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FACTORS OF IMPACT ON OPENING AR-ELEMENTS

Augmented reality is a term that refers to all projects to supplement reality any virtual items. Augmented reality is the result of the introduction of the right perception of any sensor data to supplement information about the environment and improve the perception of information.

Augmented Reality is a concept that can be used to describe products that are complemented by any virtual objects (text, images, videos, audio, etc.). They are created by entering into the field of view of any information information to supplement the environmental information and better perception of information.

This technology is quite new, but it is becoming more and more popular every day, as it allows us to introduce products of a new unusual perception, to diversify it, to make it more interesting and understandable to potential users, and to provide a high level of wow effect and interest in the edition. In addition, this technology is quite simple, inexpensive and easy to put into production, as it does not require heavy and expensive equipment to test and use.

All that is needed for the user to view the virtual content is the camera of a smartphone, tablet or laptop and, in some cases, special free software for viewing it.

Children's publications are the most popular among these products because they combine not only dry text with still images but also additional virtual content, such as animation elements, videos or audio. This not only helps the child to read, but also helps them learn something new and increase their level of knowledge in various fields.

There are a variety of augmented reality technologies. They can be grouped into two large groups based on recognition, marker and non-marker. Unmarked technologies are based on location coordinates.

The basis for them may be an entire image, color or black and white, when hovering over which the content begins to play depending on the position in the space. Marker technology is based on special marker images. They are a simple invariant image, binary or grayscale, in a square, thick frame. There are many factors that affect the playback of AR-elements. They can be grouped into the following groups: materials (M), equipment (E), technology (T), software (SW), information (I), staff (S), quality control (QC).

In order to determine the weight of a parameter, the method of expert prioritization was used. It was based on the Pareto chart based on the average score, which was calculated by a group of 21 experts. This diagram is presented in Figure 1.

Analyzing the Pareto diagram shown in Figure 1, we can see that the factors that are most important for the process of reproduction of augmented reality elements are equipment, materials, software, technology. Information, staff and quality control are the least important.

Based on this diagram, a cause and effect diagram was constructed to express the factors that influence the reproduction of augmented reality elements, as shown in Figure 2.

As you can see from this diagram, the greatest number of factors of influence have branches of equipment, materials, software, technology, as well as information that confirms the results of the Pareto diagram. Also, priority was given to each parameter in each branch of the diagram shown in Figure 2.

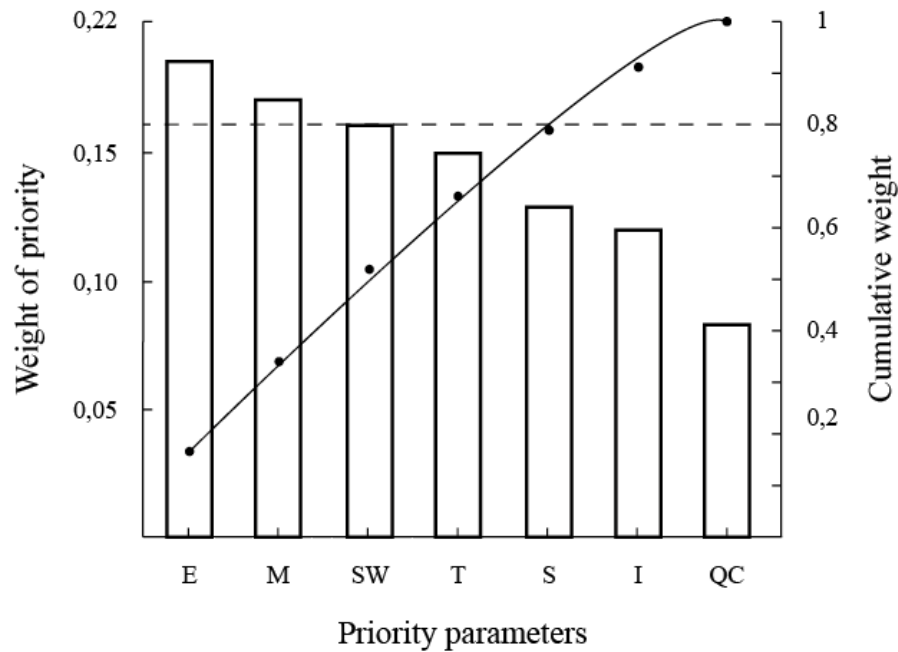


Fig. 1. Pareto diagram with priority factors influencing the reproduction of AR-elements:
 E – equipment; SW – software; M – materials; T – technology; S – staff; I – information;
 QC – quality control.

A study was conducted at the Materials Branch. Printing can be done on different materials: paper, cardboard, textiles, metal, etc. Printing on textiles has several disadvantages, among which the most significant are the presence of fibers, which can lead to the appearance of additional texture on the print, which negatively affects the reproduction of augmented reality; the paint layer is unstable to the mechanical effect and lightens with each wash, which can lead to the inability to reproduce the content due to differences between the initial and final appearance of the marker; blurring the edges of the print, etc.

Printing on metal is quite expensive, and it also has a number of disadvantages, such as the ability to illuminate and deform the print of the print, dim the print over time, the difficulty of reproducing the drawing with details. Therefore, the best material is paper or cardboard, depending on the intended use.

In addition, the branch of Technology was studied, in particular its part “AR-technology”, which most influences the correctness and correctness of reproduction of AR-elements on different devices, as improperly designed technology, created code, etc. may cause the necessary information can not to appear at all, despite the properly prepared and printed products.

