



RS Global

ISSN 2413-1032



WORLD SCIENCE

Multidisciplinary Scientific Edition



RS Global

WORLD SCIENCE

*No 6(34)
Vol.1, June 2018*

DOI: https://doi.org/10.31435/rsglobal_ws

Copies may be made only from legally acquired originals.

A single copy of one article per issue may be downloaded for personal use (non-commercial research or private study). Downloading or printing multiple copies is not permitted. Electronic Storage or Usage Permission of the Publisher is required to store or use electronically any material contained in this work, including any chapter or part of a chapter. Permission of the Publisher is required for all other derivative works, including compilations and translations. Except as outlined above, no part of this work may be reproduced, stored in a retrieval system or transmitted in any form or by any means without prior written permission of the Publisher.

Publisher –
RS Global Sp. z O.O.,

Scientific Educational Center
Warsaw, Poland

Numer KRS: 0000672864
REGON: 367026200
NIP: 5213776394

Publisher Office's address:

Dolna 17, lok. A_02
Warsaw, Poland,
00-773

Website: <https://ws-conference.com/>

E-mail: rsglobal.poland@gmail.com

Tel: +4(857) 898 55 10

The authors are fully responsible for the facts mentioned in the articles. The opinions of the authors may not always coincide with the editorial boards point of view and impose no obligations on it.

CONTENTS

PHYSICS AND MATHEMATICS

- Курбанов Ф. Ф., Ибрагимова Я. И., Гульмалиев Н. Р., Курбанов Р. Ф.**
О КВАДРАТУРЕ УРАВНЕНИЯ ЧЕБЫШЕВА
И СВЯЗЬ МЕЖДУ ЧАСТНЫМИ РЕШЕНИЯМИ..... 4

- Махмадиев Баймамат Саитахмадович, Очилов Муроджон Ашуркулович,
Саитахмадов М. Б., Ишмуратова М. С.**
ОБРАБОТКА ЭКСПЕРИМЕНТАЛЬНЫХ ДАННЫХ В MATHCAD..... 8

COMPUTER SCIENCE

- G'aybullayev A. G', Rayimqulov O'. M.**
HAND GESTURE RECOGNITION BY LOG PATH
SIGNATURE FRAMEWORK AND HAND POSE ESTIMATION..... 13

- Lupenko S., Orobchuk O., Pomazkina T., Mingtang X.**
CONCEPTUAL, FORMAL AND SOFTWARE-INFORMATION
FUNDAMENTALS OF ONTOLOGICAL MODELING OF CHINESE
IMAGE MEDICINE AS AN ELEMENT OF INTEGRATIVE MEDICINE..... 18

- Umarov F. Sh.**
USING TWO-FACTOR AUTHENTICATION FOR PERSONAL DATA PROTECTION..... 24

- Yaroslav Tarasenko, Oleg Piven, Iryna Fedotova-Piven**
RESEARCHING THE FEATURES OF PRACTICAL USE OF THE SOFTWARE
COMPLEX FOR ATTACKING THE LINGUISTIC STEGOSYSTEM..... 27

- Гавриш Б. М., Майк Л. Я., Голубник Т. С., Писанчин Н. С., Занько Н. В.**
АЛГОРИТМИ ВІДНОВЛЕННЯ ЗОБРАЖЕННЯ
З ВИСОКОЮ РОЗДІЛЬНОЮ ЗДАТНІСТЮ..... 31

TRANSPORT

- Cherchenko D. O., Churochkina A. A., Shaginyan Ya. S., Klimova A. A.**
ON THE ISSUE OF RATIONAL INTERACTION OF RAILWAY AND WATER
TRANSPORT IN THE PROMOTION OF MULTIMODAL CARGO TRAFFIC..... 35

- Vladimer Gvetadze, Giorgi Purtskhvanidze**
СТАТИЧЕСКОЕ ИССЛЕДОВАНИЕ ПРОФИЛИРОВАННЫХ ВЫПУСКНЫХ СИСТЕМ... 38

