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Regulation of the Cloud Computing
(Service-Oriented Distributed Information Systems)

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GENERAL OVERVIEW OF THE THESIS

Research Relevance

The advance of modern information technology affects virtually every sphere of life: the information component of human activity migrates to a virtual sphere, dramatically altering day-to-day processes. Cloud computing[1] is an organizational model which brings former ideas and elements of the information system to a fundamentally new level and is now among the catalysts and basic technological causes of the transformation of public life.

In 2017, the Russian Federation adopted a number of significant legal acts concerning information technology with a special attention to cloud technology. The Information Society Strategy of the Russian Federation for 2017-2030 was established by Presidential Decree No.20 of May 9, 2017[2]. It points to a significant growth of the cloud services market (by about 40 per cent annually) and allocates cloud technology to nine key areas of Russian information and communication realm. The Russian Government regulation №1632-r from July 28, 2017 'On the approval of the Program "Digital Economy of the Russian Federation"'[3] gives the cloud technology high priority and sets forth plans for the cloud computing in Russia. Other countries have adopted similar legal acts since 2011.

Nevertheless, the cloud technology, as any other Internet-based technology, necessarily poses a risk of human and civil rights violations (for example, the right to privacy or personal data security). The cloud technology formed the foundation of the Big Data and blockchain phenomena. There are significant potential risks and issues tied to cloud computing in deep analytics of large amounts of data and

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[1] These terms are used interchangeably: cloud technology, cloud information systems, cloud computing.

[2] Decree of the President of the Russian Federation No. 203 (May 9, 2017) "On the Strategy for the Information Society Development in the Russian Federation for 2017-2030" // Collection of the Russian Federation legislation. 2017. No.20. Art.2901.

[3] The Russian Government regulation №1632-r from July 28, 2017 'On the approval of the Program "Digital Economy of the Russian Federation"'// Official Internet portal of legal information. Available at http://www.pravo.gov.ru

blockchain-based transactions (for example, smart contracts in the Ethereum cloud information system).

The 2017 statistics shows over eight times increase of the illegal access to data stored in clouds[4] compared to 2016. In 2018, a significant number of personal data leakages also occurred, causing huge public outcry (some of them involved national[5] government bodies as the operators).

Moreover, the issues of ensuring the country's sovereignty and the supremacy of state authority in the internal affairs become particularly crucial in the context of the widespread use of the Internet and cloud technology.

The things are further complicated by other countries adopting extraterritorial regulations and making judicial decisions[6] aimed at providing their national authorities with cloud-processed data necessary for their functioning. 'The Cloud Act' enacted by the USA on February 6, 2018 ('Clarifying Lawful Overseas Use of Data Act'[7]) serves as the most striking example. The Act amends Title 18 of the United States Code and orders providers of electronic communication service or remote computing service registered in the United States of America to disclose upon request to public authorities the data processed by them regardless of the data location[8].

These facts indicate the need to revise national approach to the cloud technology regulation and develop general principles in harmony with other countries which, at the same time, can strengthen the digital sovereignty of the Russian Federation. The global environment requires adopting legislative norms

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[4] Breach Level Index 2017 Full Report. Available at https://www6.gemalto.com/breach-level-index-2017-full-report?utm_campaign=breach-level-index&utm_medium=blog&utm_source=pardot

[5] For example, on July 5, 2018, the Yandex search engine provided links to sensitive user data processed by the Google Docs cloud information system (e-mail and personal account passwords, personal phone numbers of large corporations' CEOs and their budgetary outlays). On March 28, 2018, Facebook was sued for the illegal use of 50 million users' personal data to predict voters' behavior and form a target audience opinion.

[6] For example, the April 17, 2018 US Supreme Court decision in *US v. Microsoft* case recognized as unreasonable the refusal of cloud providers to provide data stored outside the USA // US Supreme Court. United States, petitioner v. Microsoft Corporation, 584 US No. 17-2, April 17, 2018/ Available at https://www.supremecourt.gov/opinions/17pdf/17-2_1824.pdf

[7] H.R.4943 - 115th Congress (2017-2018). To amend title 18, United States Code, to improve law enforcement access to data stored across borders, and for other purposes. Available at https://www.congress.gov/bill/115th-congress/house-bill/4943/text

[8] Note: this regulation requires making an executive agreement by the countries' authorities which greatly simplifies official access to foreign citizens' personal data that existed before the adoption of this document (Mutual Legal Assistance Treaties).

which, on the one hand, promote the technology and services advancement, and, on the other hand, protect the person's rights and legitimate interests.

