International Journal of 3D Printing Technologies and Dijital Industry
Uluslararası 3B Yazıcı Teknolojileri ve Dijital Endüstri Dergisi

FROM MICROPROCESSOR TECHNIQUE TO THE SYSTEM INTEGRATION IN THE INNOVATIVE DEVELOPMENT OF THE WORLD

Nataliia Punchenko [a*], Oleksandra Tsyra [b]

[a] Odessa State Academy of Technical Regulation and Quality, Educational And Scientific Institute Of Metrology, Department Of Automated Systems And Cybersecurity, UKRAIN
[b] Odesa National Academy of Telecommunications Named After O. S. Popov, Department of Communication Networks, UKRAIN

[*] *Corresponding Author: iionn24@rambler.ru*

(Received: 10.02.2019**; Revised:** 30.04.2019**; Accepted:** 04.05.2019**)**

ABSTRACT

Modern humanity lives in the vast ocean of the knowledge. A modern person is every inhabitant of the planet, regardless: he is from an Indian tribe living in the jungle on the banks of the Amazon, or a billionaire with an office on Mercanti Square in Melanie, or a professor who lectures in the Twente (Netherlands). The human is a newly-born baby and a hundred-year-old elder, men and women, healthy and sick people living in megalopolises, also living in rural areas, who never left their village. Of course, not all of them have adequate knowledge.

But all of modern humanity is a witness and participant in the avalanche-like growth of the social networks, the assault growth of the Internet, the global computerization, the triumph of the virtual world and the resulting profound social changes. And it, probably, demands the deepest, first of all innovative judgment. In our opinion, the prospect of creating, and possibly domination, superintelligence, the use of its positive achievements and the prevention of negative consequences is one of the most important problems of the different directions, views and beliefs. And it is here that the core is buried, around which the system integration takes place.

Keywords: system integration, information systems, qualified specialists.

1. INTRODUCTION

The High technologies have always been developed and implemented in close connection with qualitative changes in the system of economy, financial activity, management, marketing, education, in the perfection of telecommunication systems, in improving the investment climate and socio-economic transformation. The high-tech sector is always an important resource for productivity growth and the national economy [1], which strictly requires the creation of the fundamentally new systems for managing technical objects in the telecommunications, logistics, shipping and navigation, as well as medicine. As history shows at all times the latest achievements of the science and technology have found application in these branches.

It is necessary to note the influence in these areas of the microelectronics, which began to develop by leaps and bounds in the sixties of the twentieth century. The result was not long in coming, microprocessor technology appeared, which is the basis of automation for most of the processes, where informational processes occupies the main place.

The use of such technique in many industries allowed:

- improve technical facilities;
- to create new devices and systems, which made it possible to increase the accuracy and reliability of information systems;

- to develop more advanced sensors of information on the parameters of the technological processes;
- product information processing in real time;
- to improve control of the operation of technical equipment and improve the safety for the vessel;
- to use in difficult cases the help of qualified specialists, making it possible for them to quickly transfer and display large amounts of the information characterizing development;
- to perform an automatic solution of a number of “intellectual” tasks related to the management, security, control of the technical means;
- obtain versatile required results.

Now there is a rapid development of nano-electronics. The technologies that are created using nanotechnology progress have allowed developers at the "atomic" level to get miniature powerful tools for storing and processing information. The introduction of nanotechnology into the practice allow a qualitative change and production processes and consumption processes, from which to a large extent depends on the level of health of the society and the quality of life of the future generation [2].

It is impossible not to see that electronics is the basis of the technical base for informatics, which makes it possible to implement the methods of collecting, processing and transmitting information developed in the framework of informatics.

At the present stage, the use of information technology allows us to achieve significant success in automating the preparation for the management solutions in various industries. To solve such problems, the achievements of mathematics and logic are used: symbolic (mathematical) and fuzzy.

For implementation in the different areas of the equipment, which is based on the latest achievements of electronics and computer science, it is necessary to consider:

- requirements to the interface of the devices, which determine the construction of all the equipment on a single discrete basis;
- system integration requirements;
- requirements to have for all automation tools a built-in health monitoring system;
- other necessary [3].

Many of the individual devices and simple automation systems turned to the use of integrated systems, that in a complex solving the problem of managing technical means.

2. MAIN PART (MAIN APPROACHES TO UNDERSTANDING IN THE SYSTEM INTEGRATION)

It is known that in the modern information society information technologies play an important strategic role in the development of each industry [4].

Today, in every field of activity, enterprises have passed the stage of computerization. The success of any company depends on the organization of the various stages of the process. For the most efficient business management, many companies are adopting various methods of automation. And at the same time the system integration becomes relevant.

