the USA and Canada, was arrested on charges of transferring secret information about the latest weapons to a British company. At the same time, Sutyagin did not have access to classified materials, and he took information from open newspapers and magazines. After spending several years in prison, he was sentenced under the same article 275 on treason to 15 years of strict regime. In the summer of 2010, he was exchanged for A. Chapman. The European Court of Human Rights ruled that the Russian Federation violated Sutyagin's right to a fair trial and ordered Russia to pay him €20,000.

Krasnoyarsk physicist, director of the thermophysical center of KSTU V.V. Danilov in 2000 was accused of transferring information constituting a state secret to China. After several trials, he was sentenced to 13 years in prison in a strict regime colony. In 2012, Danilov was released on parole, in total he spent about ten years in prison. By the way, in 2011 I succeeded to send him my papers on e-democracy (Polak, 2011a, b) thanks to mutual friends. In November 2020, the ECtHR recognized the conviction in the Danilov case as legally null and ordered the Russian authorities to pay €21,100 to the scientist.

Outstanding scientists, academicians E.B. Aleksandrov, V.L. Ginzburg, E.P. Kruglyakov, Y.A. Ryzhov in 2009 addressed the director of the FSB with a proposal to initiate a review of the Sutyagin and Danilov cases: the "secrets" were completely invented by investigators in collaboration with "experts" who simply could not be such according to the law. Experts selected by the prosecution misled the jury and the court, and an innocent talented scientist was sent to prison for 13 years. The academics' letter did not help; later, neither the president nor the minister of justice responded to requests and petitions for a review of criminal cases, or denied pardon.

Treason, espionage, disclosure of state secrets were also attributed to such scientists as A.I. Babkin, O.A. Kaibyshev, O.P. Korobeinichev, V.V. Kudryavtsev, V.I. Lapygin V.V. Moiseev, V.A. Shchurov and other scientists. This practice continues; here are the next high-profile cases dated 2022-23. On June 30, a court in Novosibirsk arrested D.B. Kolker, head of the NSU laboratory. In 2018,

Kolker went to lecture in China. These lectures were given (in the presence of an FSB officer) in Russian, since it was forbidden to deliver it in English. All lectures have passed an examination and received permission to be exported abroad as they do not contain information constituting a state secret. Despite this, terminally ill Kolker was accused of collaborating with Chinese intelligence and was taken to the Lefortovo detention center in Moscow. On July 2, the scientist died.

In the same place, in Lefortovo, there were other scientists from Novosibirsk: arrested on June 28, the chief researcher of the Institute of Theoretical and Applied Mechanics of the Siberian Branch of the Russian Academy of Sciences A.A. Maslov, and in August, the director of the same institute, Corresponding Member of the Russian Academy of Sciences A.N. Shplyuk. The charge of high treason may be due to their contacts with colleagues from the United States (Boeing), China and Germany. Maslov collaborated with foreign colleagues on the problems of turbulence and resistance of aircraft exclusively at the direction of the government.

On October 20, the Tomsk Regional Court sentenced physicist A.A. Lukanin to 7.5 years in prison for treason. He was detained on suspicion of trying to transfer Russian developments to China, although representatives of the special services noted that there was no talk of transferring state secrets. In December, the FSB filed charges of treason (the same article 275 of the Criminal Code) against a junior researcher, geodesist V.S. Kachin. He was transferred from Birobidzhan to Lefortovo. The materials of the criminal case against Kachin are classified as "secret". On December 7, the Lefortovo Court of Moscow extended his arrest.

On April 7, 2023, the chief researcher of ITAM SB RAS V.I. Zvegintsev, a colleague of Shplyuk and Maslov, was arrested in the case of treason. The reason for the case was his article in Iranian journal on gas dynamics. Before publication, this article passed two expertises. In connection with the arrests of outstanding aerodynamic scientists, the ITAM Academic Council published an open letter addressed to "authorities of the Russian Federation, teams of scientific and industrial organizations, the professional scientific community, as well as to all concerned citizens." It says, in part: "We simply do not understand how to continue our job. On the one hand, the main indicator of the quality of our work within the framework of the state task and projects are scientific publications and presentations at conferences. On the other hand, we see that any article or report can lead to accusations of high treason. What we are rewarded for today and set as an

example to others, tomorrow becomes the reason for criminal prosecution. In this situation, it is simply impossible for our institute, the only academic organization in the country with an extensive base for experimental and numerical aerodynamic research, to work. The lack of publications and presentations at conferences leads to the rapid decline in the level of research, a necessary condition for maintaining and increasing which is active scientific communication.

The most terrible thing in this situation is the influence of the created atmosphere on the scientific youth. Even now, the best students refuse to come to work with us, and our best young employees are leaving science. A number of research areas that are critical to creating the fundamental groundwork needed to create the aerospace technology of the future are simply closed because employees are afraid to engage in such research."