Based on the above, it is advisable to continue looking into the elements of legal implications of the cloud technology and its main legal problems, and work on the development of regulatory proposals which adds to the relevance of this thesis theme.

The Degree of Scientific Elaboration

Due to the novelty and lack of structuredness of the legal relationships in the digital environment in general and the cloud technology in particular, the distributed computing information technology have not yet become a popular subject of legal research. Nevertheless, it has already been elaborated on in the spheres of physics, mathematics, technics, economics and philology, as well as, indirectly, in other spheres of research tied to the cloud computing in public life (pedagogics, medicine, etc.).

In 2017, a thesis on civil law relations around the use of the cloud technology was conducted by I.A. Nesterova where she pays special attention to the aspects of the legal protection of the right to the intellectual property created, used or distributed by the cloud computing.

Various aspects of the cloud technology regulation are mentioned in the works of M.A. Bashirov, A.M. Vilinov, E.A. Voynikanis, A.I. Gazeykin, D.V. Gribanov, V.M. Gostev, A.K. Zharova, V.O. Kalyatin, A.V. Kolyada, S.V. Makarov, I.V. Ponkin, V. Razuvaev, I. Romashevsky, A.I. Saveliev, A.G. Sergo, L. K. Tereschenko, A.A. Shatalov and E.A. Shirokova.

The regulatory problems of the Internet and data processing using modern information technology became the subject of analysis in the works of the following Russian information law experts: I.L. Bachilo, I.Yu. Bogdanovskaya, V.A. Kopylov, V.N. Lopatin, A.A. Maksurov, T.A. Polyakova, A.A. Tedeev, Yu.A. Tikhomirov, A.A. Fatyanov, M.A. Fedotov, A.I. Khimchenko, I.G. Shablinsky and others.

The cloud technology regulatory problems are also reflected in the works of a number of foreign researchers: S. Barokas, S. Bradshaw, J. Brenner, S. Kierkegaard, N. Carr, D. Koen, I. Lloyd, K. Kukie, V. Mayer-Schönberger, D. Noble, C. Millard, C. Reed, B. Franks, E. Schmidt, I. Walden and others.

Furthermore, a study conducted in 2009-2013 at the University of Queen Mary of London clarified the particular legal features of the cloud technology implementation (standardization of treaties and reservations in agreements, specifics of agreement making), as well as personal data and consumer protection issues (Cloud Legal Project, Center for Commercial Law Studies, Queen Mary University of London).

However, a comprehensive study of the cloud computing regulation in the Russian Federation has never been conducted. It seems to us that the effectiveness of public regulation in this sphere largely depends on the scientific research. The thorough study of the cloud computing legal relations is indispensable to and, ideally, should precede or adjust national lawmaking in this area leading to the best regulatory approaches. Therefore, the subject of this research has a great scientific and practical value.

The Purpose of the Thesis

This research focuses on the comprehensive legal analysis of the relations generated by the cloud technology in the Russian Federation, as well as the formulation of a conceptual and theoretical apparatus that covers the scope of these relationships and gives approaches for the improvement of the Russian legislation on information technology.

To achieve this goal, the following **tasks** were set:

1) To define a ‘cloud technology’ concept and identify the legal implications of the cloud computing, their object and place in the information law science and legislation;

2) To study the features of the subject matter and determine the specifics of cloud computing legal relationships which directly affect the allocation of responsibilities among parties;
3) To study legal conflicts and risks imposed by the cloud technology including Big Data processing;
4) To identify regulatory features applicable to the personal data processing in a cloud;
5) To study the legislative approaches and principles adopted by other countries to regulate the cloud computing;
6) To formulate principles, proposals and recommendations for the improvement of the cloud computing regulation in the Russian Federation.

The object of the research is the legal relationship between parties involved in the use of the cloud technology.