- Разгонов С. А.**
О ЗАЩИТЕ РЕЛЬСОВЫХ ЦЕПЕЙ ОТ ВОЗДЕЙСТВИЯ НЕСТАЦИОНАРНЫХ
ТОКОВЫХ РЕЖИМОВ В СИЛОВОЙ ЦЕПИ ЭЛЕКТРОВОЗОВ..... 44

- Шапенко Євгенія Миколаївна**
ДОСЛІДЖЕННЯ ЗАЛЕЖНОСТЕЙ ЗМІНИ ВЕЛИЧИНИ
НАПРУЖЕНОСТІ РОБОТИ ВОДІВ..... 48

CONCEPTUAL, FORMAL AND SOFTWARE- INFORMATION FUNDAMENTALS OF ONTOLOGICAL MODELING OF CHINESE IMAGE MEDICINE AS AN ELEMENT OF INTEGRATIVE MEDICINE

¹*Lupenko S. Ph. d., D. Sc.,*

²*Orobchuk O. Ph. d. student,*

²*Pomazkina T. Ph. d.,*

³*Mingtang X. Ph.d.*

¹*Ukraine, Ternopil, Ternopil Ivan Pul'uj National Technical University;*

²*Ukraine, Charków, International Charitable Fondation «MINGTANG»;*

³*China, Beijing, Beijing Medical Research Institute "Kundawell"*

DOI: https://doi.org/10.31435/rsglobal_ws/12062018/5807

ARTICLE INFO

Received: 13 April 2018

Accepted: 15 May 2018

Published: 12 June 2018

KEYWORDS

ontology, ontological modeling, integrative informational and analytical environment, Chinese Image Medicine

ABSTRACT

The conceptual, formal and software-information fundamentals of ontological modeling of Chinese Image Medicine are presented in the research. A number of parts, sections and conceptual projections of the conceptual model of Chinese Image Medicine have been established; also the stages and software tools for its implementation have been developed. The stages of the development of the informational and analytical environment of research, professional healing and e-learning of Chinese Image Medicine as a promising field of integrative scientific medicine have been defined as well.

Copyright: © 2018 Lupenko S., Orobchuk O., Pomazkina T., Mingtang X. This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**. The use, distribution or reproduction in other forums is permitted, provided the original author(s) or licensor are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Introduction. Current traditional medical approaches lose their monomedical focus; they increasingly exercise the so-called 'second opinion'. Obviously, a systematic approach to human healing: the alteration to integrative medicine, is an urgent matter. The integrative medicine, synthesizing the best experience of Western, Oriental and traditional medicines, is the key to health in the XXI century. Integrative medicine holistically involves different directions of non-traditional types of medicine.

Results of research. Some methodological experience of integrative medicine has already been gained, but it needs further conceptualization and algorithmization. A relative scheme of the strategy for integrative medicine development out of the set of the established medical fields by scientific selection of qualitative knowledge and methods of each of them and synthesis of Integrative scientific medicine out of these selected elements is presented in the Fig. 1.

According to the strategy of the World Health Organization (WHO) in traditional medicine [5], the advance of an evidence-based approach to the implementation of alternative and complementary medicine into the field of official medicine, both internationally and nationally, is a topical issue. Some countries have already made a significant contribution to the development of Integrative medicine at country level, by improving the medical universities curriculum with non-traditional areas of medicine (e.g. the USA, Hungary, China, etc.); establishing consortiums and associations for the development of Integrative medicine around the world. This is an important process for development of new medical patterns and competence of medical personnel, who in the future will recognise Integrative medicine as an established scientific medicine.

One of such promising components of Integrative medicine is the area of traditional Chinese medicine – Chinese Image Medicine (CIM); it has a significant efficacy, safety, low cost, and the ease of learning and use of diagnostic and therapeutic methods. The integration of various practices of the body health as well as the integration of the image-physician with the patient is clearly evidenced.