System integration is the integration of the individual automated processes and management tools together, which involves not only the use of already operating systems, but also the creation of new ones.

System integration includes a specific set of work, which result which will be the information and communication infrastructure of the organization. This also implies three stages of integration:

- Construction of the passive part.

- Selection of network equipment for the creation of IT-infrastructure. The main criteria for choosing equipment are scalability and flexible hardware, which can be supplemented with new modules as the company grows.
- Installation of the necessary software.

The main feature of the system integration is the construction of an IT-infrastructure based on already functioning systems and applications. However, when analyzing the existing infrastructure: it is possible to replace outdated applications, as well as the creation of new subsystems combining overlapping information in different areas of the company.

To determine what type of work can be called system integration and what can describe of this definition, as well as find out what a system integrator is and what its purpose, it is necessary to refer to the terminology.
The term "system integrator" does not define a profession specifically to the industry related to information technology, since it can be used by a multidisciplinary company in any direction that derives profit from value added to the customer's amount.

From this we can conclude that system integration means the creation of a unified system and small separate streams that are interconnected. The interconnection is organized to obtain additional benefits that can only be gained when working together and using all dependent elements, in contrast to the single-handedly using.
Therefore, the designation "system integration" can be interpreted as a multi-threaded network infrastructure or as the addition and formulation of innovative ideas and technological solutions.

What does the integration procedure include?
The integration procedure is often used within the limits of corporate information structure, where the most important are the following elements:

i. **Network infrastructure containing:**
   - server high-tech equipment;
   - telecommunications;
   - client workstations;
   - some of the organizational systems of integration.

ii. **The system of automated or manual control and monitoring of technological processes**

These parts of the corporate information structure are basic and without them it cannot be formed, but other information technology components can also be used. The basic rule that cannot be violated when building a single corporate system is the importance of organizing the correct interconnections between the threads of the system.

The tasks that have to be solved by system integrators are unique and have no analogues anywhere except in a particular enterprise. This applies to work with very large structures, when the task cannot be performed by standard methods. In such cases, work is equivalent to the work of the designer or engineer.

As for small and medium enterprises, it is enough for a specialist to use standard and proven, one might say, publicly approved methods. Their integration will bring profit to the company due to budget savings, but will not affect the quality of the project execution.
The most difficult in integration is conditional complexity.

2.1. System integration in the different areas of activity

The term "system integration" does not have an exact meaning. It can be used in completely different areas of activity, and it is often confused with the usual introduction of a new technology into one process or another. The term is used in the following areas:

- advertising and marketing;
- personal publications on websites, blogs, newspapers;
- among development companies and participants in technological progress;
- in the everyday using in media and television.

What is interesting, even the companies that are directly involved in the system integration, completely differently disclosed this concept.

The system integration – what is it really about?
The activity, which is aimed at increasing the effectiveness and efficiency of the company's control, is called system integration. This also includes control over communications and information technology in order to obtain the highest possible profit. Basically, work related to the system integration is aimed at increasing the number of covered business objectives of the organization.

Before launching a project in one area or another, a full-fledged analysis of the current state of the company is carried out, and the prospects for system integration are also assessed. The customer organization is informed about the benefits derived from integration, derives profits and budget savings as a result of the work carried out, and also will develop a phased solution of the problem.

i. Types of the integration

As a rule, integration is divided into several stages, each of which is considered to be a separate, fully completed procedure. There are several types of integration depending on the direction of the organization and the necessary work package:

When an organization plans expansion by absorbing objects or adding a new one and it is necessary joining into a single network, the procedure for such integration is called networking. After it comes the stage of the organizing common processes and activities.

If an organization needs global changes due to a change in the type of activity or a combination of the different structures, there is a need for the comprehensive integration, which may include rethinking workflows and redesigning the business. This approach is called the company's reengineering and is often done because of the primary implementation of automation in the control and accounting system.
When a change in the organization’s functionality is required due to the achievement of new goals, functional integration is carried out.

As for system integration, it is used to change the priorities work of the individual areas and arrange them over the main goals of the company.

ii. The importance of the system integration

The system integration is always calculated to increase production indicators or increase profits, which is achieved by combining individual projects or innovations in the activities of the organization. In this context, system integration manifests an innovative character, which is characterized not only by the end result of human intellectual activity, which reflects the economic effect, but also by the process of radical changes in scientific knowledge [5]. This is the most important aspect, but besides the economic factor, there need disclosed are others.