The subject of the research is the law governing the relationship between parties involved in the use of the cloud technology in the Russian Federation and other countries, as well as academic doctrines and debates related to it.

Methodology and Methods of Research

The research methodology combines the following scientific cognition methods: general (dialectics, analysis, synthesis, induction, deduction, comparative approach), specific (historical, formal logical, systemic), private law (legal comparative, legal forecast, formal law) and others.

The empirical basis of the study is comprised of international, Russian and foreign legal acts that regulate various aspects of the cloud technology operation.

Due to the apparent novelty of the phenomenon, the legal research of the relationship between parties involved in the use of the cloud technology required assessment of the cloud technology implementation experience in Russia and abroad, as well as the related technical, organizational and economic models. In

particular, 30 various cloud computing services were analyzed along with the provisions of agreements tied to them. We studied Russian and foreign judicial practice, as well as official law interpretations, guidelines and recommendations, local regulatory and self-regulatory acts, non-regulatory and advisory documents, research works submitted by business community, as well as applied the author's practical experience of participation in research and review projects.

The theoretical basis of the research was formed by the works of national theoreticians in the State and Law sphere and experts in constitutional, international, civil and administrative law: S.S. Alekseev, L.F. Apt, S.N. Bratus, V.N. Vasin, A.B. Vengerov, V.B. Isakov, D.A. Kerimov, Yu.K. Krasnov, M.N. Marchenko, V.S. Nersesyants, I.B. Novitsky, M.M. Rassolov, E.A. Sukhanov, Yu.A. Tikhomirov, R.O. Khalfina, V.A. Chetvernin, V.E. Chirkin.

The works of the following national legal scientists formed the foundation for the study of information issues: V.V. Arhipov, I.L. Bachilo, I.Yu. Bogdanovskaya, E.A. Voynikanis, A.S. Dupan, T.A. Polyakova, I.M. Rassolov, A.I. Savel'ev, A.A. Tedeev, L.K. Tereschenko, B.N. Topornin, M.A. Fedotov, A.I. Khimchenko and others.

The analysis of the international scientific and practical regulatory basics related to the use of cloud technology required the study of the works of the following scientists and experts: S. Barokas, S. Bradshaw, J. Brenner, S. Kierkegaard, N. Carr, D. Koen, I. Lloyd, K. Kukie, V. Mayer-Schönberger, D. Noble, C. Millard, C. Reed, B. Franks, E. Schmidt, I. Walden and others.

This research also involved the study of the works of the following information technology experts: M. Van-Stein, G.I. Radchenko, V.O. Safonov, E. Tanenbaum, L.Z. Shautsukova and others.

The Scientific Novelty of the Research

This is the first comprehensive thesis focusing on regulatory aspects of the relationship between parties involved in the use of the cloud technology.

Key Provisions to Be Defended

1. Cloud computing is not a separate technology. It is an organizational model of the remote (network) use of the information system components (software, hardware and data), together or in part, at any time, in any volume and in any configuration. Thus, the subject of the cloud technology regulation is the relationship between the cloud service provider and a person who uses the information systems components (cloud technology user).

2. The parties to the legal relationship around cloud computing are:

1) the cloud service provider – a person who holds rights to all or several components of the cloud information system and provides users with an access to the required components of that system;

2) the cloud technology user – a person who uses cloud information system components, access to which has been granted by the cloud provider, to process his own or third-party data.

3. Specific features of the legal relationship forming around the cloud computing:

1) The 'information system operator' status can belong to both parties (it is established separately in each case of cloud information system involvement). The information system involving cloud technology constitutes of the body of data, hardware and software of a both the cloud user and provider, which entails specific mutual responsibilities to ensure the data integrity and the information system security, and to perform other duties of the information system operator;

2) The cloud technology service is essentially different and distinct from the regular communication service, whereby the cloud service provider is not required to have a telecom operator status. In spite of the fact that this type of technology depends on the regular communication networks, any third party can provide this type of service.

4. The object of legal relationship forming around the cloud computing is complex and includes both the information system elements (software, hardware and data) crucial for the cloud technology user, and the cloud service provider which gives access to the required components of the information systems.

