

# Information Technology for Legal Regulation of the Dental Services Contract

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**Abstract.** Given the lack of the established form of the dental services contract in Ukraine and the inability of many dental clinics and offices to seek the paid services of a lawyer, information technology for the legal regulation of the dental services contract can significantly improve the effectiveness and legal correctness of such contracts. In this paper, the information technology for the legal regulation of dental services contract and method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation were first time developed. The developed information technology and method provide: support for the process of determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation; validation of the contract for legal correctness without the participation of legal experts, which enables dental clinics to conclude legally correct contracts without hiring lawyers for their verification; conclusion about the possibility/impossibility of concluding (signing) the contract; request for modification of the contract, indicating the essential terms, which should be added to the contract – in case the prepared contract cannot be signed; increasing the effectiveness of dental services providers due to reducing documentation burden on them.

**Keywords:** Information Technology, Legal Regulation, Dental Services Contract, Information Technology for Legal Regulation of the Dental Services Contract, Method for Determining the Possibility of Concluding (Signing) the Dental Services Contract on the basis of Legal Regulation.

## 1 Introduction

Dental services are nowadays one of the largest types of health care services for the Ukrainian population, which rank second in the services of outpatient clinics after seeking treatment to therapists. The share of stomatology morbidity in the overall morbidity of the population reaches more than 16%. Over 90% of the population has caries, 40% – with periodontitis and periodontal disease [1].

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Modern dentistry is a highly specialized scientific, laborious, socially significant production with a clear medical, clinical, biological, organizational, economic and legal specificity. In the overall model of the formation and implementation of the state health policy of Ukraine, it occupies one of their leading places.

Considering the above background, more and more attention to the issue of concluding the dental services contract is needed today. To date, there are no rules in the legislative acts that define the concepts and regulate the procedure for concluding the contract on the provision of dental services. But Art. 3 and Art. 627 of the Civil Code of Ukraine [2] provide for the principle of freedom of contract, i.e. the possibility of concluding any kind of contract that does not contradict the requirements of the law and the moral principles of society. Therefore, the dental services contract can be defined as an agreement whereby one party (contractor) undertakes, under the requirement of the other party (customer), according to the health care legislation, to provide dental services, which aimed at the prevention of disease of teeth, mucous membranes, oral cavity organs, jaws and face, partly neck (maxillofacial area), their diagnosis and treatment, and the customer is obliged to pay the performed service unless otherwise stipulated in the contract or by law [3]. The parties of the dental services contract are medical professionals who are empowered to engage in medical activities, namely, to provide dental services, who have received a higher or secondary medical education in Ukraine, who have a diploma and speciality, and the patients, i.e. persons, who appealed to the medical institution for the provision of dental services by concluding a civil legal contract.

Many dental services contracts now contain burdensome conditions for patients, offer no legal dispute resolution, and don't have the characteristics, which individualise the medical services. As a result, these shortcomings may lead to adverse legal consequences for both patients and medical organizations, which use contracts, that have obvious limitations of their content and insufficient preparation from the legal point.

Throughout the country, innovative legal and healthcare teams have come together and recognized that many health inequities have a legal root and that addressing health-harming legal needs among patients and communities may have a lasting impact on health [4].

Of course, not every dental clinic can afford to hire a lawyer to prepare the dental services contract. In such circumstances, given the lack of the established form of the dental services contract in Ukraine, information technology for the legal regulation of the dental services contract can significantly increase the efficiency and legal correctness of such contracts – by giving a conclusion on the possibility or impossibility of signing the prepared contract from a legal point of view.

In general, accelerating the development and implementation of the latest competitive information technologies in all spheres of human activity in order to reduce the share of manual labour and minimize the impact of human factor through process automation is the main strategic goal of the information society development in Ukraine [5]. Designing and implementing the information technology (as a set of processes that uses methods and means of accumulating, processing and transmitting the information to obtain information product [6]) is currently *the actual task* for Ukraine.

## 2 Literature Review

Let's conduct the analysis of the literature to find known models, methods, tools for the legal regulation of the dental services contract in particular and for the field of medical law in general – Figure 1.