Currently, the CIM as a comprehensive component of integrative medicine experiences a number of faults in CIM research causing corresponding scientific problems that need to be systemically solved: the difference between the *nosological taxonomy of human diseases types in the CIM and the established* precise nosological taxonomy of Western (scientific) medicine; there are no new information and analytical software for collecting and analysing the results of diagnosis and treatment by CIM techniques, expert systems of CIM, CIM e-learning systems.

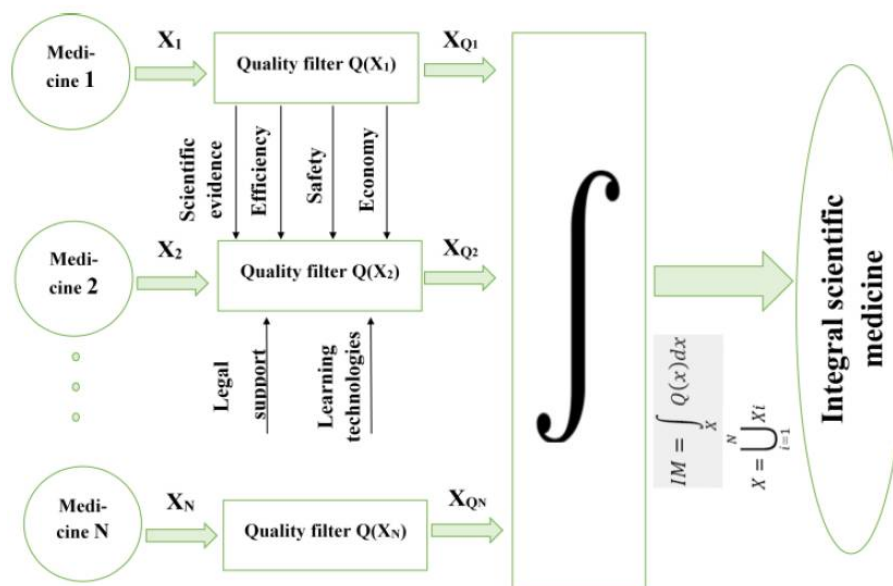


Fig.1. Approach of integrative medicine

In consequence, the integrative onto-based informational and analytical environment for CIM research, professional healing and e-learning of CIM is a current matter that is determined in the International Research Program [1] of the Beijing Medical Research Kundawell Institute. The purpose of the development is to work out a unified database and knowledge base for theoretical, experimental and clinical research in the field of CIM; to provide at high scientific, technological and infrastructural levels the collection, computerized statistical and intellectual analysis of the results of diagnosis and treatment by CIM methods; to develop a new intellectualized information means and resources in traditional, complementary and integrative medicine both at national and international levels. The development of this environment will facilitate the implementation of the International CIM Research Program; legalization, approval and increase of the prestige of CIM; improvement the efficiency of CIM experts' work by standardization of CIM theory and practice; implementation of the latest information systems for the arrangement, coordination of activities, web-based training, advanced training of the international community of CIM experts; recognition of CIM by integrative scientific medicine. The main users of the information environment will be CIM practitioners, students taking CIM courses (as well as on-line courses), CIM researchers and scientists.

The first steps in solving this problem were made in the study [2]: the general requirements and generalized architectures of the components of informational environment were developed. The components were defined: Image-Therapist – the information system of professional healing, the knowledge database of Chinese Image Medicine, the expert system for supporting the diagnostic and therapeutic decisions, the information system of e-learning of Chinese Image Medicine, the information system of CIM research (Fig. 2).