5. The cloud technology regulation should be based on the following principles:

1) public-private cooperation: due to the complexity of such regulation, it is necessary for the national government to withdraw from the detailed formulation of rights and obligations of the cloud computing parties and, instead, regulate the key principles while granting the relevant nongovernmental institutions the rest of the regulatory load;

2) technological neutrality of legislation: it is crucial to make the regulation as independent from the technical features as possible so that its norms may be carried through by the parties regardless of technological advancement and changes;

3) international cooperation: the transboundary nature of cloud computing relationships calls for achieving regulatory harmony with the existing international legislation.

6. The use of the cloud technology requires addressing the personal data protection issue by promoting responsible action among the legal entities involved: the user, the cloud provider, the operator, other professional parties to the legal relations and their associations (public institutions and professional communities) and the government.

7. The user as the personal data subject and/or operator (being the one who determines the ultimate goal of data processing and the necessity of data transmission) is responsible for choosing the cloud information system and maintaining its safe use which may entail the following activities:

a) responsible assessment of the cloud provider before choosing him (taking into account his reputation, transparency and data safety tests results);

b) analysis of the purposes and conditions of the personal data processing before expressing consent to it;

c) observance of precautionary measures during the cloud information system use (maintaining the password confidentiality, restricted access to the electronic devices and proper information access settings, etc).

8. Entities engaged in the professional use of cloud technology are responsible for the following:

1) the cloud technology provider should not justify incompliance with personal data processing principles by the technical features of cloud information systems. 8. The cloud technology provider is responsible for maintaining personal data integrity in accordance with the Russian personal data protection law and for providing the best practice in the context of the specific nature of the cloud information system operation. The provider's ongoing improvement of the internal management and the technical advancement of data processing will bring following results, *inter alia*:

a) The adequate and accurate report on the processes going on within the cloud information system (transparency) including providing such report upon request;

b) The data processing purposes and conditions are plainly, vividly, thoroughly and consistently articulated;

c) Users are armed with the most effective personal safety means for their maximum control over their data privacy;

d) Users are provided with an access to manage their personal data and obtain a copy of their personal data report, as well as information about their data sources;

e) Transparent declaration of personal data processing purposes and the unrestricted access to the cloud computing in case of the user's non-consent to the secondary data processing purposes (i.e. for research);

f) Proactive steps for building user trust by increasing data security beyond the requirements of law and providing user-friendly tools for personal data processing (i.e. providing access to data on demand in the private online office);

2) The communication service provider (as a distinct entity or a cloud technology provider) is responsible for users' personal data privacy as part of his

function of providing access to the cloud information system in accordance with the Russian personal data protection law, communications law and best practice;

3) Public institutions and professional communities formulate rules for the assessment of the cloud providers and the cloud information systems, and actively test the integrity of cloud information systems and publish reports and materials to assist users in choosing the proper cloud information system;

9. At the governmental level, there is a need in a systemic policy, which is aimed both at increasing the overall information security and at promoting the relations formed around the cloud technology. With this aim in view, following areas of regulation should be put in place:

1) Adoption of a regulatory strategy concerning the relationships around the cloud computing;

2) Adoption of a law with clear basic concepts: cloud technology, cloud service provider, cloud technology user, cloud service agreement;

3) Adoption of a law with the key rights and obligations of the cloud technology provider and user (including personal data safety requirements);

4) Adoption of a law with specific requirements for cloud technology providers for processing governmental data, complete with the compliance confirmation options (one or both), as follows;

a) compliance assessment (accreditation or certification) of the cloud technology provider;

b) mandatory participation of the cloud technology provider in a self-regulatory organization;

5) Formulation of the guidelines (for legal entities) or concise road maps (for individuals) with the input of professional communities to help the user make an informed choice of a cloud technology provider with the best user data protection;

6) Making out standard agreements between the cloud technology provider and user which would balance both parties' interests;

7) Raising the legal awareness of Internet users by spreading the information about the possible consequences of processing data in the clouds;

8) Participation in the international regulatory work concerning the cloud technology while strengthening the digital sovereignty of our nation.

