

THE VALUE OF THE LIFE CYCLE IN THE DESIGN OF INFORMATION SYSTEMS

Kayumova Nasiba Ashurovna¹, Tukhtaeva Gulchekhra Eshmatovna¹

¹Karshi State University

E-mail: kayumova.n@mail.ru

Abstract: The article shows the methods of using life cycle models of information systems design, analyzes the processes of designing information systems, and compares the methods of using life cycle models.

Key words: information, system, information system, design, UML, information system life cycle, cascade model, spiral model, incremental model, comparison of information systems models.

INTRODUCTION. The development of society leads to the fact that human knowledge about nature is expanding so much that it is impossible to cover not only their entire volume, but also individual areas. At the same time, data in related fields is needed to create useful knowledge and products. Information systems theory is designed to help humanity overcome the shortcomings of narrow specialization, strengthen interdisciplinary ties, develop a dialectical vision of the world and systems thinking.

The Law of the Republic of Uzbekistan "On Informatization" dated December 11, 2003 is defined as "an information system - a set of organizationally regulated information resources, information technologies and means of communication that allow collecting, storing, searching, processing and using information."¹

The basic concepts of information systems design include such concepts as system, information information system, project, design.

The system comes from the ancient greek *sōstukma*, which means "whole, consisting of parts, connection", which means a set of elements that are interconnected with each other, forming a certain whole, unity.

A system is a set of elements interacting with each other and with the external environment based on certain patterns (L.von Bertalanffy) ².

Information is a detailed message, information about an event, by information we mean any information from the environment (nature or society) that we perceive through our senses (eyes, ears, nose, mouth, skin). An information system (IS) is a set of interrelated tools, methods, and personnel used to store,

process, and retrieve information in order to achieve a specific purpose. The integration of these components makes it possible to automate information management processes and targeted activities of end users aimed at obtaining, modifying and storing information.

PURPOSE. It consists in modifying, systematizing the information available in society, displaying the content, the essence of the life cycle when designing in accordance with the goal.

RESEARCH METHODS. To achieve this goal, theoretical and empirical methods of research and comparative analysis, modeling (design), direct and indirect observation, analysis and generalization of information, system, systematization, role, essence of the life cycle in system design were used.

A BRIEF ANALYSIS OF THE SCIENTIFIC LITERATURE ON THE TOPIC. The book "Designing Information Systems" by Russian scientist V. V. Anisimov describes existing information systems, their structure and design methods³.

The studies of I.Y. Kotsyuba, A.V. Chunaev and A.N. Shikov highlight the historical periodization of information systems, processes, activities of individuals that contributed to the development of information systems in this period⁴.

The broadest definition of an information system was given by M. R. Kogalovsky, according to which the concept of an information system should include, in addition to data, programs, technical means and human resources, communication facilities, linguistic means,

¹ Law of the Republic of Uzbekistan "On Information" dated December 11, 2003.

<https://fayllar.org/axborotlashgan-jamiyat-va-uning>

² Definitions of the concept "system". <http://fpi-kubagro.ru/opredeleniya-ponyatiya-sistema>

³ Анисимов В. В. Проектирование информационных систем / В. В. Анисимов. – Хабаровск: Изд-во ДВГУПС. 2006. – 112 с.

⁴ Коцюба И.Ю., Чунаев А.В., Шиков А.Н. Основы проектирования информационных систем. Учебное пособие. – СПб: Университет ИТМО, 2015. – 206 с.

information resources, showing that together they form a system that provides "support for a dynamic information model of some part of the real world to meet the information needs of users"⁵.

Researchers from the Punjab University in India, Monika Sethi and Anju Sharma, suggest that the presence of stable information provided in the development of information systems is the basis for making the right decisions in an organization, showing that an information system consists of five constituent elements: human, data, software, equipment and network with which they interact⁶.

Barishnikova M.Y. in her studies in the field of engineering management and information technology, she tried to clarify the standardization of information systems projects, the requirements of the ISO / IEC 12207 standard and the main, auxiliary and organizational life cycle processes in the design of information systems⁷.