The main stage in the development of CIM informational environment, implementation of scientific and conceptual fundamental, scientific paradigm of CIM involves the development of its ontology. In general, computer ontologies de facto are a privileged means both for the presentation of poorly formalized medical knowledge and for the basis of modern technologies of educational systems development. Both of these aspects are present in the informational and analytical environment, and the development of a qualitative CIM ontology will be the basis for their support. Besides, CIM ontology development is aimed at the necessity of a comprehensive solving of a range of important tasks of theoretical, clinical, experimental as well as informational and analytical areas of International Research Program [1], such as: 1) the unification, standardization of information presenting technique

(data and knowledge) in CIM, which allows overcoming the problem of semantic heterogeneity of poorly structured and difficult to formalize knowledge of CIM 2) the working out a high-quality dictionary (glossary) and knowledge data-base (thesaurus) in CIM that would have such properties: completeness, consistency, interpretability, unification, integration with other subject areas, including integrative medicine; 3) the multiple reuse of CIM knowledge in various information systems and applications; 4) the necessity of intelligent CIM information search on the Internet in terms of WEB 2.0 semantic search technologies, which ensures a high relevancy and pertinence of the information wanted.

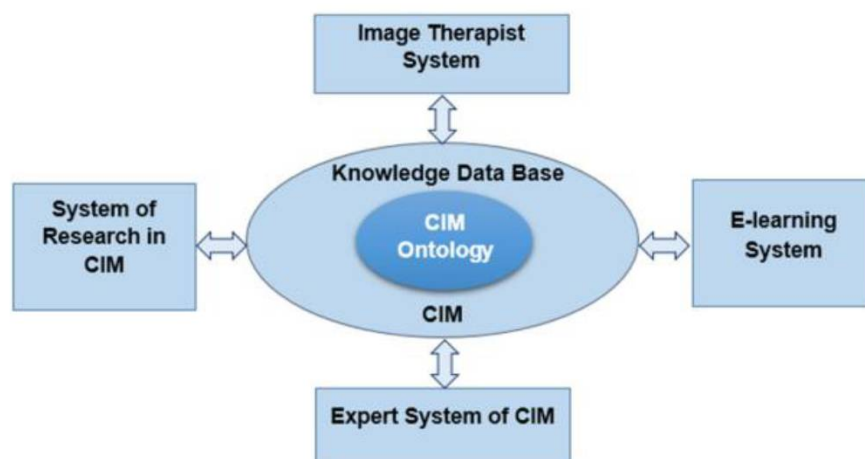


Fig. 2. General structural scheme of integrative onto-based informational and analytical environment of Chinese Image Medicine research, professional healing and e-learning

For the first time, the substantiation of the significance and development of conceptual fundamentals of ontological modeling of Chinese Image Medicine as a promising component of Integrative medicine is presented in the study [3]; it suggests a generalized formal ontological model of Chinese Image Medicine, its scope; also the language, informational environment of its presentation are defined.

The conceptual ontological model as a verbal description of the subject area has a three-component sign structure (word-sense-meaning), that is a formal-linguistic (syntactic) level, conceptual (sense bearing, semantic) level and a level of the subject domain as an object of description. Such model in the terminological and conceptual form presents objects of the subject area, their properties, relations and regularities. The success of all subsequent stages of CIM ontology as well as CIM integrative informational and analytical environment, and realization of an effective dialogue of image-therapist with the system, during which their intuition and experience is transformed into words and conclusions, depend on the proper, qualitative conceptualizing.

The stage of CIM conceptualization is followed by a process of extraction of knowledge, which is no less complex and important. In this case, it is complicated by the fact that knowledge extracted from experts will contain different types of so-called non-factors (incomprehensibility, inaccuracy, inexactness of ambiguity), and at present the issue of extracting vague knowledge and development of non-contradictory knowledge databases of traditional medicine is not studied. In CIM, the knowledge verbalization would be performed by a knowledge engineer the best, who has gained the fundamental knowledge of CIM and uses active methods of knowledge extracting (categorisation of 'thoughts aloud', interview, free dialogue, questionnaires, involving a group of experts with the subsequent correlation of their thoughts). In a dialogue, a knowledge engineer transforms the information received into an internal image – a unified knowledge, on its basis the hierarchical conceptual structure of CIM and its ontology is developed. An important task here is the balanced use of natural language and ontology. These issues are presented more profoundly in the study [4].