The Theoretical Significance of the Research

The findings of this study will help ongoing regulatory work and research of legal and information aspects of the relationship between parties using the information technology including clouds and Big Data processing. Furthermore, they might enhance the development of the law doctrine on information processes which would regulate the rights of citizens of the Russian Federation to privacy in the advanced contemporary digital technological circumstances.

The Practical Significance of the Research

The conclusions and proposals formulated in this thesis might be applied in lawmaking to improve and structure the current legislation on information. Furthermore, this study may provide a scientific foundation for every stage of the 'Digital Economy in the Russian Federation' Program approved by the decree of the Government of the Russian Federation on July 28, 2017 No. 1632-r. It may prove especially helpful at the final stage which would focus on the development of a comprehensive regulation of the digital economy and the law concepts systematization.

Moreover, this research might be useful for educational purposes as it offers various regulatory issues concerning the information technology and data processing (i.e. 'Information Law' academic course).

Testing and implementation of the thesis results were done several ways. The research was given consideration and approval at the Research Guidance Center of the 'UNESCO Chair on Copyright and Other Intellectual Property Rights' of the 'Higher School of Economics' National Research University.

The research conclusions were included in a number of scientific articles and were discussed at the Russian and international scientific conferences, lectures and

seminars, among which are: ‘The Internet Law’ course at the Kutafina Moscow State Law University (March-June, 2018); ‘Digital Economy Laws: Blockchain and Smart Contracts’ advanced professional training course at the Kutafin Moscow State Law University (June 26-27, 2018); ‘Law and Information: Issues of Theory and Practice’ VIII International Scientific Conference during the Legal Forum (April 20, 2018, St. Petersburg); ‘The Digital Technology of Industrial Russia’ Conference (CIPR Conference) (May 24-26, 2017, Innopolis, Russia); ‘Law in the Digital Age’ II International Scientific Conference (May 20-21, 2013, Moscow); ‘Information Technology: Law and Safety’ 7th International IT Lawyers Association Conference (October 1-6, 2012, Athens, Greece).

Besides that, the key findings of the study were applied and tested by the author during her research work at the Institute of Legal Regulation (2011-2018, Moscow, HSE)[9].

The author also participated in the following working groups: ‘Competence Center of the Digital Economy Regulation’ (Skolkovo.Legal, 2017, Moscow, Russia); ‘Digital Economy State Regulation’ (Ministry of Economic Development of the Russian Federation, 2017); ‘Cloud Computing Regulation in Russia’ (The Russian Association for Electronic Communications (RAEC), 2012-2013).

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[9] Note: the author took part in the following research projects, *inter alia*: ‘Finding Solutions to the Fake Information Dissemination through the Media and Internet’ (Administrative Directorate of the President of the Russian Federation, 2018); ‘Preparation of Proposals on the Interstate Digital Ecosystems of the Eurasian Economic Union’ (State Duma of the Russian Federation, 2017); ‘Interstate Intersectoral Digitized Infosphere Experience Review’ (including study of the European Union Digital Single Market) (Administrative Directorate of the President of the Russian Federation, 2017); ‘The Impact of Economy’s Digitalization on the Economic Growth" (Microsoft Rus LTD, 2017); ‘Study of the Big Data Processing Regulatory Possibilities to Benefit Various Sectors of the Russian Economy and National Security’ (Administrative Directorate of the President of the Russian Federation, 2016); ‘Preparation of Proposals to Improve the Personal Data Protection’ (Administrative Directorate of the President of the Russian Federation, 2015); ‘Cross-Border Personal Data Transfer Regulatory Issues’ (Microsoft Rus LTD, 2014); ‘Evaluation of Opportunities to Improve the Intellectual Property Regulation in the Russian Federation" (Ministry of Economic Development of the Russian Federation, 2013); ‘Work on the Draft Concept of the Intellectual Property Management in the Public Sector’ (Education and Science Ministry of the Russian Federation, 2012-2013); ‘European Approach to the Cloud Computing Regulation and Its Possible Implementation in Russia; Work on the Draft Concept of the Cloud Computing Regulation in Russia’ (Microsoft Rus LTD, 2012-2013); "Analysis of Regulation on the International Access to Open Data and Work on Draft Principles and Approaches to Providing Open Data Access’ (Ministry of Economic Development of the Russian Federation, 2012); ‘Analysis of the Cloud Computing Regulation Principles and Trends (including SaaS, PaaS, IaaS) in the United States, Japan and European Union: Personal Data Protection, Privacy, Intellectual Property Rights, User Identification and Interoperability Issues’ (Microsoft Rus LTD, 2011-2012).