One more message. On June 25, 2023, the Moscow City Court sentenced MIPT professor Valery Golubkin to 12 years in a strict regime colony, finding him guilty of high treason. Golubkin has been in custody since April 2021. Prior to that, he worked at the Central Aerohydrodynamic Institute of TsAGI and was one of the most famous specialists in the field of hypersonic. Together with his leader A.A. Gubanov (arrested in December 2020), Golubkin took part in an official international project under the TsAGI contract. The project involved the creation of a hypersonic civil aircraft powered by hydrogen fuel HEXAFly-INT (High-Speed Experimental Fly Vehicles) and was agreed with all the necessary departments. This plane was supposed to cover the distance between Tokyo and Brussels in two hours. In addition to TsAGI, European and Australian research institutes took part in the research. Investigators saw treason in the fact that, at the direction of his superiors, Golubkin sent reports on the work performed. The defense side stated in court that there was no corpus delicti, since the information transmitted to colleagues in the international project did not contain state secrets.

Until April 2023, the sanction under Article 275 on high treason provided for 12 to 20 years in prison and a fine of up to 500,000 rubles. According to the law of April 28, 2023 No. 157-FZ "On Amendments to the Criminal Code of the Russian Federation and Article 151 of the Code of Criminal Procedure of the Russian Federation", citizens of the Russian Federation can receive a life sentence for espionage, issuance of information constituting state secrets to foreigners, defecting to the side of the enemy, etc.

The criminal prosecution of scientists was discussed in September, 2022 at the pre-election

meeting of the then President of the Russian Academy of Sciences A.M. Sergeev with the voters of the Siberian Branch of RAS. Mr. Sergeev made a proposal on how the situation could be mitigated - to create a structure at the academy for investigating such cases: "We should talk about some analytical body that would be recognized by law enforcement agencies. Let's formulate such proposals together so that there are examples of how we work and protect our colleagues... We are the intelligentsia, it would be possible not so harshly, not necessarily with machine gunners. About the same style, the new President of Academy G.Y. Krasnikov speaks: "We have already formed a group of lawyers to consider all these precedents. My position is unchanged: there should be a careful, unbiased attitude towards outstanding people. Recently, there has been a trend towards excesses."

He urged colleagues to report to him all cases of law enforcement claims against leading scientists, especially members of the academy.

## 4 ACTIONS OF THE AUTHORITIES

As we can see, the development of scientific communications does not always meet with the support of the authorities.

Open Society Institute (*Soros Foundation*) played a huge role in equipping domestic universities with network technologies. From 1996 to 2001 it invested about \$ 100 million in the University Internet Centers project. As a result, 33 Internet centers appeared in Russia. The Fund allowed Russian fundamental science to survive during the years of the breakup of the old system, and transition to market relations. It operated in Russia since 1995 to 2003. During this period, the Fund donated more than a billion dollars in grants to teachers, professors and students. However, in 2015 it was included in the list of "undesirable" organizations under No. 2. And in January 2016, books published with the support of the Soros Foundation were burned in educational organizations of the Komi Republic.

In 2001, Professor D.B. Zimin founded the non-commercial charitable foundation *Dynasty*, the first and largest private foundation in Russia that supports the development of domestic fundamental science. In addition to projects aimed at creating conditions for talented youth to live and work in Russia, the foundation supported projects in the field of helping children, as well as cultural and educational initiatives. Millions of dollars were spent annually for these purposes. On May 25, 2015, *Dynasty* was entered by the Ministry of Justice of the Russian

Federation into the register of “non-profit organizations acting as a foreign agent.” As a result, the fund was closed.

In August 2019, the order of the Ministry of Education and Science to limit communication with foreign scientists caused a great international outcry. The order dated February 11, 2019, had not been officially published; its scan was placed by Professor A.L. Fradkov in the *Troitsk Variant - Science* newspaper. In this document, in particular, it was prescribed that it was necessary to notify the management of the institute and the ministry about a meeting with a foreign colleague at the research institute no later than 5 days in advance, attaching the passport details of all participants. The order allowed foreigners to use computers, watches, telephones, cameras, voice recorders, binoculars and other technical means “only in cases stipulated by the treaties of the Russian Federation.” Other requirements: meetings with foreigners are carried out in the amount of at least two employees; after the meeting, the head must send to the ministry a report, certified by a round seal. The order aroused natural public outrage. Here are some headlines from the media: “Entrance with a passport, take away watches”, “The triumph of scientific control”, “The head of Academy of Sciences called the recommendations of the Ministry of Education and Science for Russian scientists ridiculous”, “The Ministry of Education and Science has draconianly tightened the rules for meetings of scientists with foreign colleagues”. The odious order, which was in force for exactly a year, was canceled three weeks after the appointment of a new minister, who at the same time said: “We are interested in cooperation developing on the principles of open science.”