Taking into account the holistic subject-object character of CIM with the predominance of intuitive and image forms of its knowledge, the development of CIM ontology should be based on the deductive-axiomatic scheme of CIM theory development that satisfies the requirements for logic and ease of use. The first component of the strategy is the deductive-axiomatic strategy of CIM terminology-conceptual apparatus development that involves: 1) the definition of fundamental concepts of CIM theory; this enables the presentation of these data in a format accessible for computerised processing in the form of a hierarchy of classes and relations between them, and further computerised processing of the semantics of the defined informational units by the developed

ontology; 2) the definition of derivative concepts of CIM theory, basing on its fundamental concepts. The second component is a deductive-axiomatic strategy for establishing the true statements of CIM theory; it involves: a) the definition of true statements-axioms, the truth of which is accepted with no proof; b) the development of rules for logical derivation of all statements of the theory from its axioms. To unify the conceptual apparatus of CIM, the use of a 'top-down' method with a plurality of iterations following the general model of quality data stored in the structured format of computer system according to the ISO/IEC 25012 international standard would be the most effective.

It was suggested to divide the scientific theory of CIM into two major parts: 1) the general scientific theory of CIM, which would be a component of general scientific theory of integrative medicine; 2) a special scientific theory of CIM, which would present specific and unique knowledge that is typical only for CIM, and which would be based on the knowledge of general scientific theory of integrative medicine. The special theory of CIM should be presented as two interrelated and complementary conceptual projections, that is: 1) the ancient Chinese traditional conceptual projection – the projection of the representation of terminological and conceptual apparatus in terms and concepts usual for ancient Chinese culture, philosophy and medicine, and for practical understanding and using by CIM experts; 2) contemporary scientific conceptual projection describes and studies CIM by a rigorous scientific methodology within a classical, non-classical and post-classical type of scientific rationality.

It was suggested to divide the theory of CIM into the following parts: the general theory of CIM (presents the basic concepts and ideas of CIM and is a fundamental for the rest of the CIM parts); the theory of health and diseases of CIM (presents the basic concepts of health and diseases and diagnostic standards of CIM); the theory and techniques of diagnostics of CIM (presents and formalizes theoretical principles, methods and means of gaining diagnostic medical information by means of CIM methods, as well as methods for its interpretation); the theory and technology of therapy of CIM (presents and formalizes theoretical fundamentals, methods and means of carrying out of therapeutic procedures of CIM, as well as their interrelation with the corresponding diagnostic information); the theory and technology of learning, the professional development of CIM expert (presents the learning theoretical and practical content for training and advanced training of CIM experts). Each of the elements of the structure should be used as a certain case of the classes of CIM ontology, thus being a part of the onto-based knowledge database of CIM.

In the study [3] the generalized formal model of CIM ontology as a triple range is substantiated:

$$\mathbf{O} = \{\mathbf{A}, \mathbf{R}, \mathbf{F}\}, \quad (1)$$

A is a definite range of concepts (notions, terms) of CIM that composes the dictionary of ontology; **O**, **R** is a definite range of relations between the concepts of CIM that present the interconnections between concepts and properties of concepts (attributes and restrictions on them); **F** is a definite range of interpretation functions specified on the concepts and/or relations of **O** ontology. It was suggested to use a family of descriptive logics that distinguishes two parts of knowledge description as a formal and logical representation of CIM ontology, that is: 1) general knowledge that contains general concepts of CIM and the relations between them, which all together make the terminology of CIM (defined as **TBox**); 2) specific knowledge in the form of statements (facts) about specific objects (individuals, specimens), their properties and relations. The combined specific knowledge about individual objects is defined as **ABox**. The **TBox** terminology is a relatively stable (fixed) part of CIM knowledge, and the combined specific knowledge **ABox** is a dynamic unfixed part of CIM knowledge. The combined **TBox** and **ABox** terminology are **KBase** knowledge database (**TBox** + **ABox** = **KBase**).