The Structure of the Research

According to the inner logic of the thesis, it contains an introduction, three chapters divided into six paragraphs, conclusions and a list of legal acts and literature.

II. BRIEF SUMMARY OF THE THESIS

The introduction presents the relevance of the research topic, its goals and objectives, the object and the subject of the study, the degree of scientific elaboration, methodological, theoretical and empirical base, the scientific novelty, the key provisions to be defended, its theoretical and practical significance, explanation of the thesis structure, and report on the approbation of the research proposals.

The **First Chapter** 'The content of Informational and Legal Relations Formed with the Use of the Cloud Technology in the Russian Federation' consists of two paragraphs expounding on the legal nature, set of facts and key features of the cloud technology regulation.

The **first paragraph** of the First Chapter 'Cloud Technology as an Object of Information and Legal Relations' looks into the 'cloud technology' concept definition and the legal nature of the relations around the cloud computing.

The evolvement of this term in the Russian law has been analyzed. As the study discovered, before the adoption of the Russian Government Decree No.1632-r from July 28, 2017 'On the Approval of the 'Digital Economy of the Russian Federation' Program', this term mostly signified the digitization of particular departments of the federal, regional and municipal governments. Overall, the term's introduction to the Russian law was spontaneous and sporadic, driven by the urgent need to define an emerging information system. This explains the existing legal disparity and the lack of a unified approach to the definition of the technology in question.

The formulation of a legally correct definition and classification of the cloud phenomenon required a thorough study of its technical and organizational features

that determine the legally significant characteristics of the emerging relationships and have the potential to cause specific regulatory problems.

The terminology describing the cloud computing has been systematized by performing classification by the technology type, the manner of access to it and the resulting informational objects. This required an in-depth study of the cloud information systems' types and components followed by their step-by-step correlation with the Russian law concepts regulating corresponding jural relations (laws on information, communication, personal data, intellectual property, etc.).

The conclusion presents the complexity of the object of legal relations formed by the cloud computing. The choice of the cloud computing type depends on its ability to meet the parties' requirements. As separate entities, the technology elements absolutely lose the exclusive information system characteristics which they retain as a consecutive combination.

The **second paragraph** of the First Chapter 'Parties to the Information and Jural Relations Formed with the Cloud Computing in the Russian Federation' defines parties who carry information rights and corresponding responsibilities, as well as responsibilities within the cloud computing relations.

It was concluded that no law regulates the cloud computing directly. Thus, to determine the legal status of the entity providing the cloud service, a correlation was done with the existing entities having legal status (an information system operator, a website owner, a communication operator, a web-hosting provider, etc.).

The cloud technology provider was juxtaposed with each of the above entities. Then we analyzed the feasibility and sufficiency of each term in view of the cloud technology. The study revealed the distinctive features of the cloud provider's operation.

Specifically, a cloud software providing entity cannot have a status of an information system operator since it would insufficiently determine its legal status and improperly identify it as a legal entity creating great uncertainty. This is due, first of all, to the fact that the cloud computing requires simultaneous use of cloud

software both by the provider and the user, each acting as an information system operator. Moreover, this term doesn't cover other inherent rights, duties and responsibilities (i.e. the software provision, processing capacity, etc.) leaving the entity artificially limited by its legal status.

Web hosting and cloud service do not match in volume. Thus, the fact that the cloud technology provides access to other objects besides data processing itself, i.e. software, does not allow to call a cloud service providing entity a 'hosting provider'.

Chapter Two 'Legal Issues of the Cloud Computing' consists of two paragraphs. They address the specific issues and risks tied to cloud technology and the implementation of legal principles in personal data and Big Data processing in cloud information systems.