Therefore, as the analysis shows, the known models, methods and tools of medical law information support do not solve the task of legal regulation of the dental services contract. In addition, they all belong to different methodological approaches and do not integrate with each other, i.e. there is currently no information technology for the legal regulation of the dental services contract.

Given the above urgency, importance and actuality of the task of designing and implementing the information technology for the legal regulation of the dental services contract, *the purpose of this study* is the development of the structure of information technology for legal regulation of the dental services contract, and the development of the production rules and method of determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation.

## 3 Civil Law Regulation of the Dental Services Contract

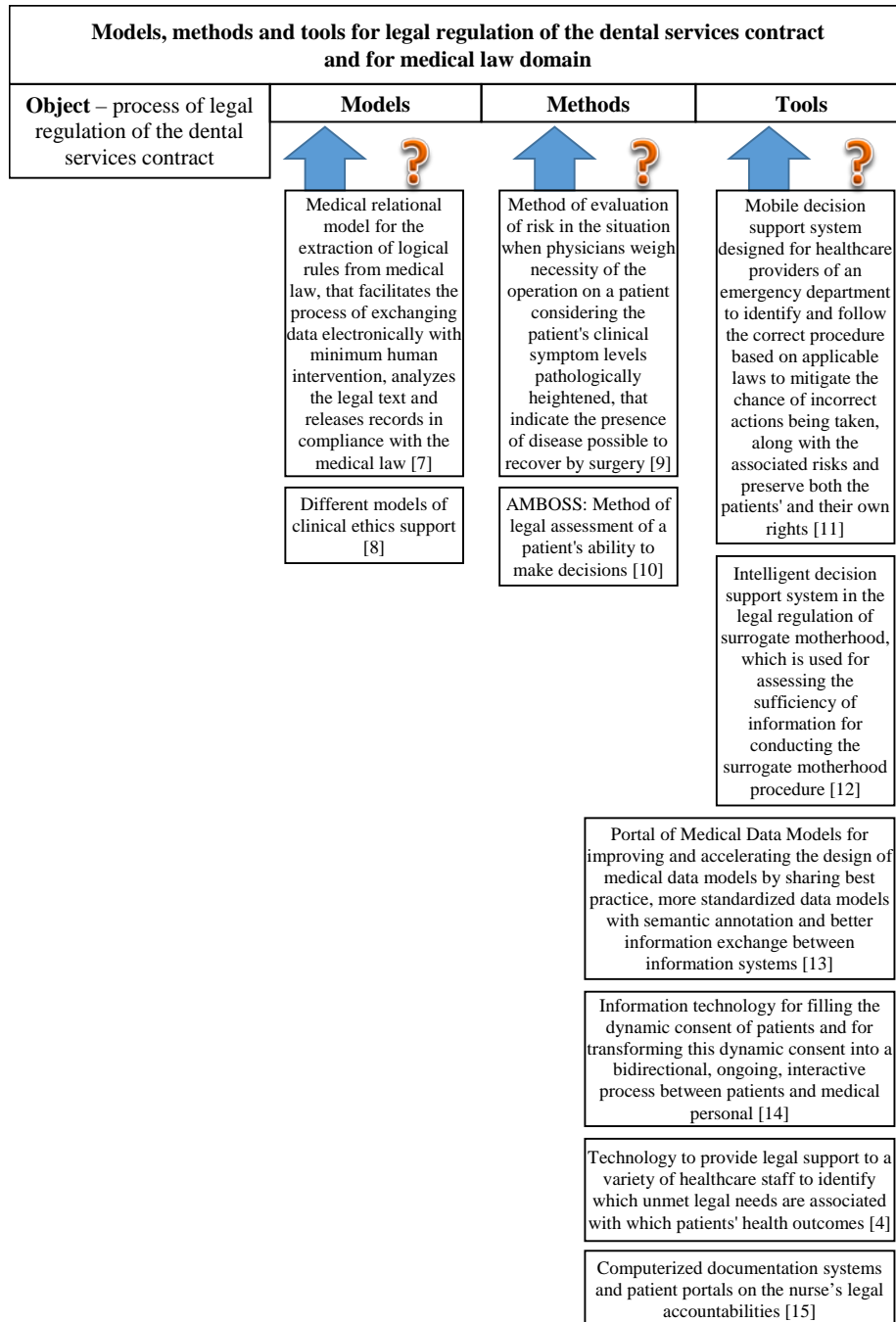
For the development of information technology for legal regulation of the dental services contract, it is first necessary to find out what the tasks it must solve and what properties it must have. For identification of these needs, a subject domain analysis should be conducted. In analyzing the subject domain of the developed information technology, the legal aspects and civil law regulation of the signing of the dental services contract should be explored.

