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Technical Translation in Nuclear Energy: New Terms, Context, Equivalence

The paper briefly outlines the theoretical concepts underlying scientific and technical translation such as equivalence and context. It emphasizes the importance of contextual knowledge essential for the translation of new terms that emerge in modern academic and technological society. The significance of extensive and comprehensive contextual knowledge is demonstrated by the example of two new concepts brought to light following the Fukushima Daiichi accident. The concepts and challenges associated with their translation are addressed in detail.

K e y w o r d s: scientific and technical translation, Fukushima Daiichi accident, stress tests, post-Fukushima measures, safety upgrades, nuclear power plant.

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Технічний переклад у сфері атомної енергетики: поява нових термінів, контекст, еквівалентність

Стисло викладаються теоретичні концепції, що лежать в основі науково-технічного перекладу, такі як еквівалентність і контекст. Підкреслюється важливість контекстуальних знань для перекладу нових термінів, які виникають у сучасному науково-технічному суспільстві. Значимість вичерпного розуміння контексту продемонстровано на прикладі двох нових концепцій, що виникли після аварії на АЕС «Фукусіма». Детально розглядаються самі концепції та пов'язані з ними питання перекладу.

К л ю ч о в і   с л о в а: науково-технічний переклад, аварія на АЕС «Фукусіма», стрес-тести, постфукусімські заходи, підвищення безпеки, атомна електростанція.

Scientific and technical translation is an essential component of academic and technological society, promoting the dissemination of ideas, notions and concepts. Its role in today's information age has become especially important. It is a vehicle for facilitating significant scientific and technological advances that accompany virtually all aspects of our lives. It should be recognized universally that translation is a necessary driving force in imparting scientific and technical knowledge [1].

Nowadays, the domain of science and technology is a major area of translation. Among other things, there is a fundamental concept of equivalence. The context-based notion of equivalence is generally accepted today as a tool for reaching relevant equivalence-related insights. The text is an integral part of the context. It is essential that the context relates predominantly to the domain underlying the text [2].

Science and technology are expressed through language. Thus, scientific and technical translation is essential for disseminating knowledge on an international scale at various levels. Contextual knowledge refers to the specific domain of science or technology, such as nuclear and radiation safety in our case. International organizations in specific areas (for example, International Atomic Energy Agency, International Electrotechnical Commission, etc.) produce their own terminological equivalents that may semantically differ from the standardized terminology of science and technology in general. In this instance, equivalence is largely dependent on specific context reflecting the conventions of a specialized language community, as will be discussed below.

Unfortunately, the emergence of new terms in the field of nuclear and radiation safety may be associated with accidents or emergencies that occur at nuclear power plants with different reactor designs. The severe accident that occurred in March 2011 at the Fukushima nuclear power plant is no exception. Following the accident at the Fukushima nuclear power plant in Japan, the European Council declared that *"the safety of all EU nuclear plants should be reviewed, on the basis of a comprehensive and transparent risk assessment (stress tests)"* [3]. Based on the WENRA proposals made at the plenary meeting, the European Commission and ENSREG members decided to agree upon "an initial independent regulatory technical definition of a stress test" and its application across Europe. Hence, a stress test is defined as a targeted reassessment of the safety margins of nuclear power plants in the light of the events that occurred at Fukushima: extreme natural events challenging the plant safety functions and leading to a severe accident.

This new term is a striking example of a semantic unit whose definition depends on the specific domain and context. It is limited to the use in nuclear community, unlike universal definitions accepted previously for applied science and medicine. For example, Webster's Unabridged Dictionary [4] defines a stress test as *"1. A test, especially one conducted in a laboratory, to determine how much pressure, tension, wear, etc., a product or material can withstand. 2. A test of cardiovascular health made by recording heart rate, blood pressure, electrocardiograms, and other parameters while a person undergoes physical exertion"*. Wikipedia, in turn, offers a variety of descriptions for "stress tests" or "stress testing" as applied to medicine, finances, human research, mechanics, etc.

