Ch. de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland | T: +41 22 749 01 11 | iso.org | central@iso.org

Form 1: Proposal for a new field of technical activity

Circulation date: 2016-02-17 Closing date for voting: 2016-05-17	Reference number (to be given by Central Secretariat)
Proposer: GOST R	**ISO/TS/P** 257

A proposal for a new field of technical activity shall be submitted to the Central Secretariat, which will assign it a reference number and process the proposal in accordance with the ISO/IEC Directives (part 1, subclause 1.5). The proposer may be a member body of ISO, a technical committee, subcommittee or project committee, the Technical Management Board or a General Assembly committee, the Secretary-General, a body responsible for managing a certification system operating under the auspices of ISO, or another international organization with national body membership. Guidelines for proposing and justifying a new field of technical activity are given in the ISO/IEC Directives (part 1, Annex C).

The proposal (to be completed by the proposer)

Title of the proposed new committee (The title shall indicate clearly yet concisely the new field of technical activity which the proposal is intended to cover.)

Safety Management of Complex Technical Systems

Scope statement of the proposed new committee (The scope shall precisely define the limits of the field of activity. Scopes shall not repeat general aims and principles governing the work of the organization but shall indicate the specific area concerned.)

Standardization in the field of complex technical systems, such as aerospace systems, including all their constituent elements (operators, manufacturers of industrial products, industrial infrastructures, maintenance and repair organizations, training centers, etc.) throughout the full Life Cycle – definition, classification of threats and risk factors, procedures for determining Safety Efficiency, including predictive risk modeling; recommendations on the practical application of risk management.

Proposed initial programme of work (The proposed programme of work shall correspond to and clearly reflect the aims of the standardization activities and shall, therefore, show the relationship between the subject proposed. Each item on the programme of work shall be defined by both the subject aspect(s) to be standardized (for products, for example, the items would be the types of products, characteristics, other requirements, data to be supplied, test methods, etc.). Supplementary justification may be combined with particular items in the programme of work. The proposed programme of work shall also suggest priorities and target dates.

At the current moment, using the accumulated experience in development of safety management standards in TC 034 "Air Transport" (Rosstandard (GOST R)), for 2010-2015 the list of planned standards for development is as follows (2016 -2017):

• Safety management system of aviation activities. Database. Aviation risks for implementation of the safety system evaluation while providing air traffic.

• Safety management system of aviation activities in civil aviation. The main provisions.

• Metrological assurance of safety management of aviation activities. Database. The main provisions.

• Metrological assurance of safety management of aviation activities. Compliance methods. Principles of choice the means and methods of measurements, testing and control. The main provisions.

• Safety management system of aviation activities. Database. Aviation infrastructure risks associated with the production of airport activity.

• Safety management system of aviation activities. Database. Risks associated with aviation training.

• Safety management system of aviation activities. Database. Risks of aviation engineering design

• Safety management system of aviation activities. Database. Risks of OAE production.

• Safety management system of aviation activities. Database. Risks of certain types of aviation operating activities: helicopter activities.

• Safety management system of aviation activities. Database. Risks of certain types of aviation operating activities: types of special applications.

• Safety management system of aviation activities. Database. Risks of certain types of aviation operating activities: transport types.

• Safety management system of aviation activities. Database. Risks of MRO services.

• Safety management system of aviation activities. Database. Residual risks of aviation engineering production.

Note: Customers of these standards in Russia are actual Russian companies (aviation operators, aircraft manufacturers, organizations of air traffic control, etc.). Most of them have confirmed their readiness to order the development of these standards. At the current moment, Russian standards developers are preparing the training programs for customers' specialists who will work with these standards in their enterprises activities.

Indication(s) of the preferred type or types of deliverable(s) to be produced under the proposal (This may be combined with the "Proposed initial programme of work" if more convenient.)

The preferred type of deliverables is international standard.

However, depending on the level of reached consensus in each case it may be useful to consider the possibility of other types of deliverables' development, such as TS, TR or PAS.

Note: the nature of these standards is not *Technical* – they are *System Standard (SS).* It is close to PAS Integrated Management System but each SS is supported by and provides the special methodology of its on-site implementation. This aspect is especially important for the organization with small scope of its Complex Technical System (CTS).

A listing of relevant existing documents at the international, regional and national levels. (Any known relevant document (such as standards and regulations) shall be listed, regardless of their source and should be accompanied by an indication of their significance.)

In the framework of Technical Committee TC 034 "Air transport" (Rosstandard (GOST R)) 43 national standard series have been developed and implemented on “safety management of aviation operations” (status GOST R) , the main standards are the following:

GOST R 55588-2013. Air transport. Safety Management System of aviation activities. Terms and definitions.

GOST R 55846-2013. Air transport. Safety Management System of aviation operations. The acceptable risks. Principles and methods of acceptable risks determining for the State and service providers.

GOST R 55848-2013. Air transport. Safety Management System of aviation operations. Aviation Complex service providers: Designers and Engineering Manufacturers. General provisions.

GOST R 55859-2013. Air transport. Safety Management System of aviation operations. Database development for service providers.

GOST R 55860-2013. Air transport. Safety Management System of aviation operations. General principles of SMS construction at Life Cycle stages of aviation engineering. Block diagram and functions’ modules of typical SMS. General provisions.

GOST R 55861-2013. Air transport. Safety Management System of aviation operations. Methods to determine compliance with SMS provisions. Guidance to determine compliance with Aviation Complex SMS for service providers.