One of the prerequisites for ensuring the quality of dental services is the licensing and accreditation of health care facilities.

Informed consent of the patient to medical intervention is an important component of stomatology activity. In many medical facilities, the consent of the patient to medical intervention is only required on the complex diagnostic examination or surgery. In practice, the form of written consent of the patient to a paid dental intervention may be patient's signature in a medical card under the dentist's record of a planned medical study or intervention, which may have minimal complications.

The contract with the patient on behalf of the medical organization may be concluded by the treating dentist, but only on the basis of the duly designed power of attorney. Dental services may only be concluded with a patient who has submitted an identity document.

Dental services contract should contain the rights and obligations of the parties, the price of the contract (usually the cost of dental service is a firm value) and the procedure for payments for dental services (usually in full after the dental service is provided), the liability of the parties, the term of dental care services, etc.



**Fig. 1.** Models, methods and tools for legal regulation of the dental services contract and for medical law domain

Performers of the paid dental services cannot ignore the provisions of the civil law of Ukraine on the publicity of legal relations for the provision of dental services. Therefore, the establishment of different prices for the same medical services for different consumer groups in the dental services contracts may be regarded as a gross violation of the requirements of the current legislation. When setting prices for dental services, medical institutions should not ignore the provisions of the Civil Code of Ukraine [2], the Law of Ukraine "On Protection of Consumer Rights" [16] regarding the price for providing the dental services.

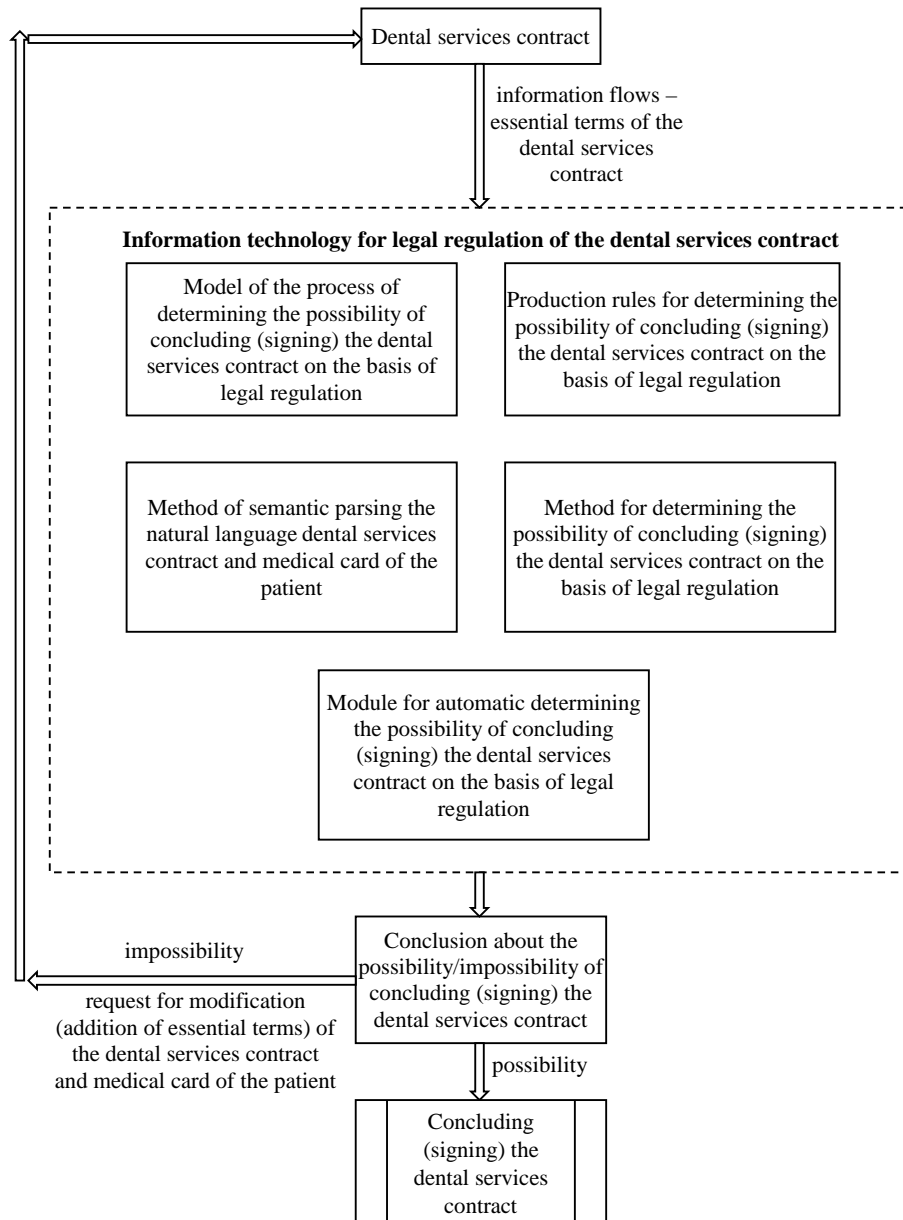
In addition to the term, as an essential term of the dental service contract, the parties must provide for warranty period (for example, differentiated warranty periods for the preservation of seals, which depend on the materials from which the seals are made). For the dental services, the warranty period of quality of materialized results must be provided. A mandatory annex to the dental services contract should be a medical card of the patient, in which the doctor must carefully describe the general and dental health status of the patient, the proposed plan of examination and treatment, complaints, some anamnestic data, diagnosis, describing the treatment method, fixing the date of the next visit.