Results and practical examples. If we focus on the process of designing information systems within the framework of ongoing research, then a project is a set of actions limited to a certain time and aimed at solving a specific problem or achieving a specific goal. Design is also the process of creating a claim for an object based on its primary claim or the algorithm required to create an object that does not exist under given conditions.

By the end of the 20th century, dozens of methods for designing and modeling complex systems had been developed. All of them differed from each other in terms of functionality, but in many respects there were opinions with similar approaches to the analysis and description of the subject area. There was a need to combine successful solutions into a single methodology suitable for most developers of information

systems projects. As a result of these processes, UML (Unified Modeling Language) was created.

A unified, approximate version of UML 0.8 was released in October 1995, and the first version of UML 0.9 was released in June 1996. In 1997, two versions of UML appeared simultaneously (UML 1.0 and UML 1.1). In 1998, the developers introduced version UML 1.2. In 1999, UML version 1.3 was released, and in 2001, UML version 1.4. UML 1.5 in 2003. This version has been adopted as the international standard ISO/IEC 19501-2005. Now the most popular version of UML 2.4.1 was released in 2011 and complies with the requirements of the international standards ISO / IEC 19505-1 and 19505. Auxiliary and visual programming tools that generate code directly from UML models using the C ++ and Java programming languages include Rational programs Rose and Visual Paradigm.

The life cycle of an information system is a period of time starting from the moment a decision is made on the need to create an information system and ending with the termination of its full use. The methodology for designing information systems characterizes the process of creating and maintaining systems in the form of an IS life cycle, expressing it in the form of a certain sequence of stages (stages) and processes carried out according to them⁸.

The life cycle model is understood as a structure that determines the sequence and interconnection of the execution of processes, actions and tasks performed throughout the entire life cycle of IS. Most often, the IS life cycle is represented by three cascade, incremental (growing) and spiral models.⁹:

The waterfall (cascade) IS model is a classical model and assumes a linear sequence of execution of the stages of building an information system. In other words, the transition from one stage to another should occur only after the work at the current stage is fully completed. This model was proposed by Winston Royce in 1970 and provides for the sequential execution of all stages

⁵ Коголовский М. Р. Перспективные технологии информационных систем. — М.: ДМК Пресс; Компания ИТ, 2003.

⁶ Monika Sethi (Panjab University, India) and Anju Sharma (Thapar University, India) Information System and System Development Life Cycle. <https://www.igi-global.com/chapter/information-system-system-development-life/75744>

⁷ Братищенко, В. В. Проектирование информационных систем / В. В. Братищенко. — Иркутск: Изд-во БГУЭП, 2004. — 84 с.

⁸ Инюшкина О.Г. Проектирование информационных систем (на примере методов структурного системного анализа). Учебное пособие. Екатеринбург. «Форт-Диалог Исеть», 2014. 240 с.

⁹ Сенник Ю. С. Жизненный цикл информационных систем / Ю. С. Сенник, И. Р. Гребенников // Системный анализ и прикладная информатика. - 2015. - № 2. - С. 4 - 9. <https://rep.bntu.by/handle/data/19054>

of the project in a strictly defined order. The transition to the next stage occurs only after the complete completion of all the work of the previous stage.

At the first stage, the requirements for the problem to be solved are formulated, that is, the possibility of its technical implementation is investigated. Questions to ask here: "What is the problem? Can this problem be solved? What are the ways to solve this problem, etc."

And at the stage of analyzing system requirements, the question arises: "what should the information system do to solve the problem? What software gives effective results? Are the image values of the program used sufficient to create an information system." At this stage, the current system and its workflow are examined. The result of the system analysis stage is a list of system requirements and their priority.

At the system design stage, answering the question "how should the created information system work to solve an existing problem?", The result of the stage is a detailed design of a new or modified system. As a result of the information system design process, the input, output, interface, hardware, software, database, telecommunications, personnel and procedures, interactions and relationships between these components are shown in detail.

At the stage of coding the system, programmers are involved, an information system is practically created and brought to the state of a program using a programming language.

At the testing stage, if the program is a database, it is filled in, if it is software, then it is created and tested to the end. The result of this step is a fully functional program. The tested program is put into practice and its effectiveness is determined.

Over time, after the launch of the created information system, changes are inevitable. Over time, changes are made during the maintenance phase. At this stage, the inconspicuous errors of the previous step are corrected and brought to the desired level.