The **first paragraph** of the Second Chapter 'Legal Issues and Risks Posed by the Cloud Technology', by showing the various issues and risks in this sphere, determines potential regulatory strategies of these legal relationships. The constantly changing data processing approaches and methods complicate the prediction of emerging rights violations of the involved parties and require attention of the regulatory bodies working to this sphere. The aspects of reidentification and profiling, *inter alia*, are urgent and critical to the personal data processing security.

This paragraph assesses the particulars of legal relations within the 'Big Data as a Service' organizational model of providing useful properties of cloud technology, as well as complex risks caused by the deep Big Data analytics in the cloud.

The **second paragraph** of the Second chapter 'Regulatory Issues Concerning the Relationships Formed by Personal Data Processing in Clouds' focuses on processing limited access and sensitive data in the cloud. The personal data processing justifiably attracts the greatest attention of national regulators and law analysts.

The paragraph studies the data processing legal relations correlated with cloud computing legal relations. The entity responsible for the data storage and the relevant compliance control method (i.e. the distribution of responsibilities among entities) plays crucial role in regulating cloud relations.

The international regulation, which establishes the procedure for personal data processing, has been analyzed. Also, details of the implementation of the information security principles and values of the personal data processing in cloud information systems are studied.

Each principle is to be implemented with a corresponding set of specific rights, duties and responsibilities of the parties of the emerging legal relations which, in their turn, should also be enhanced, clarified and revised. Let's take the transparency principle as an example: a cloud provider should furnish a way to assess the cloud information system's user-friendliness; the personal data holder must be provided with any supplementary information necessary to guard his rights, including notification of the data collection fact and purpose, list of parties involved and locations of data processing technical facilities. The transparency should be stipulated in the relevant agreements concerning every link of the chain: between personal data subjects and operators (entities using the cloud information system) and between operators and data processors (cloud providers, especially if many of them are involved).

In the **Third Chapter** 'Issues of the Cloud Technology Regulation Improvement' we analyze the international regulatory experience concerning the relations formed by the cloud technology to identify the existing approaches and principles. This allowed us to formulate proposals and recommendations that would enhance the national regulation concerning cloud technology in the Russian Federation.

The **first paragraph** of the Third Chapter 'Regulatory Approaches and Principles of the Cloud Computing Relations' states that the cloud technology advancement in an everyday life reveals the critical regulatory vacuum concerning the emerging legal relationships in many countries. We studied the relevant

regulatory principles and trends of the United States of America, the European Union, Japan and other countries.

Potentially, the cloud computing might be subject to government regulation, public regulation ('self-regulation' in terms of the Russian law) and the regulation through the agreements between parties (local or contractual).

The starting point of the public regulation might be an adoption of a strategic document, a plan that recognizes the fact of the enormous cloud technology advancement rate in a present-day life, expresses the government's position on the issue and establishes action benchmarks. Further, a specific two-fold program might be adopted (on public and private use of the cloud technology) containing a list of tasks (including particularities of cloud computing and its evaluation criteria, the legal status of the parties involved, the aspects of access, disclosure, transfer and processing of data in the cloud, as well as the organizational and technical security requirements, etc.).

The cloud provider operation standards, features and conditions should be determined by the professional communities of public-private partnership. The outcome of their cooperation will lay the foundation for the dispositive norms of law including public regulation (self-regulation) through certification and enabling the user to perform his own assessment of the cloud provider.

In the conclusion, we reinstate the value of creating conditions for an expert assessment of the cloud provider due to the existing practice of leaving little room for the review of the cloud technology agreement terms (as in most cases, standard agreements are used). As the users rarely possess the special knowledge indispensable for the effective review and evaluation, the government should provide the sufficient support.

In the **second paragraph** of the Third Chapter 'Improving the Cloud Technology Regulation in the Russian Federation', we analyze the regulatory approach concerning the cloud technology in the Russian Federation and suggest ways of improving it.

We found that the Russian Federation has no unified regulatory position on the cloud technology, including its principles, approaches and content, and lacks the proper comprehension of this phenomenon.

The thesis' **Conclusion** summarizes the results of the research and formulates their key theoretical and practical implications.

The bibliography contains a list of legal acts and literature relevant to the research.