However, the development of open science and cooperation continues to encounter many obstacles, both objective (for example, a pandemic) and man-made. In April 2021, the so-called “law on educators” appeared, some provisions of which directly contradict the “strategy of scientific and technological development”, the law on the Russian Academy of Sciences and the national project “Science”. This law allows the government to control everything that is related to activities “outside the framework of educational programs”, but aimed at “the dissemination of knowledge, experience, the formation of skills and abilities.” It will complicate the invitation of foreign specialists - for example, the conclusion of agreements with foreign organizations and citizens on education issues is possible only with the approval of the Ministry of Education and Science. The purchase of foreign books by the university library can be carried out only after agreement with the federal executive body. The same applies, for example, to holding international round

tables and conferences, symposiums and seminars with foreign participation, agreements on joint research, on organizing foreign internships, student exchanges, etc.

## 5 FORCE MAJEURE CIRCUMSTANCES

Ridiculous laws and orders can be corrected or repealed. Force majeure situations are practically beyond the control of ordinary people. The COVID-19 pandemic had become a challenge for all sectors of society, but scientists had a special role to play in overcoming it. Paying tribute to the invaluable contribution of pharmacists and medical practitioners, let's not forget about representatives of other specialties. Scientific communication, as a tool for the rapid dissemination of information about the characteristics of the coronavirus infection and the epidemic caused by it, made it possible to realize the fundamental right to access to knowledge, which in the current situation actually meant the right to life and health. Physicians have used the telemedicine format extensively; a significant part of the population switched to a remote mode of work and study; many public services began to be provided remotely. The growing use of digital products and services has become a powerful stimulus for the development of communication technologies.

Personal contacts of scientists have switched to a remote format, traditional conferences have practically disappeared; their announcements began to be accompanied by the words: “Due to the current epidemic situation, the conference will be held online.” Thus, the general meeting of members of the Russian Academy of Sciences in December 2021, dedicated to the pandemic, took place in an unusual format: a small number of members of the Academy were in the Great Hall of the Russian Academy of Sciences, the rest participated in the meeting (with the ability to vote) in remote mode.

The International Coalition of Library Consortia (ICOLC) issued a “statement on the global COVID-19 pandemic and its impact on library services and resources” in March 2020, calling on publishers and other content providers to

- immediately open access to paid systems with content and data on coronaviruses, vaccines, and antiviral drugs to accelerate research and find treatment options;
- remove all restrictions on access to licensed educational digital content to enable research, discovery and education;
- postpone or minimize any planned price increases during the pandemic.

The executive committee of the German Commission for UNESCO issued a statement emphasizing that open science is a matter of survival and essential to overcome the pandemic. The Creative Commons (CC) organization has re-emphasized its demand that publicly funded research be made available under an open license or put into the public domain.

At the same time, it is noted that “easy access to unverified information and its uncontrolled absorption, the low level of media literacy of the population and the lack of critical thinking skills, as well as the weak interest of scientists in the qualitative presentation of the results of their own research in the media negatively affect the effectiveness of crisis communications and the dissemination of scientific information”.

The February events of 2022 led to massive breaks in Russia's international scientific ties. Already on March 4, the European Commission decided to suspend cooperation with Russian organizations in the field of research, science and innovation. Any current projects with Russian participation, both under the Horizon Europe flagship science grant program and the previous EU Horizon 2020 program, have been revised. A decision was made not to participate in further cooperation projects in the field of research and innovation with Russian organizations. All payments under the Euratom and Erasmus+ programs have been suspended. The participation of Russian organizations in all existing grant agreements has been terminated.

The European Space Agency has announced that it is suspending most of its cooperation with Roscosmos and has notified the Russian side that works on the ExoMars mission has been terminated. Launches of Soyuz rockets from the Kourou cosmodrome have been halted. The leading particle physics laboratory CERN has frozen Russia's observer status. CERN has also banned new collaborations with Russian institutions, and the agreement with Russia ending in December 2024 will not be renewed.

The German Ministry of Education and Science, just a few hours after the outbreak of hostilities in Ukraine, announced an immediate freeze on any interaction with Russian organizations in the scientific and educational fields. Work with Russia was suspended by the German Academic Exchange Service (Deutscher Akademischer Austauschdienst, DAAD). Leading research institutes and universities in Germany have severed relations with Russian partners and announced that all ongoing research projects will be suspended. The Alliance of German Scientific Organizations released a statement “strongly supporting the federal government's consistent action” against the Russian authorities. The

alliance, along with DAAD, includes the German Research Foundation, the Alexander von Humboldt Foundation, the Fraunhofer and Max Planck Societies, the Helmholtz and Leibniz Associations, the German Rectors' Conference, the Leopoldina National Sciences and the Government Scientific Council. Then the government departments of Great Britain, Denmark, the Netherlands, Italy, the Czech Republic, Slovenia, France, Norway and Finland stopped financing joint scientific and educational projects.