The diagnostic ontology of CIM, which includes the nosological ontology of CIM (presents knowledge about the types of diseases established by CIM diagnostic theory), the topological diagnostic ontology of CIM (presents information about the topological localization of diseases), the ontology of diagnostic methods of CIM (presents knowledge about methods (sources) of gaining and specifications of sensual and image diagnostic information in CIM) and the ontology of diagnostic metrics of CIM (presents the quantitative characteristics of diagnostic area of CIM that determine the degree of disease manifestation and can be defined at a specific numeric or non-numeric scale).

A fragment of the ontology of CIM diagnostic methods developed in the Protégé environment using the OWL ontology description language is presented in Fig. 3. The choice of these means is based on the fact that Protégé is a generally recognized freeware environment for development and editing ontologies and knowledge databases; its characteristic features are flexibility, platform

independence and modularity (presence of plugin system) and it is used in the ontology engineering, knowledge acquisition and automated reasoning. The fact that Protégé is appropriate for processing a large amount of information is the advantage of CIM. Protégé allows using the mechanism arguments (reasoner), which can check whether statements and definitions in ontology are mutually consistent, and also recognize the accordance of definitions with certain notions.

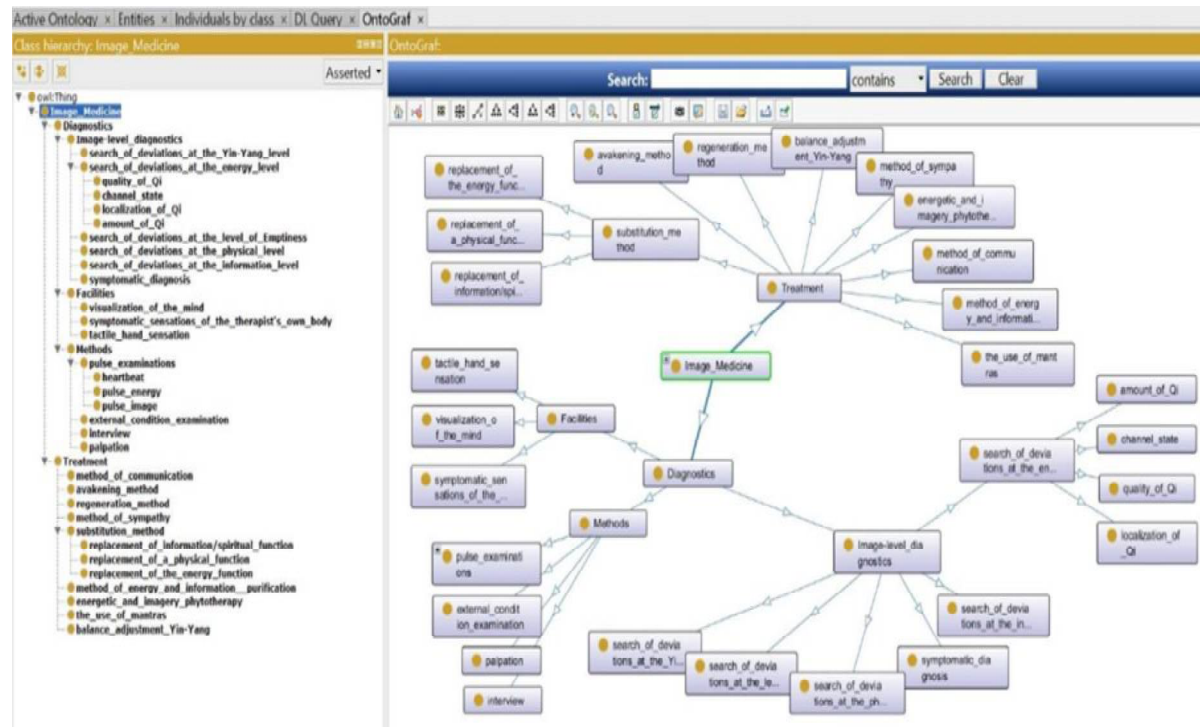


Fig. 3. The example of CIM ontology fragment in the Protégé environment

This mechanism supports the accuracy of knowledge database hierarchy; the OWL procedures are available for their processing and decision making. Considering the specificity of CIM, the fact that the OWL language has a large set of operators and is based on a logical model that enables developing of complex concepts into definitions out of simpler ones and to organize them in taxonomy is an advantage. At present, this is a standard of the means for organizing of semantically-oriented access of users to ontology objects provided with machine-readable axioms. This property is also important in developing a computer CIM e-learning system.

The development of onto-based CIM e-learning system is also one of the tasks of the International Research Program of CIM. This information system will promote the further popularization of CIM, advancement of a high-quality image-therapeutics stuff, and extension of access to the materials for those wishing to master these types of medical practices. In the present educational segment, CIM is not presented at all, even at the level of printed textbooks. Therefore, the development of a computerized e-learning system of CIM would significantly improve the availability, efficiency, quality, adaptability and low cost for skilled CIM experts, and meet current requirements and standards of medical education, self-education and advanced training. The development of onto-based e-learning environment is presented in the study [4]; it is emphasised that informational multimedia system with ontologically-controlled architecture enables realizing all the benefits of e-learning and using the ontologies mentioned above. The main requirements of the Bologna process and the latest model of credit-module educational process, the regulatory structure and evidence-based standards of training, implementation of the personality-centred approach should be taken into account by the educational paradigm of CIM.