Particular attention is paid to the informative part of the contract when concluding the dental services contract. Considerable attention should be paid to the main questions: clarification regarding the diagnosis (the patient's decision to accept on the proposed method of treatment depends on the patient's knowledge of the actual state of affairs); informing about the treatment plan, treatment methods (this issue refers to agreeing with the approximate cost of treatment, as well as informing the patient about the existing alternative treatment methods); informing about the typical risks associated with the treatment, about their possible impact on the patient's quality of life in the future. The dentist is obliged to inform the patient in a timely manner that non-compliance by the patient the specific rules or recommendations may reduce the quality of the dental service. The dental services contract should have reference to internal instructions that determine the procedure for familiarizing patients with medical records and the conditions for its issuance.

#### **4 Structure of Information Technology for Legal Regulation of the Dental Services Contract**

The development of information technology requires sophisticated preparation, time costs and high-tech equipment. Its design begins with the creation of mathware, the formation of information flows. One of the most important requirements for the design of information technology is to ensure the dynamism of its structure and functions. So, great interest has the identification of supporting data structures and processes that can be stable properties and characteristics of flexible information technology. Obviously, this requires a thorough study of the capabilities of both modern computing facilities and technological processes in a particular subject domain and their technical equipment [6].

Structure of information technology for legal regulation of the dental services contract is represented on Figure 2.



**Fig. 2.** Structure of information technology for legal regulation of the dental services contract

The main source of information is, in fact, the dental services contract, which is being prepared for signature. Such a contract needs validation with the help of developed information technology for legal regulation of the dental services contract. If the contract does not contain certain essential terms, then it is not recommended to sign from the legal point view – with the purpose of the prevention of negative consequences for one or both parties (in particular, for example, to prevent inability to avoid bringing the guilty party to justice). Therefore, for ensuring the correctness of the dental services contract, it is necessary to carry out a study of its structure and content in order to identify and eliminate defects and inaccuracies before signing the contract. During such research, it is necessary to find out whether all the above essential terms are present in the contract and to offer to sign the contract in the presence of all essential terms or to modify the contract (add essential terms) in the absence of some essential terms. In case the contract cannot be signed and its revision is necessary, the request for modification of the dental services contract contains the list of essential terms, which are missed in the contract.