The Ministry of Education and the Academy of Sciences of Poland are terminating cooperation with Russia in the field of science and technology, Deputy Minister V. Bernatsky said on March 1, 2022. “Firstly, we are terminating cooperation within the Joint Institute for Nuclear Research in Dubna and the International Center for Scientific and Technical Information. Secondly, the Ministry terminates cooperation with Russia within the framework of the agreement on cooperation in the field of science and technology, concluded on August 25, 1993”. This means stopping contacts with research centers, educational institutions, Russian scientists; cancellation of the agreement on the recognition of certificates, diplomas, scientific degrees.

On June 9, 2022, President of Ukraine signed a decree imposing sanctions on 236 Russian universities and 261 rectors. In particular, the sanctions list included Moscow Lomonosov State University, Moscow Bauman State Technical University, Higher School of Economics, RANEP, 1st Moscow Sechenov Medical University. The sanctions imply the termination of cultural exchanges, scientific cooperation, educational and sports contacts.

The largest publishing company Elsevier, together with 15 other leading scientific publishers in the world (Cambridge University Press, Springer Nature, etc.), issued a joint statement. Now access to corporate subscriptions to most international scientific journals in Russia and Belarus is closed. The ability for scientists to publish on a case-by-case basis depends on the editorial board, but many journals rejected articles by Russian researchers for political reasons, and some countries prohibit citizens from co-authoring articles with Russians.

Clarivate has closed its Russian office, and has stopped considering applications from Russian journals for inclusion in the Web of Science database. The Institute of Physics Publishers, which has been translating and distributing the most important Russian scientific journals abroad for many years, has refused to do so since July. The editors of the Journal of Molecular Structure decided not to consider the manuscripts of scientists from Russian institutions “in connection with the humanitarian consequences of

the Russian military operation in Ukraine.”

This June I have received a letter from a German publishing house, where one of my books was published some years ago: “Dear Dr. Yuri Polak! Unfortunately, the publishing house cannot cooperate with the Russian Federation, as it was before. At the moment, we are postponing the possibility of publishing all Russian authors indefinitely. Your text will be stored in a special folder for the time being. I will definitely contact you as soon as the possibility of publication appears. Thank you for your understanding and patience.”

The Massachusetts Institute of Technology (MIT) said it would not continue to cooperate with the Skolkovo Institute of Science and Technology in response to a military operation “on the territory of a peaceful neighbor.” Interaction with Russia was interrupted by the global network of oncologists OncoAlert; participation in international conferences was reduced. The isolation of scientists in Russia from the rest of the world is a reality of today.

On March 7 and 22, the Association of European Universities suspended the membership of 14 Russian universities, as their leaders signed a "letter of rectors" - an appeal from the Russian Union of Rectors in support of the Kremlin's position on Ukraine. The rector's signature under the appeal means that the university does not share European values, because the document “diametrically contradicts” them.

Back in November 2021, MIPT (Fiztech) was on the US Department of Commerce sanctions list for “development of goods and services for the military-industrial sector” without any specific facts. International scientific cooperation suffers from sanctions, in particular, the purchase of foreign software and equipment for scientific research. The United States imposed sanctions on Pirogov Russian National Research Medical University. Refusal to issue foreign diplomas in the implementation of bilateral educational programs and a ban on the supply of American-made medical equipment to RNIMU were among the restrictive measures.

However, a number of projects involving Russian scientists continue to work. For example, the world's largest international thermonuclear experimental reactor (ITER) is being built 60 km from Marseille. Russian specialists were entrusted with the production of 25 unique systems, in which more than 30 enterprises from different cities of the country participate. “Throughout the history of ITER, political disagreements between its members have never affected the spirit of cooperation. This is a project for the world”. Russia is also involved in the work of the European Synchrotron Radiation Facility in Grenoble, a research accelerator complex, the most

powerful source of third-generation synchrotron radiation.

## 6 CONCLUSIONS

Open science is currently unthinkable without the Internet. Internet effectively provides access to scientific information and communication of scientists. This is especially important now, when humanity is facing local and global cataclysms.

Some optimism is caused by statements of contenders for the presidency of the Russian Academy of Sciences: “previously, many issues related to the development of domestic technologies and developments were often pushed aside. Now our leaders are set differently. Therefore, I believe that our time is coming... International conferences of scientists should be held... The world scientific community, despite the tense international situation, is trying to maintain contacts with our country. I think that sooner or later all difficulties will be left behind, but science will not go anywhere, and, in my opinion, it is absolutely international” (Leskova, 2022).

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