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CURRENT ISSUES OF TERMINOLOGY STANDARDIZATION IN DEPENDABILITY

Nearly four centuries ago the English philosopher Francis Bacon, in his treatise “Novum Organum” wrote: “Loud and solemn debates of scientists often turn into disputes about words and names, and it would be prudent (according to custom and wisdom of mathematicians) to start with them and through the definitions put them in order”. Publications on dependability in Russian began to appear in the mid of the 1950s, therefore in the early of the 1960s the necessity appeared for the basic concepts in this area “through the definitions to put them in order”.

The first document of this kind was developed by the USSR Academy of Sciences during 1960 – 1961 and published in 1962 [1]. Such eminent scientists and experts as A.I. Berg, N.G. Bruyevich, B.V. Gnedenko, V.I. Siforov, Y.M. Sorin, I.A. Ushakov, Y.B. Shore and other took part in development of the document. Terms were viewed from the perspective of linguistic standards compliance at the Institute of the Russian Language of the USSR Academy of Sciences. The project was released as 600 copies and distributed for discussion. Later on, 110 reviews with comments and suggestions were received. We can only dream of such a level and scale of development!

Dependability in [1] was defined as “a system or a system component property, mainly conditioned by its reliability and maintainability and providing implementation of tasks in the amount established for the system (component)”. This shows that even at that time dependability was considered as a complex property, including properties of reliability and maintainability. Besides them, properties such as retention (later transformed into storageability), recoverability including, as a special case, self-restorability etc. were determined. But durability, which is currently considered as one of the basic properties, constituent part of dependability, at that time was defined as the cumulative time to failure of a non-recoverable element from the beginning of operation (use) until a failure occurs. Thus, over time, our interpretation of some terms has undergone significant changes.

A few years later the first national standard for terms and definitions in the field of dependability GOST 13377-67 was adopted, revised and updated in 1975 (GOST 13377-75). In the 1980s there was already a group of standards “Dependability in Engineering”, which received number 27, within which new terminology standards GOST 27.002-83 and GOST 27.002-89 were developed. Finally in 2009, the Russian standard GOST R 27.002-2009 (at first called GOST R 53480-2009) was adopted. The age of this document proved to be short-lived, and it is necessary to dwell on the issue in more detail.

GOST R 27.002-2009 was developed in view of the basic regulations of international terminology standard for dependability IEC 60050 (191): 1990. Thus, one of the basic principles of standardization, established in clause 12 of the Federal Law “On technical regulation,” i.e. application of an interna-

tional standard as the basis for developing a national standard, was implemented. At the same time it is necessary to clarify that GOST R 27.002-2009 is a nonequivalent standard in relation to IEC 60050 (191): 1990, and therefore, it cannot be regarded as harmonized. Thus, the title of article [2] devoted to the adoption of GOST R 27.002-2009 “Terminology in dependability has been harmonized” is, strictly speaking, untrue.

Why exactly was IEC taken as a basis? The main global International standardization organizations are: IEC (International Electrotechnical Commission), ISO (International Organization for Standardization) and ITU (International Telecommunication Union). Between them there is close cooperation and coordination within the alliance of WSC (World Standard Cooperation).

In accordance with the agreement between these organizations, it is IEC that plays the leading role in the standardization of dependability, and ISO and ITU are based on IEC standards in developing their documents. For example, the definition of the notion “dependability” that is introduced in ISO 9000 (there is an identical Russian standard GOST R ISO 9000), is taken from IEC 60050 (191): 1990. This standard represents Chapter 191 of the International Electrotechnical Vocabulary (IEV) and often is denoted as IEV-191. Generally, all the terminological work in IEC is coordinated by Technical Committee (TC) 1. Particularly, this Committee has organized a special online portal called “Electropedia” (<http://www.electropedia.org/>), which provides online access to IEV.

Standardization of dependability in IEC is dealt with by TC 56, which is called “Dependability”. It has the status of a “horizontal” (inter-branch, general technical) committee, serving all “vertical” industrial technical committees of IEC and ISO. More detailed information on the activities of IEC/TC56 can be found in [3]. Unfortunately, in recent years due to lack of funding, our experts cannot participate actively in the work of TC 56. However, other former Soviet states are not represented in TC 56 at all.

IEC 60050 (191):1990 has the official translation into the Russian language, which was done shortly after the adoption of GOST R 27.002-89, and it was harmonized with IEC 60050 (191):1990 to some extent. However, at the start of working on GOST R 27.002-2009, the new third edition of the standard terminology (IEV-191, Ed.2) was actively developed in IEC/TC56 as it was clear that the 1-st edition (IEV-191, Ed. 1), i.e. the current IEC standard 60050 (191): 1990 has been already outdated. Therefore, developers of GOST R 27.002-2009 hoped that they could take as a basis the new standard IEC (IEV-191, Ed.2). However, the work in TC56 has been delayed and adoption of the new IEC standard was postponed, but our Rosstandard did not take appropriate correction of standardization plan, as a result of what we have had to be guided by the standard developed almost 20 years ago. Unfortunately, the existing Russian translation of this standard has not been duly taken into account.

In addition, we have changed the procedures for developing and adopting standards. Unlike how it was done before, the project is not circulated to all interested organizations and experts, not discussed at scientific and technical seminars. Of course, all existing formal procedures were followed, the project was exhibited for information on the Internet, making it possible to provide feedbacks, but many experts did not even know about the project. As a result, on the one hand, many organizations were not previously acquainted with the basic principles of the new standard and the arguments justifying the changes. On the other hand, the developers of the standard did not receive any feedback on errors and inaccuracies in the new standard.

