V. The subject area and ontology of GI disease

Gastrointestinal (GI) diseases are one of the most common problems in medical practice worldwide. They cover a wide range of conditions, from functional disorders to serious pathologies such as peptic ulcers and cancer. According to the World Health Organization (WHO), GI diseases are the leading causes of death and disability worldwide.

GI disease statistics:

- according to the WHO, in 2020, GI diseases are the cause of death for more than 4 million people worldwide;
- according to studies conducted in different countries, GI diseases account for up to 25
- some of the most common GI diseases include peptic ulcer disease, gastric and duodenal ulcers, gastritis, colitis, irritable bowel syndrome (IBS), gallstones, pancreatitis, and GI cancer;

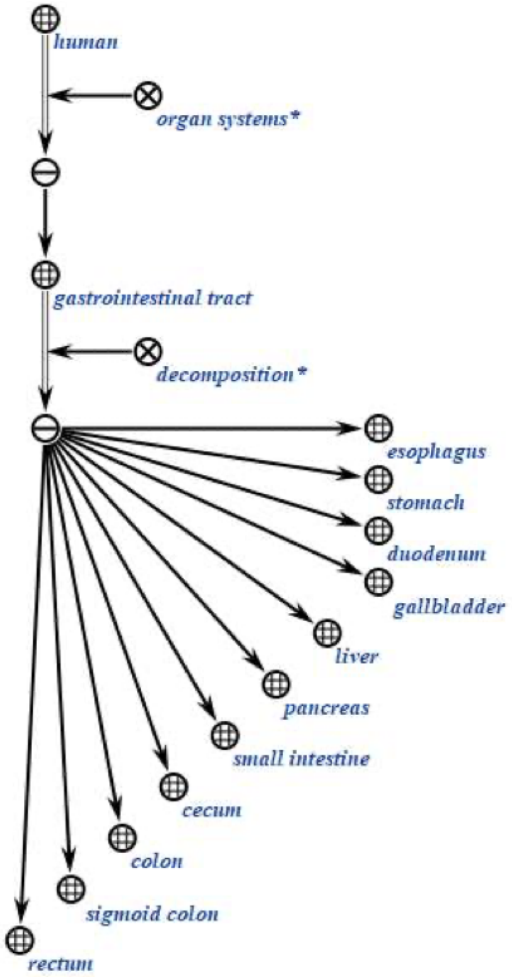

Figure 1: A fragment of the ontology of a medical record that allows you to store clarifying information

The International Classification of Diseases, 10th Revision (ICD-10) provides a coding system for diseases used in medical statistics and diagnosis. GI diseases are described in ICD-10 section K00-K93. This section includes a wide range of conditions, from dental problems to diseases of the liver, pancreas, and other GI organs. Diseases of this area include functional disorders, inflammatory processes, infections, tumors, and other pathologies specific to the GI tract. They can be manifested by various symptoms such as abdominal pain, diarrhea, constipation, nausea, vomiting and others. The definition and classification of GI diseases according to ICD-10 is important for statistical analysis, morbidity studies and health care planning.

Fig. 3 shows the formalization of the digestive organs domain using OSTIS technology. This formalization includes the development of an appropriate ontology structuring information about GI diseases according to the main sections of the International Classification of Diseases 10th Revision (ICD-10) [12].

The first section of the digestive organ ontology covers the anatomical structure and functions of organs including stomach, liver, pancreas, intestine and others. Each organ is presented as a separate entity described by its anatomical features and functions. The subject matter is further divided into various sections, including functional disorders, infections, tumors and other pathologies, in accordance with ICD-10. Each section contains the relevant classes of diseases and their associated medical conditions, symptoms and treatments.

In the context of the study of the subject area of digestive organs, special attention is paid to the stomach, considered on the example of gastritis in its usual and hyperacidic forms. Each disease corresponds to a reference marker set by the expert, which can be tissue or drugspecific. In addition, each disease has etiologic markers, which are multiple indicators that point to possible sources of the disease, such as bacteria, viruses, and other factors.

Organs in the digestive system can be in three states: disease state (more than 80% similarity), risk state (50% to 80% similarity), and non-risk state (healthy organ, less than 50% similarity). This approach allows the system to classify organs according to their current status based on analysis of user data.

The formalization of the ontology fragment and its corresponding knowledge base, presented in the figure, allows not only to treat diseases after their manifestation, but also to carry out the tasks of early diagnosis and prevention of the disease at early stages. This methodology allows integrating reference and etiological markers of diseases into the knowledge base, which provides the system with access to information for analyzing and processing medical indicators at a deeper level, which is discussed in the works of Rostovtsev V. N. [13]–[15].