The main requirements and the generalized architecture of information system of CIM experts e-learning are described in the study [2]. The requirements of interoperability should be added to the modules of theoretical and practical material at the beginning of the development. The methods of information presentation should include text, graphic illustrations, sound, video clips, animation, 3D objects and models. Such a harmonious combination of different types of multimedia technologies will develop a single information field that will be interactive and guided by a learner. The development of

educational content should be based on repeatedly tested means that ensure the whole process of distance learning. At the same time, more attention should be paid to reducing the time and costs of system versions development with the latest scientific and technological achievements, for example, the use of cloud services for content storage. The methodological basis for managing the quality of online e-learning platforms is the ISO 9000 international standards.

Conclusions. To ensure the quality of onto-based informational and analytical environment of research, professional healing and e-learning of CIM and also the possibility of multiple reuse of knowledge for various information systems and applications as the prospect of further research, the test launch of the environment, its verification and validation has been determined.

REFERENCES

1. Beijing Medical Research Kundawell Institute. (2017). International program of scientific research in Chinese image medicine and Zhong Yuan Qigong for 2017-2023. Retrieved from <https://kundawell.com/ru/mezhdunarodnaya-programma-nauchnykh-issledovaniy-kitajskoj-imidzh-meditsiny-i-chzhun-yuan-tsigun-na-2017-2023-god>.
2. Lupenko S. A., Orobchuk O. R., Horkunenko A. B., Vakulenko D. V., Sverstyuk A. S. (2017). Integrated Onto-based Information Analytical Environment of Scientific Research, Professional Healing and E-learning of Chinese Image Medicine. Scientific Journal «Information systems and networks», 872, 10-19.
3. Lupenko S., Orobchuk O., Pavlyshyn A. (2017, July 20). Conceptual Fundamentals for Ontological Simulation of Chinese Image Medicine as a Promising Component of Integrative Medicine. Science and Education a New Dimension. Natural and Technical Science, 140(15), 28-32.
4. Lupenko S. A., Orobchuk O. R., Zahorodna N. V. (2017, December 26). Formation of the onto-oriented electronic educational environment as a direction the formation of integrated medicine using the example of CIM. Actual scientific research in the modern world: Collection of scientific papers of the XXIII International scientific conference, 12(32), 56-61.
5. World Health Organization. (2013). WHO strategy for traditional medicine for 2014-2023. Retrieved from http://www.who.int/medicines/publications/traditional/trm_strategy14_23/ru.