III. The Following Publications Contain Key Findings of this Thesis

Author's articles in the leading peer-reviewed scientific journals approved by the Higher Attestation Commission of the Ministry of Education and Science of the Russian Federation:

1. Bikbulatova, Yu. S., *Osobennosti pravovogo regulirovaniya otnosheniy, formiruyushchikhsya pri obrabotke bol'shikh ob'yomov dannykh s ispol'zovaniem oblachnykh tekhnologiy* [Peculiarities of the regulation of relations formed by big data processing through the cloud technology] 32 (1) Trudy po intellektual'noy sobstvennosti [Intellectual Property Works] 17-39 (Russia, 2018).
2. Bikbulatova Yu. S., *Oblachnye tekhnologii kak osnovnoe napravlenie razvitiya tsifrovoy ekonomiki v Rossii* [Cloud technology as a key to the digital economy development in Russia: regulatory models] 31 (4) Trudy po intellektual'noy sobstvennosti [Intellectual Property Works] 27-42 (Russia, 2017).
3. Kozhevnikova Yu.S., *Problemy reglamentatsii otnosheniy, formiruyushchikhsya pri ispol'zovanii informatsionnykh oblachnykh tekhnologiy: sochetanie regulirovaniya i samoregulirovaniya* [Regulatory issues concerning the information cloud technologies: compromise between the public regulation and self-regulation] 13 Jurist [Jurist] 30-35 (Russia, 2014).
4. Kozhevnikova Yu.S., Alekseevskaya E.I., *Informatsionnye tekhnologii kak tochka soprikosnoveniya organov ispolnitel'noy i sudebnoy vlasti, osushchestvlyayushchikh nadzornye polnomochiya* [Information technologies as a point of contact between executive and judicial supervisory authorities] 9

Gosudarstvennaja Vlast' i Mestnoe Samoupravlenie [State Government and the Local Governance] 35-39 (Russia, 2013).

Other publications:

5. Dupan A.S., Zharova A.K., Zhulin A.B., Elin V.M., Bikbulatova Yu.S., Bikbulatov T.I., *Novaya paradigma zashchity i upravleniya personal'nymi dannymi v Rossiyskoy Federatsii i zarubezhnykh stranakh v usloviyakh razvitiya sistem obrabotki dannykh v seti Internet* [The new paradigm of personal data protection and management in the Russian Federation and other countries due to the development of Internet data processing systems] (Higher School of Economics Publishing House, Moscow, 2016).

6. Oganesyan T.K., Styrin E.M., Abdrakhmanova G.I., Rozmirovich S.D., Merkulova D., Bikbulatova Yu. S. *Tsifrovaya ekonomika: global'nye trendy i praktika rossiyskogo biznesa* [Digital Economy: Global Trends and Russian Business Practice] (Higher School of Economics Publishing House, Moscow, 2017).

7. Kozhevnikova Yu.S., *Regulirovanie otnosheniy, formiruyushchikhsya pri ispol'zovanii oblachnykh informatsionnykh tekhnologiy (oblachnykh vychisleniy): problemy ispol'zovaniya evropeiskogo opyta* [Cloud information technology (cloud computing) regulation: the problems of the European experience application] 2 (5) Pravo i Kiberbezopasnost' [Law and Cybersecurity] 59-66 (Russia, 2014).

8. Kozhevnikova Yu.S., *Osobennosti informatsionno-pravovogo regulirovaniya ontosheniy po ispol'zovaniyu oblachnykh tekhnologiy pri obrabotke personal'nykh dannykh v zarubezhnykh stranakh* [Regulatory aspects concerning the relations arising around the personal data processing in clouds in foreign countries] 14 (3) Trudy po intellektual'noy sobstvennosti [Intellectual Property Works] 86-145 (Russia, 2013).

9. Kozhevnikova Yu.S., *Sushchnost' informatsionno-pravovykh ontosheniy, formiruyushchikhsya pri ispol'zovanii oblachnykh informatsionnykh tekhnologiy v Rossiyskoy Federatsii* [The essence of cloud technology regulation in the Russian

Federation] 13 (2) Trudy po intellektual'noy sobstvennosti [Intellectual Property Works] 150-223 (Russia, 2013).

The above publications fully correspond to the thesis theme and contain its key points.