As a result, GOST R 27.002-2009 caused disapproval and sharp criticism of many specialists [4-6]. Basic claims can be divided into two groups: 1) deviation from some of the regulations of the preceding national standards; 2) errors, mistakes, lack of consistency in translation of terms and definitions taken from IEC. The developers responded to criticism of their offspring [7], but the result was not in its favor. By Rosstandard Order No.1843 dated 29.11.2012, the application of GOST R 27.002-2009 was suspended and the application of GOST 27.002-89 was restored.

Of course, the return to the standard of 25 years old is a necessary temporary measure. For this reason simultaneously with the decision to return to the standard of 1989, it was decided to develop a new terminology standard for dependability. It should be not only a Russian standard but also a CIS interstate standard. Given the international (albeit regional) nature of the developed standard, even a greater importance consists in the reliance on an official international standard.

This aspect has acquired special importance in connection with Russia joining WTO. Joining the organization brings weight to a topical issue of harmonization of national standards with their international counterparts. Today, the level of harmonization is one of the indicators, which is constantly being talked over by the heads of our national standardization body, and which they call to increase. Therefore, the new GOST must be as closely as possible harmonized with international standard (IS) IEC 60050 -191 (IEV -191, Ed. 2), which will be adopted in the near future.

On the other hand, all CIS countries once used the USSR's standards, and it is desirable to keep legacy. Now it is also clear that a new standard is unlikely to be made equivalent to IEC IS (this is clear from the circumstances mentioned below).

Therefore, it is not an easy task. The group of experts, which most actively protested against GOST R 27.002-2009, agreed to take the development of the new standard in their hands. During several discussions within TC 119 in June 2013, it was decided to form a working group (WG), which is tasked with developing the first version of the new standard. It includes nine experts representing various industries: aircraft building, defense, communications, energy, including atomic power engineering, railway transport; Research institutes and universities: MISA, MTUCI, RNII "Electrostandard" VNIINMASH, ESI SB RAS, Institute of Machine Dependability and Technology of Saint-Petersburg Technical University. Professor G.N. Cherkesov became the head of TC 119 WG. In November 2013 at the meeting of TC 119 the decision was taken on agreement of the overall structure of the future standard, as well as the name of its main sections: (1) Basic concepts; (2) States; (3) Times; (4) Failures, defects, damages; (5) Maintenance, recovery, repair; (6) Dependability indices; (7) Dependability rate setting (normalization) and control; (8) Redundancy; (9) Dependability test.

Opinions of WG members on several issues discarded. One of the main issues that caused disagreements is what to take as a basis for developing the new standard – GOST 27.002-89 or IEC MS.

In particular, the definition of the basic term "dependability" depends on a decision to be taken on that issue. According to one view, it is necessary to take the definition that was in GOST 27.002-89: "Dependability is an object property to keep in time, within the established limits, the values of all parameters characterizing the ability to perform the required functions in specified modes of operation and conditions of use, maintenance, storage and transportation".

According to another view, it is desirable to get away from the parametric descriptions, limitations, which were recognized in GOST 27.002-89 (Appendix, an explanation of the term "dependability"), and to use the definition of IEC IS (IEV-191, Ed. 2), which at the moment sounds as follows: "Ability to perform as and when required".

Next, in GOST 27.002-89 dependability is a complex property, which, depending on the purpose of the object and the conditions of its application may include reliability, durability, maintainability, and storageability or some combination of these properties. In IEC IS the property of storageability is absent, but there are other properties, such as availability, which is not present in GOST 27.002-89 (although there are indicators that characterize this property, in particular, the availability factor).

Besides the above two important differences, IS differs from GOST by the presence of several dozens of new terms and the lack of a number of terms that existed in the national standard.

WG members believe that the standard under development should include all the most useful concepts of the two standards (IEV-191, Ed. 2 and GOST 27.002-89). Without going so far in the discussion on the undecided issues, we would like to give readers a chance to think about them without any influence from our side.

It should be noted that the 30-th of January, 2014 in MIIT a seminar on dependability was conducted under the guidance of Professor I.B. Shubinsky. This is the only ongoing seminar on dependability, actually working in Moscow. Two reports of WG members, representing two different approaches to the development of the new standard were presented in the seminar: “Topical issues of terminology standardization in dependability” by V.N. Netes and “Comparative analysis of key terms’ definitions (dependability, failure, availability) according to GOST 27.002-89 and IEC” by Y.I. Tarasyev. We agreed that this discussion did not lead to the emergence of some common decision, i.e. differences between the members of the WG still remain.

Given the crucial importance of creating the new terminology standard, the authors would like all persons involved in the development works in the area of dependability in the Russian Federation to respond to this publication, and express their views in essence. We, on the other hand, plan to soon publish a second article on this topic, which will detail the arguments on both sides on the issue of a general definition of dependability, and which document should be taken as a basis for the new GOST.

References

1. Dependability theory in the field of radio electronics. Terminology: Collection of recommended terms. Issue 60 / Academy of Sciences of the USSR. Committee of tech. terminology, Institute of Radio Engineering and Electronics. – M., 1962.
2. **Demidovich N.O.** Terminology in dependability is harmonized! // Standards and Quality. 2011. # 2.
3. **Bogdanova G.A., Netes V.A.** IEC/TC 56: standardization in dependability // Methods of Quality Management. 2009. #5.
4. **Netes V.A., Rezinovsky A. Ya., Tarasyev Y.I., Ushakov I.A., Fishbein F.I., Shper V.L.** Degradation instead of harmonization // Standards and Quality. 2011. # 5.
5. **Ushakov I.A.** Uninvited GOST // Methods of Quality Management. 2011# 5.
6. **Grigoriev A.** New GOST – “brains inside out”? // Standards and Quality. 2011. # 9.
7. **Demidovich N.O.** It is time to end the problem terminology of dependability // Standards and Quality. 2011. № #10.