Risk management of interactive electronic technical manual design projects

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Abstract. The analysis, assessment and minimization of risks for projects on the development of interactive electronic technical manual of different thematic focus is one of the classic examples of application of the results of modern scientific risk management in the subject area of creating software and information products. The need for these analyses and assessments is due to the fact that the creation of modern, high-technology interactive electronic technical manual integrated both in the operation of complex equipment and in the training of exploiters is a resource-intensive and expensive process. This provision fully applies to the interactive electronic technical manual for the operation and repair of aviation equipment.

1. Introduction

Traditionally, the risk assessment of projects to create interactive electronic technical manual (IETM) as one of the types of software and information products is carried out at a qualitatively-empirical level, with an approximate degree of accuracy (i.e., with an accuracy of the development evaluation).

The concept of "risk", being generally used, at the same time is not strictly fixed. Various authors interpret it differently, with reference to narrower areas of consideration. Thus, in [1-4], risk is understood as the possibility (probability) of the occurrence of adverse or undesirable consequences of the subject's activity. The standards [1-3] define the risk in relation to their regulatory area as: "effect of uncertainty on objectives (An effect is a deviation from the expected – positive and/or negative. Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process). Risk is often characterized by reference to potential events and consequences, or a combination of these. Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence. Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of, an event, its consequence, or likelihood.)" etc. It seems reasonable to understand the risks of projects on the creation of the IETM for the operation and repair of aviation equipment - some measure characterizing the danger of not fulfilling the goals and tasks of creating these electronic guidelines. Prior to its
manifestation, risk is simply an abstraction. This is something that can affect the quality of the IETM for the operation and repair of aviation equipment, or it may not.

2. The main provisions
Risk management is the process of thinking through corrective actions before the problem arises (the real manifestation of risk), while it remains just an abstraction. The opposite of risk management is crisis management - an attempt to understand what to do with the problem after it has appeared. The moment when what was risk suddenly turns into a problem is the moment of a risk event [1-3, 5].

The risk event is the main concept in risk management. This is an event that initiates measures that are expected to be taken in relation to risk. The reason for attention to the event of risk is that when you have symptoms, you need to take some action. Before the appearance of signs of a risk event, it is too early to take action, because they need to spend material resources and time, so the hope is justified that actions may not be required. However, although some corrective actions can be postponed, some of the actions may be urgent. It may be that some steps need to be taken before the risk event occurs, so that there are options and the possibility of subsequent corrective actions is provided. This work is called risk mitigation.

In essence, risk management is the work of identifying risks, their qualitative and quantitative assessment, and its weakening. At the same time, risk assessment, primarily quantitative, is a procedure for limiting uncertainty in real conditions. Limited uncertainty can be frightening, because it is psychologically difficult to approach the realization that there are few things in which one can be sure, but without it one has to deal with what is much worse - boundless uncertainty [4].

At the same time, it is necessary to state that within the framework of modern risk management a certain mathematical apparatus has been developed and accumulated for quantitative assessment and mitigation of risks [6-9]. So, according to the works [4-5], quantitatively, the risk is estimated as a certain probability value $R$:

$$ R = py, $$

where: $R$ – non-physical risk; $p$ – probability of undesirable consequences; $y$ – the magnitude of possible damage in the event of undesirable consequences.

This variant of the quantitative measure of risk has found wide application in risk management in the economy, finance and other fields. It is on the definition of risk according to (1) that all the main risk minimization methods described, for example, in [4-7, 9] are constructed. However, it is difficult to apply in the development and creation of such software and information products as IETM for the operation and repair of aviation equipment, due to the problematic nature of the potential damage assessment from their potentially poor quality.

Traditionally, the risk management of projects to create IETM for the operation and repair of aviation equipment is carried out at a qualitative level, i.e. without the application of quantitative measures and appropriate measurement methods. Conditionally the essence of such management is reduced to two successive procedures: risk assessment and risk response. The logical-information model of risk assessment is reduced to the construction of the so-called. risk assessment matrix (risk effect matrix). An example of such a matrix from is given in table 1.

| Possible damage ($y$)                      | The probability of an event ($P$) | Low less than 20% | Average from 20 to 60% | High more than 60% |
|------------------------------------------|----------------------------------|-------------------|------------------------|-------------------|
| Strong: A significant disruption of the calendar schedule, an increase in cost or a deterioration in the quality of implementation | Average | High | Critical |
| Average: Possible violation of the schedule, increase in cost or deterioration in the quality of implementation | Low | High | High |

Table 1. Example of a risk assessment matrix at a qualitative level.
The probability of an event \( (P) \) | Low less than 20% | Average from 20 to 60% | High more than 60%
---|---|---|---
Possible damage \( (Y) \) | Weak: Perhaps the appearance of remarks or problems in the implementation, but it is unlikely that this will lead to a violation of the calendar schedule, budget or deterioration of quality | Low | Average | Average

Accordingly, for different gradations of risk values, different methods of responding to risk are envisaged. In their scientific and methodological nature, these risk-response methods are typified into several separate groups, which are summarized in Table 2. A detailed description of the distinctive features of each of the generic-typed methods in Table 2 can be found, for example, in [4-5]. At the same time, it is obvious that the qualitative measurements presented in Table 1 are not difficult to result in a numerical form and use a more sophisticated mathematical apparatus for assessing and taking into account risks of IETM projects on the operation and repair of aviation equipment.

The translation of risk assessments refers to the tasks of the so-called. "Qualitative or soft measurements" and is solved by appropriate scaling of the ranges of possible changes in the values of these estimates. Thanks to it, it becomes possible to transition from a qualitative view of the risk assessment of IETM projects on the operation and repair of aviation equipment, shown, for example, in Table 1, to a quantitative, standardized representation with measure definition without a concretized physical interpretation.

| № | Method Name | The essence of realization | Note |
|---|---|---|---|
| 1 | Avoiding risk | The method consists in simply avoiding a particular job, activity or circumstances that contain a source of risk, or in a radical redesign of the plan | The most commonly used response method |
| 2 | Transfer of risk | The method involves transferring the entire risk or part thereof to a partner or a third party | - |
| 3 | Reducing the significance of risk | The method consists in conducting its own preliminary measures to limit the consequences of a risk or to reduce its probability | - |
| 4 | Risk retention | The method implies retaining all responsibility for the risk and ability to cover all possible losses (damage) | It is most equipped with formalized procedures for scientific and methodological support |

3. Conclusions

It should be noted that in the future, the risk management of projects to create interactive electronic technical manual for the operation and repair of aviation equipment remains largely an art than a scientifically grounded software and engineering technology.

To date, specialized scientific and methodological and software tools for assessing the risks of interactive electronic technical manual development projects in automation systems of the corresponding technology have not been submitted; scientific methods, models and methods of risk management are not developed enough. It is this fact that opens the need for the development of a comprehensive scientific and methodological tool (scientific and methodological tools) for the integrated assessment and risk management of projects to establish interactive electronic technical manual for the operation and repair of aviation equipment.
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