In the "waterfall" model, the system being created is reviewed and tested after the completion of each stage. If any error is found, it does not necessarily move on to the next step, but rather the previous step will be reviewed to determine the existing error. The "waterfall" model is much more convenient to manage,

because after each stage, all the work done is reconstructed and documented.

Advantages of the "waterfall" model:

- at each stage, a complete set of documents, software and hardware is formed that meets the criteria for completeness and consistency;

- steps taken in a clear sequence allow you to reliably plan working time and related resources (monetary, material and human).

Disadvantages of the "waterfall" model:

- the real process of developing an information system rarely fits into such a rigid scheme.

- the exact formulation of the initial requirements for the model information system, as a rule, it is difficult to fully formulate the requirements of the customer at the beginning of the project;

- the main disadvantage is that the development results are provided to the customer only at the end of the project. Incorrect formation of requirements leads to the fact that the system does not meet the needs of the client.

Incremental model of information system. Increment in English - increase, which means increase, includes the development of a pre-planned information system in the form of a linear sequential improvement, in several stages (versions) as capabilities increase.

This information systems life cycle model is typical for the development of complex and complex systems, and a clear idea of what the end result of the information system being created should be will be available both on the client side and on the developer side.

The disadvantage of the incremental IC model is that the stages of building the system are identical to the cascade (classical) model, and the advantages, unlike the classical strategy, are that the client can see and feel the results earlier. After the development and implementation of the first version, having seen the result, you can slightly change the development requirements or abandon it by entering into a new contract and offering the development of a more advanced product.

Spiral model of information system. The spiral model was developed in 1988 (an evolutionary or iterative model) by Barry Bem based on the classic Deming cycle PDCA (plan-do-check-act). Building an information system using this model involves several iterations such

as turning the spiral. Not all requirements are defined at the beginning of a project, and as a result of versioning, the requirements become more specific. At each turn of the spiral, the requirements for the creation of the next part of the information system are indicated, the quality of the work performed is determined, and a work plan is drawn up until the next turn of the spiral.

However, at each iteration (repetition), it is necessary to evaluate:

- project conditions and the probability of exceeding the budget;
- the need to perform another iteration;
- degree of completeness and accuracy of understanding of system requirements;
- the feasibility of completing the project, etc.

This life cycle model is used to develop innovative (non-standard) systems. At the beginning of work on the project, the customer and the developer do not have a clear idea of the final product, a clear definition of requirements, successful project implementation, and the presence of risks. In this regard, a decision is made to change the requirements for the creation of the system or to abandon its further development.

Advantages of the spiral information system model:

- the system allows users to quickly show a workable product, thereby activating the process of clarifying and filling out requirements;
- in the process of developing an information system, there is the possibility of changing requirements, which is typical for developments, standards;
- provides flexibility in project management;
- allows you to create a more reliable and stable system.

Graphical representation of the stages of the spiral model of IS includes:

- there is an opportunity to improve the development process
- the risks for the client are reduced, he can complete the development of an unpromising project with minimal financial losses.

Disadvantages of the spiral information system model:

- the uncertainty of the developer in the prospects for the development of the project

increases. This disadvantage is due to the previous advantage of the model;

- operations for planning time and resources for the entire project are complex. To solve this problem, it is necessary to set a time frame for each stage of the life cycle in advance. Although not all planned work has been completed, the transition to the next phase will continue as planned.

- the plan is drawn up on the basis of statistical data obtained in previous projects, and the personal experience of the developers.

The use of international life cycle standards in this work can significantly save effort, time and material resources.

CONCLUSION AND RECOMMENDATIONS. Speaking directly about information systems, we can come to the following conclusion. The rapid development of information systems affects all aspects of society, the system of continuous education, in particular, the system of higher professional education, and increasingly expands its capabilities.

If we talk about distance learning, then the information system suffers as its important element. Because this process is carried out directly with the help of information systems and technologies. Information systems provide the basis for fulfilling the main task of distance learning without direct contact between the educational process and the student. Information systems contribute to convenient distance learning, maximum perception of educational information, and economic benefits for students.