Managers and directors of companies can independently solve problems, changing the tasks and goals of the business object as a whole or experimenting in certain areas, but this is not always constructive. Contacting the system integrator can avoid unnecessary actions without losing money and time, especially when it can become critical.

Constant changes in the market due to the emergence of new technologies or for other reasons leads to the fact that they need to integrate or update the company's divisions. Strict organization by structure and activity profile is required, after which classified objects are introduced into other structures and system integration minimizes the company's risks when working with innovations.

Systematization can also be used for:

- the combination of various elements from the different developers;
- building a proper and workable structure of the business processes;
- promotion and implementation of individual business flows;
- building and preparing projects for the external and internal networks.

In addition to planning the structure of the operation, the integrator is engaged in transferring ideas to a prepared technological basis. In order to choose and qualitatively plan the options for building a network, as well as to prepare the system design and technological equipment for different software, need the expert opinion of this specialist.

The system integration is important for both small and large enterprises of different fields of activity. The procedure may be needed for every organization that needs the best possible management of the large streams of information from the various sources.

2.2. Existing tools

Among the more than fifty solutions offering functionality, ensuring the joint work of teams in the field of IT, there are several of the most popular, possessing the best price-quality ratio and occupying leading positions in the market for this type of the software.

For example, the software products from the Salesforce, Slack Technologies, Cisco, and Citrix are the undisputed market leaders in team-work software, according to a Gartner's square that prepared by the G2 Crowd. Each of the software products listed above developers has a wide functionality to ensure team work of the specialists in the different fields of activity. Among the main services offered by these applications are:

- service of the social corporate networks;
- instant messaging;
- notes, management of the tasks and calendars;
- document exchange;
- basic functions of the project management and so on.

In the most products are offered in options as a cloud placement of the service, and using the resources of the company purchasing the software product. Some vendors suggest using mobile platforms to work with the service, which undoubtedly increases the efficiency of the tasks assigned to the executors and positively affects the result of the teams' work [6].

It should be noted that none of the above products is produced by the Russian development companies. Moreover, all are focused on the mass market, without taking into account the characteristics of industries and their standards, and the functionality of each of the applications does not cover all business processes that exist in the field of the system integration.

3. CONCLUSION

In view of all the above, an environment formed in the IT-industry has emerged. One of the most important indicators of the quality of companies' work is the project implementation timeframe, observing work schedules and utilizing the resource plan, which has a direct impact on the result of the project.

In addition to the general-purpose software products described earlier, today there are a lot of tools for planning and monitoring projects execution offline, with the possibility of the making changes to the project or describing its status on the fact; and all changes or the planned configurations are delivered to the performers by the third tools.

The project progress reports are compiled periodically based on a predefined schedule, thus creating conditions for the receiving feedback from the customer with an indefinite time delay.

All the above facts indicate the existence of the possibility of optimizing the implementation of the systems integration methods. Also, the need to develop a new approach to automation, to provide the information processes to the activities, aimed at solving the problems of integrating information systems, elements of these systems, starting with voicing the task and ending with the stage of industrial operation with accompaniment of the entire system life cycle.

ACKNOWLEDGE
We wish to thank V. Kychak, prof., I. Trotsyshyn, prof., O. Punchenko, prof. and G. Bortnyk, prof. for their insightful comments on earlier drafts.

REFERENCES

1. N. Punchenko, O.Tsyra "The strategy of informative redundancy of necessary measurements in the ship navigation as the independent direction in the development of a high tech park", M.Sc. thesis, [IEEE 5th International Conference on Methods and Systems of Navigation and Motion Control (MSNMC)] [Thesis in English], National Aviation University Kyiv 2018

2. Tsyra O.V. The humanistic change of the modern nano-technological revolution, Vol. 52, Issue 1, Pages 133-148,2013.

3. Vagushchenko L.L." Integrated bridge systems", Odesa, 2003, p169.

4. Punchenko N.O., Besonov O.O. under the gen. ed. V.S. Ponomarenko "Information technology: current state and prospects with accompaniment", In Punchenko N.O., Characteristics of information provision of logistic loading processes, Kharkov, Pages 133-148, 2018.

5. Tsyra O.V. Innovation of science as a universal phenomenon of the modern socio-economic development of the society, Belarusian Journal of Proceedings of the BSTU, Vol. 5, Issue 1, Pages 210-217, 2014.

6. N. Punchenko,B. Berdiev, O. Popov. Using the data exchange function between indicators in integrated navigation systems [International Conference on Measuring and computing devices in technological processes] [Thesis in English], Academy of Telecommunications named after O. S. Popov, Hose Odessa (Zatoka) 2018.