Information technology for legal regulation of the dental services contract provides:

- support for the process of determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation;
- validation of the contract for legal correctness without the participation of legal experts, which enables dental clinics to conclude legally correct contracts without hiring lawyers for their verification;
- conclusion about the possibility/impossibility of concluding (signing) the contract;
- request for modification of the contract, indicating the essential terms, which should be added to the contract – in case the prepared contract cannot be signed;
- increasing the effectiveness of dental services providers due to reducing documentation burden on them.

## **5 Method for Determining the Possibility of Concluding (Signing) the Dental Services Contract on the basis of Legal Regulation**

Let's first develop *production rules for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation*:

1. if in the dental services contract, ready to be signed, the license number of the health care facility, which will provide dental services, is available, then  $et=et+I$ , else "the license number of the health care facility" should be included in the set *AETC*;
2. if in the dental services contract the rights of the parties are available, then  $et=et+I$ , else "the rights of the parties" should be included in the set *AETC*;
3. if in the dental services contract the obligations of the parties are available, then  $et=et+I$ , else "the obligations of the parties" should be included in the set *AETC*;
4. if in the dental services contract the price of the contract is available, then  $et=et+I$ , else "the price of the contract" should be included in the set *AETC*;

5. if in the dental services contract the procedure for payments for dental services is available, then  $et=et+I$ , else "the procedure for payments for dental services" should be included in the set *AETC*;
6. if in the dental services contract the liability of the parties is available, then  $et=et+I$ , else "the liability of the parties" should be included in the set *AETC*;
7. if in the dental services contract the term of dental care services, then  $et=et+I$ , else "the term of dental care services" should be included in the set *AETC*;
8. if in the dental services contract the warranty period of quality of materialized results is available, then  $et=et+I$ , else "the warranty period of quality of materialized results" should be included in the set *AETC*;
9. if in the dental services contract the clarification regarding the patient's diagnosis is available, then  $et=et+I$ , else "the patient's diagnosis" should be included in the set *AETC*;
10. if in the dental services contract the treatment plan and treatment methods are available, then  $et=et+I$ , else "the treatment plan and treatment methods" should be included in the set *AETC*;
11. if in the dental services contract the typical risks associated with the treatment are available, then  $et=et+I$ , else "the typical risks" should be included in the set *AETC*;
12. if in the dental services contract the specific rules and recommendations for the patient are available, then  $et=et+I$ , else "the specific rules and recommendations for the patient" should be included in the set *AETC*;
13. if (in the dental services contract the informed consent of the patient to medical intervention is available) or (in the medical card patient's signature is under the doctor's record of a planned medical study or intervention), then  $et=et+I$ , else "the informed consent of the patient" should be included in the set *AETC*;
14. if in the medical card of the patient the general health status of the patient is available, then  $et=et+I$ , else "the general health status of the patient" should be included in the set *AETMC*;
15. if in the medical card of the patient the dental health status of the patient is available, then  $et=et+I$ , else "the dental health status of the patient" should be included in the set *AETMC*;
16. if in the medical card of the patient the proposed plan of examination and treatment is available, then  $et=et+I$ , else "the proposed plan of examination and treatment" should be included in the set *AETMC*;
17. if in the medical card of the patient the patient's complaints are available, then  $et=et+I$ , else "the patient's complaints" should be included in the set *AETMC*;
18. if in the medical card of the patient some anamnestic data is available, then  $et=et+I$ , else "some anamnestic data" should be included in the set *AETMC*;
19. if in the medical card of the patient the patient's diagnosis is available, then  $et=et+I$ , else "the patient's diagnosis" should be included in the set *AETMC*;
20. if in the medical card of the patient the treatment method is available, then  $et=et+I$ , else "the treatment method" should be included in the set *AETMC*;
21. if in the medical card of the patient the date of the next visit is available, then  $et=et+I$ , else "the date of the next visit" should be included in the set *AETMC*.