Information systems created in society, in particular the role of the life cycle in the design of electronic educational resources in the educational process, and the creation of electronic educational resources used in the implementation of education using the spiral model of information systems design, serve to increase the efficiency of the educational process, the principles of construction and classification of information systems, methods for constructing a logical data model, synchronization of the main stages of the spiral model of the information system

Based on the foregoing, we can conclude that the life cycle for the designers of any information system serves as a "guideline", the improvement of information systems in all areas,

in particular in the education system for society, requires an in-depth study of this area..

References.

1. Закон Республики Узбекистан “Об информатизации” от 11 декабря 2003 года. <https://fayllar.org/axborotlashgan-jamiyat-va-uning>
2. Анисимов В. В. Проектирование информационных систем / В. В. Анисимов. – Хабаровск: Изд-во ДВГУПС. 2006. – 112 с
3. Братищенко, В. В. Проектирование информационных систем / В. В. Братищенко. – Иркутск: Изд-во БГУЭП, 2004. – 84 с.
4. Kayumova N.A. Improving the teaching methodology of future informatics teachers in the e-learning environment based on an integrated approach. Dis. ... doctor of pedagogical sciences (DSc). -T.: 2022.-306 b.
5. Инюшкина О.Г. Проектирование информационных систем (на примере методов структурного системного анализа). Учебное пособие. Екатеринбург. «Форт-Диалог Исеть», 2014. 240 с.
6. Когаловский М. Р. Перспективные технологии информационных систем. — М.: ДМК Пресс; Компания ИТ, 2003.
7. Коцюба И.Ю., Чунаев А.В., Шиков А.Н. Основы проектирования информационных систем. Учебное пособие. – СПб: Университет ИТМО, 2015. – 206 с.
8. Monika Sethi (Panjab University, India) and Anju Sharma (Thapar University, India) Information System and System Development Life Cycle. <https://www.igi-global.com/chapter/information-system-system-developme>
9. Определения понятия «система». <http://fp-i-kubagro.ru/opredeleniya-ponyatiya-sistema>.
10. Сенник Ю. С. Жизненный цикл информационных систем / Ю. С. Сенник, И. Р. Гребенников // Системный анализ и прикладная информатика. - 2015. – № 2. - С. 4 - 9. <https://rep.bntu.by/handle/data/19054>
11. Каюмова Н.А. Совершенствование методики подготовки будущих учителей информатики в электронной образовательной среде на основе интеграционного подхода. Дис. .. док-ра пед.наук (DSc). - Т.: 2022.– 306.
12. КАЮМОВА Н. А. THE NEW TECHNOLOGIES IN THE ORGANIZATION OF THE ELECTRONIC LEARNING ENVIRONMENT IN HIGHER EDUCATION //Современное образование (Узбекистан). – 2021. – №. 2. – С. 64-73.
13. Каюмова Н. А. ОЛИЙ ТАЪЛИМДА ЭЛЕКТРОН ТАЪЛИМ МУҲИТИНИ ТАШКИЛ ЭТИШДА ЯНГИ ТЕХНОЛОГИЯЛАР //Современное образование (Узбекистан). – 2021. – №. 2 (99). – С. 64-73.
14. Kayumova, Nasiba. "DEVELOPMENT OF CRITERIA OF PROFESSIONAL COMPETENCE OF A COMPUTER OF INFORMATICS IN THE ENVIRONMENT OF DIGITAL TECHNOLOGIES." International Conference on Problems of Improving Education and Science. Vol. 1. No. 02. 2022.
15. Nasiba K. META-SUBJECT APPROACH TO TEACHING COMPUTER SCIENCE //International Conference on Problems of Improving Education and Science. – 2022. – Т. 1. – №. 02.
16. Kayumova N. INTEGRATION OF PEDAGOGICAL AND TECHNICAL KNOWLEDGE REQUIREMENTS //International Conference on Problems of Improving Education and Science. – 2022. – Т. 1. – №. 02.
17. Kayumova N., Fayziyeva S. USING SOFTWARE THAT CREATOR COMPUTER NETWORK MODELS //CENTRAL ASIAN JOURNAL OF EDUCATION AND COMPUTER SCIENCES (CAJECS). – 2022. – Т. 1. – №. 2. – С. 61-65.