The parameters of the study are the following: programming language (PL), method of implementation (MI), recognition features (RF), method of development (MD), content type (CT). The study was conducted using the Pareto diagram.

The result is presented in Figure 3.

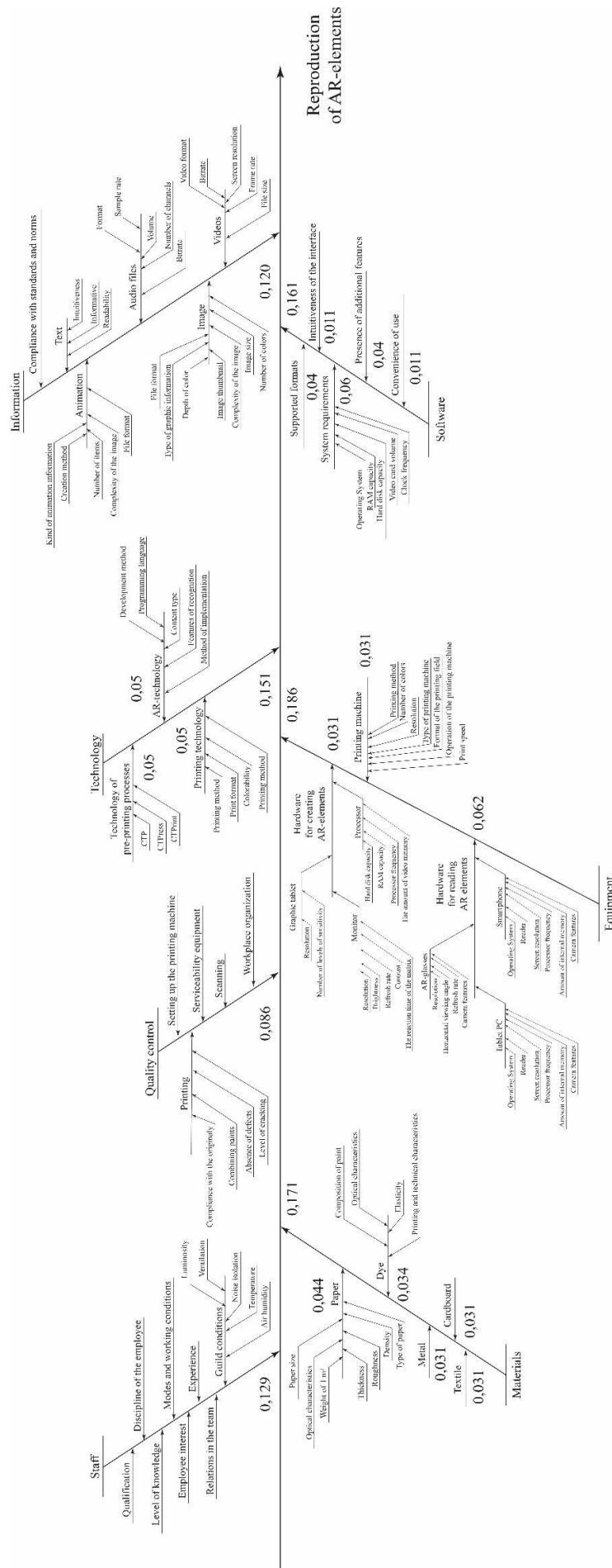


Fig 2. – Cause and Effect Diagram

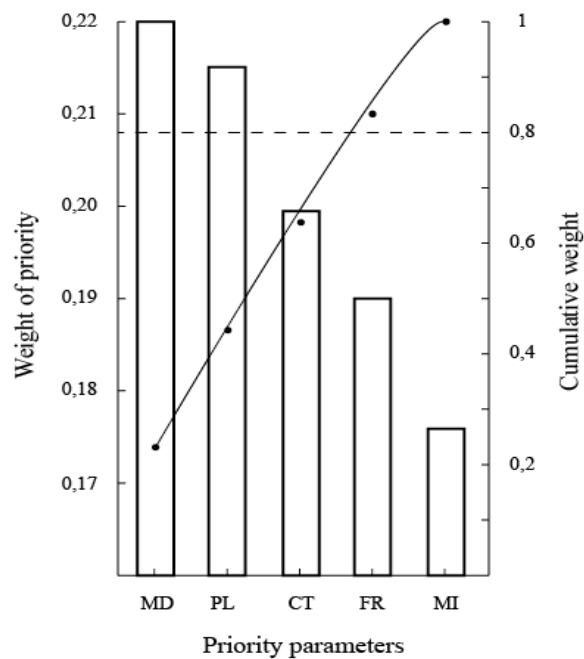


Fig. 3. Pareto diagram with priority factors influencing the reproduction of AR elements:
 MD – method of development; PL – programming language; CT – content type; RF – recognition features; MI – method of implementation

Analyzing this chart, you can see that the factors that most affect the reproduction of AR elements are programming language, design method, and content type. The least significant is the implementation method and the features of recognition.

So, based on the research, we can draw the following conclusions: Augmented reality is a fairly new technology in our time, a rapidly evolving and expanding field in various fields; There are a variety of AR technologies that can be grouped into 2 large groups - non-marker and marker; when designing augmented reality products, many factors must be taken into account that will further influence its use as a whole; the most influential parameters are equipment, materials, software, technology.