Following the stress tests, European Union countries prepared reports and statements regarding the comprehensive and transparent risk assessments. For example, the French Nuclear Safety Authority (ASN) in its "Opinion N°2012-AV-0139 of 3rd January 2012 concerning the complementary safety assessments of the priority nuclear facilities in the light of the accident that occurred on the nuclear power plant at Fukushima Daiichi" [5] imposed a range of measures on the licensees. In particular, it underlies the importance of the "*creation of a "hard-core" of material and organizational measures designed to ensure control of the basic safety functions in extreme situations; the licensees will propose ASN the content and specifications of this "hard-core" for each facility*" [5].

ASN thus noted the emergence of the "hard-core" concept defined by IRSN and asked the licensees to propose a "hard-core" of material and organizational measures for each facility, specifications and procedures for implementing these measures, such as control of the basic safety functions in exceptional situations.

Appendix II to the ASN Opinion [5] defines composition of the *hard-core*: *"crisis management premises and equipment, means of communication and alert, technical and environmental monitoring instrumentation, operational dosimetry resources for workers, strengthened equipment, including for the nuclear power plants, an electricity generating set and an emergency cooldown water supply for each reactor"*.

Therefore, another new term, associated with the lessons learnt from the Fukushima accident, came into use in nuclear community. For instance, Philippe Jamet, Chairman of the Stress Test Peer Review Board, mentioned the "hard core" concept in his presentation at the International Experts' Meeting on Reactor and Spent Fuel Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant held in IAEA Headquarters in Vienna in March 2012. Hence, the "hard core" of material and organizational measures to manage basic safety functions in extreme situations is intended to prevent a severe accident or limit its progression, limit large-scale releases in a severe accident and enable the operator to perform emergency management duties. The "hard core" is designed to withstand much more severe conditions than the plant design basis and a significant proportion of European plants decided to implement this concept.

The ENSREG Peer Review Report on Stress Tests Performed on European Nuclear Power Plants [6] recommended the national regulators to consider, inter alia, the development of a "hardened core" of selected safety systems protected against extreme hazards and stated that numerous plants decided to install a "hardened core" of equipment and organizational measures or bunker-based systems having their own power sources with dedicated fuel reserve, dedicated pumps with independent sources of water, their own instrumentation and controls. According to the report, the "hardened core" concept, besides equipment, encompasses trained staff and procedures designed to cope with a wide variety of extreme events.

Furthermore, the ENSREG Peer Review Country Report (for France) [7] extensively uses the term "hardened safety core" characterized as follows: *"As a substantial safety improvement, the licensee proposes to define a "hardened safety core" of reinforced equipment such as to minimize the potential for severe accidents and avoid significant radioactive releases into the environment, over and above the current safety requirements, for the deterministic situations studied in the complementary safety assessments. The licensee intends to draw up a list of the main hardened safety core items and the robustness requirements to be applied to them."* The concept of "hardened safety core" has been implemented through gradual creation of the Nuclear Rapid Response Force (Force d'Action Rapide du Nucléaire, FARN) proposed by EDF, a national response system comprising specialist crews and equipment, able to take over from the personnel of a site affected by an accident and deploy additional emergency response resources in less than 24 hours.

According to Webster's Unabridged Dictionary [5], *hard core* is defined as *"1. The permanent, dedicated, and completely faithful nucleus of a group or movement, as of a political party. 2. An unyielding or intransigent element in a social or organizational structure, as that part of a group consisting of longtime adherents or those resistant to change. 3. Those whose condition seems to be without hope of remedy or change"*.

The hardened safety core (hard-core or hardened core) term as well poses a challenge for the translator since no previously and universally accepted definition can obviously be applied. Given clarity of the concept based upon extensive definitions and already available applications, it still remains to find the relevant, perceptive and concise translation for the term into national language, considering that it is not governed by either national or international terminological systems. In such instances, in view of the collective and comprehensive nature of the new term, the translator should study and analyze all available approaches, concepts, and opinions and consult experts specializing in the field in question to reach the adequacy and equivalence of the translation.

Conclusions

The role of scientific and technical translation has become especially important as a necessary driving force for disseminating new knowledge and exchange of information on an international scale at various levels. Conceptual knowledge is an essential prerequisite for interpreting and translating the new terms that emerge in modern conditions in an adequate and perceptive manner. This has been demonstrated by the example of two new concepts or terms that appeared in the light of the lessons learnt from the Fukushima Daiichi accident. It is emphasized that the correct and adequate translation of the new terms is challenging and requires deep analysis and consultation with experts in the field of question, to be further implemented and standardized in national terminological system.

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