*Method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation* consists of the next steps:

1. semantic parsing the natural language dental services contract and medical card of the patient with the purpose of the search of the above essential terms, which are available in the contract and card – using the above developed production rules for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation, according to which the counter  $et$  is calculated;
2. if  $et=21$ , then the conclusion about the possibility of concluding (signing) the dental services contract is formed, else if  $et\neq 21$ , then conclusion about the impossibility of concluding (signing) the dental services contract is formed;
3. if  $et\neq 21$ , then request for modification (addition of essential terms) of the dental services contract and medical card of the patient is formed – the elements of the set  $AETC$  are shown to the user as essential terms, which should be added to the dental services contract for ensuring the possibility of its signing, and the elements of the set  $AETMC$  are shown to the user as essential terms, which should be added to the medical card of the patient for before signing the dental services contract.

## **6 Experiment, Results and Discussions**

Let's consider the functioning of the developed information technology for legal regulation of the dental services contract and method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation.

As an example, let's consider the following case. The patient needs the treatment and prosthetics in the dental clinic. The patient insists on concluding the dental services contract. The dental clinic prepared such a contract but did not create a medical card for the patient. The patient decides to analyze the contract using the developed information technology for legal regulation of the dental services contract. Semantic parsing of this dental services contract with the purpose of the search of the above essential terms, which are available in the contract, using the above-developed production rules for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation, showed that the counter  $et=11$ . Because  $et\neq 21$ , then conclusion about the impossibility of concluding (signing) the dental services contract is formed. In addition, request for modification (addition of essential terms) of the dental services contract and medical card of the patient is formed. The essential terms, which should be added to the dental services contract for ensuring the possibility of its signing, were indicated in this request: "the license number of the health care facility", "the warranty period of quality of materialized results". In addition, the essential terms, which should be added to the medical card of the patient for ensuring the possibility of signing the dental services contract, were indicated in this request: "the general health status of the patient", "the dental health status of the patient", "the proposed plan of examination and treatment", "the patient's complaints", "some anamnestic data", "the patient's diagnosis", "the treatment method", "the date of the next visit". Thus, the developed information technology for legal regulation of the dental services contract helped the patient to avoid signing the dental services contract, which was incorrectly executed, did not

contain some essential terms and could have led to negative consequences for one or both parties (in particular, for example, to the prevention of the impossibility from being held liable of the clinic in case of poor dental services).

The developed information technology for legal regulation of the dental services contract and method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation provided the opportunity to perform a rapid check (validation) of the dental services contract for the consideration of the above essential (from the point of view of civil law regulation) terms. Such check (validation) allows making unmistakable (from the point of view of civil legal grounds) decisions about the possibility/impossibility of concluding (signing) the dental services contract, minimizing the influence of subjectivism and the human factor, as well as eliminating the need for dental clinic to pay for lawyer's services.

The described experiment proved the workability and efficiency of the developed information technology for legal regulation of the dental services contract and method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation.

## **7 Conclusions**

Given the lack of the established form of the dental services contract in Ukraine and the inability of many dental clinics and offices to seek the paid services of a lawyer, information technology for the legal regulation of the dental services contract can significantly improve the effectiveness and legal correctness of such contracts – by giving a conclusion on the possibility or impossibility of signing the prepared contract from the point of view of civil law regulation.

In this paper, information technology for legal regulation of the dental services contract and method for determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation are first time developed. They provide: support for the process of determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation; validation of the contract for legal correctness without the participation of legal experts, which enables dental clinics to conclude legally correct contracts without hiring lawyers for their verification; conclusion about the possibility/impossibility of concluding (signing) the contract; request for modification of the contract, indicating the essential terms, which should be added to the contract – in case the prepared contract cannot be signed; increasing the effectiveness of dental services providers due to reducing documentation burden on them.

The future research of authors will be devoted to:

1. development of the model of the process of determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation;
2. development of the method of automatic semantic parsing the natural language dental services contract and medical card of the patient;
3. design and development of the module for automatic determining the possibility of concluding (signing) the dental services contract on the basis of legal regulation.

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