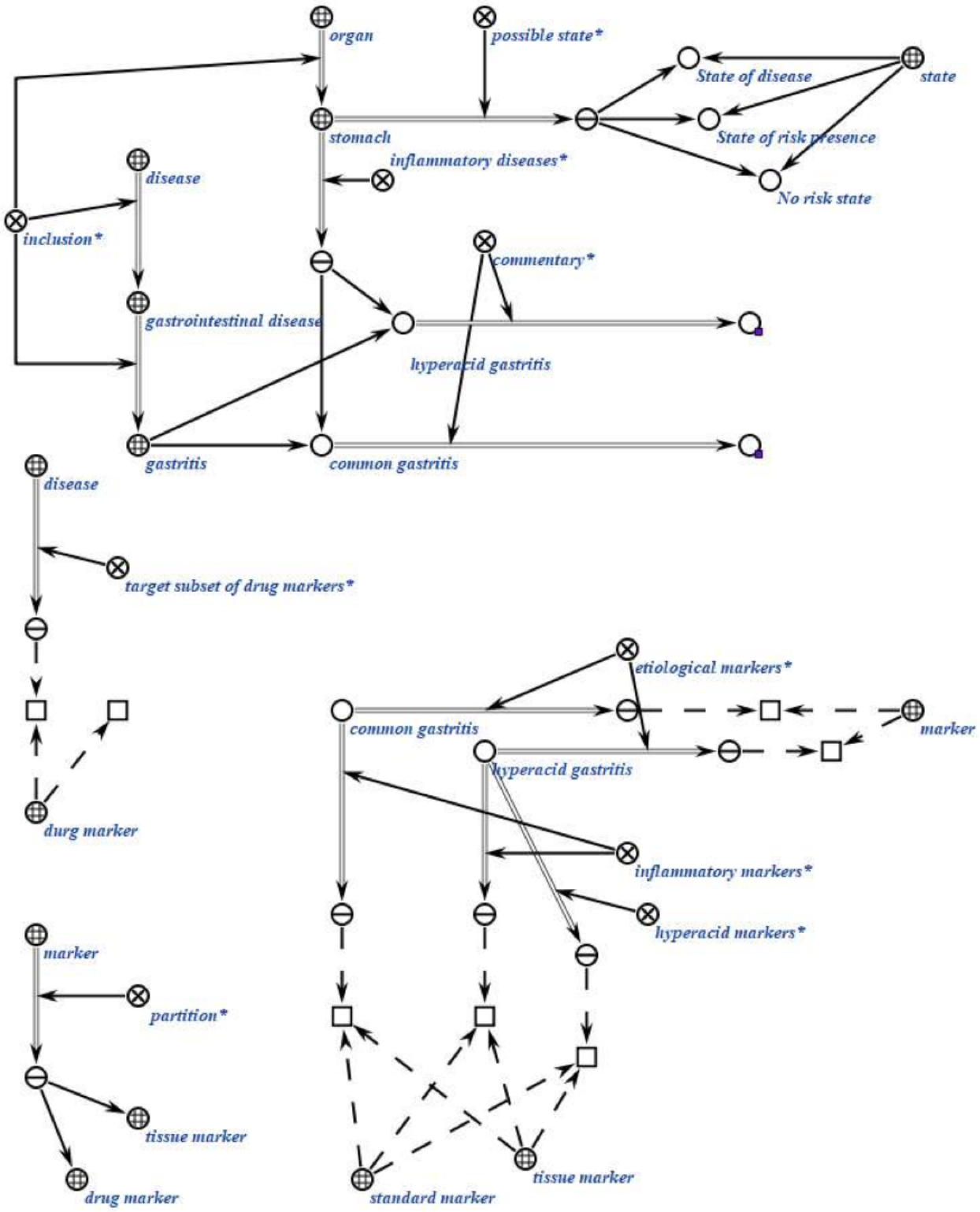

Figure 2: Fragment of medical record ontology

VI. Conclusion

The integration of Open Semantic Technology for Intelligent Systems (OSTIS) into medical information systems presents a promising solution to the challenge of data format incompatibility. OSTIS offers innovative tools and approaches for creating semantically compatible medical systems capable of efficiently processing and storing data regardless of their original format and structure. One of the key features of OSTIS is its ability to unify various types of knowledge into a single database. This centralized approach allows for the organization and structuring

of medical data according to unified semantic standards, ensuring high compatibility and interoperability.

Furthermore, the flexibility and adaptability of OSTIS enable the customization of systems to meet the specific requirements and standards of each country, including Belarus, Russia, and Kazakhstan. This adaptability facilitates seamless integration into existing healthcare infrastructures.

The automatic conversion and matching of data in different formats represent a significant advantage of OSTIS. This capability eliminates compatibility issues and facilitates smooth information exchange between various medical systems and institutions, ultimately enhancing system efficiency and the quality of healthcare delivery

In summary, the application of OSTIS technology offers an effective and promising approach to addressing data format incompatibility in medical information systems. It fosters the creation of modern and innovative healthcare systems capable of adapting to diverse requirements and changes in the medical field, which is crucial for improving the quality and accessibility of healthcare in different countries.

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ИНТЕГРАЦИЯ И СТАНДАРТИЗАЦИЯ В ИНТЕЛЛЕКТУАЛЬНЫХ МЕДИЦИНСКИХ СИСТЕМАХ НОВОГО ПОКОЛЕНИЯ НА ОСНОВЕ ТЕХНОЛОГИИ OSTIS

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В статье рассматривается интеграция международных медицинских стандартов в России, Беларуси и Казахстане с применением семантических технологий. Предлагается подход к интеграции и стандартизации медицинских данных на основе применения технологии OSTIS. Приводится пример разработки фрагмента онтологии на основе различных стандартов медицинских карт в интеллектуальных медицинских системах. Преимуществами такой интеграции являются улучшение обмена медицинской информацией, упрощение процесса диагностики и лечения, а также возможность создания единого медицинского пространства в рамках региона.

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