GOST R 55862-2013. Air transport. Safety Management System of aviation operations. Aviation Complex SMS for service providers: airlines, airports, air traffic management, training centres, MRO. General provisions.

GOST R 55865-2013. Air transport. Safety Management System of aviation operations. Means of flight information collecting.

GOST R 56072-2014. Air transport. Safety Management System of aviation operations. Safety Management System of aviation service providers. Typical SMS manual for aircraft operators (airlines).

GOST R 56082-2014. Air transport. Safety Management System of aviation operations. Safety Management System of aviation service providers - organization of air traffic management (ATM). SMS manual for ATM organisations.

GOST R 56118-2014. Air transport. Safety Management System of aviation operations. Safety Management System of aviation service providers. Safety management of airport complex activities.

GOST R 56120-2014. Air transport. Safety Management System of aviation operations. Safety Management System of aviation service providers – aviation engineering designers. SMS manual for organizations on maintenance and repair (MRO).

GOST R 56480-2015. Air transport. Safety Management System of helicopter activity. Risk management. Terms and definitions.

GOST R 56483-2015. Air transport. Safety Management System of helicopter activity. Risk management. Typical SMS manual for helicopters’ testing. General provisions.

GOST R 56484-2015. Air transport. Safety Management System of helicopter activity. Risk management. Typical SMS manual for aviation specialists’ teaching and training. General provisions.

GOST R 565486-2015. Air transport. Safety Management System of helicopter activity. Risk management. Typical SMS manual for helicopters design. General provisions.

GOST R 56487-2015. Air transport. Safety Management System of helicopter activity. Risk management. Typical SMS manual for helicopter manufactures. General provisions.

Particular issues concerning safety and security have been published in numerous documents: FAA, EASA, IATA, IBAC, the ICAO Convention Annexes. For ISO, some system issues to identify risks of civil industries production is reflected in ISO 31000:2009 – Risk Management – Principles and Guidelines.

The safety issues of space activities reflected in different documents of NASA, in particular NASA System Safety Handbook, Aviation Safety Program (AvSP).

A statement from the proposer as to how the proposed work may relate to or impact on existing work, especially existing ISO and IEC deliverables. (The proposer should explain how the work differs from apparently similar work, or explain how duplication and conflict will be minimized. If seemingly similar or related work is already in the scope of other committees of the organization or in other organizations, the proposed scope shall distinguish between the proposed work and the other work. The proposer shall indicate whether his or her proposal could be dealt with by widening the scope of an existing committee or by establishing a new committee.)

Standardization in the field of safety management of Complex Technical Systems activities is proposed first for the global aviation community because it is based on 15 years of research by Russian specialists, and their activity area was the aerospace industry. Therefore the advantages of the proposed system approach described in this proposal are tied to the aerospace industry. The approaches currently being used (mainly ICAO, IATA, Boeing, Airbus and supporting by ISO committees TC 262, TC 20) are based on the assessment of AS discrete elements activities without their consideration as integrated indicator – efficiency of AS safe operations.

The proposed approach has also been tested in areas other than aerospace. For example, to analyze (open media materials) the results of accident investigations on nuclear power plants (USA, USSR, Japan), technocratic accidents (the Sayano-Shushenskaya hydro-station, Russia), and the accident with the ship "Concordia" (Italy). And this analysis shows that using the proposed approach it was possible to avoid or at least significantly reduce the consequences of these negative situations. Importantly, this approach allows the optimization of costs for providing approved safety levels for such complex technical systems (CTS) functioning.

Simply expanding the scope of an existing ISO/TC (TC 20, 269 etc.) in order to address this new area of work will impose significant limitations:

- it will restrict the possible utilization field of the proposed systematic approach by using the distinguishing features of existing TC. In some cases, for example for TC 20, its area of responsibility covers practically only the "machine" part of CTS;
- it will not allow to take fully into account the specific features of complex man-machine systems functioning for various areas of human activity (this is a slightly different view for complex technical system) from the point of view of developing the procedures (including utilization of systems' models with the special mathematical apparatus basis) for safe system operations at reasonable (acceptable) risk levels. It should be noted that we are talking about CTS, first of all, with a high level of impact negative situations, but having the probability of these events realization close to "zero" (so-called "rare events"). Such examples could be: the explosion of a gas power pipeline (realistic case), a disaster involving spacecraft, an accident at a chemical plant, etc.).

These aspects may be interesting (in addition to TC 20), for example, for TC 46, 69, 85, 154, 171, 196, 199, 204, 207, 241, 251, 260, 262, 267, 268, 269, 288, 292, 299. In other words, the proposed scope of the new TC (area of its interests) goes far beyond just the aerospace industry. The wide implementation of this systematic approach to provide safety management of CTS functioning could be realized by joint efforts of specialists from different industry branches (it is advisable, in the form of new TC subcommittees). It has to be announced the appearance of synergy effect of this cooperation, including the optimization of economic expenses for specified activity.

Moreover, at present there is no detailed approach for cost optimization to ensure the safety of aviation activity. So, given the numerous numbers of aircraft, its complexity, plus the complexity of AS in general, as a result we have direct influences of AS structure and functioning on economic indicators (both sides have to be optimized). This problem can be effectively addressed through the development of effective safety management standards.

In addition, proposed standardization would contribute to the expansion of interaction between ISO/IEC and ICAO systems concerning the AS risk management and harmonization of approaches, indicators of flight safety, aviation security, etc., that are now using in worldwide aviation practice for separate elements of Complex Aviation System.

A listing of relevant countries where the subject of the proposal is important to their national commercial interests.

These are the countries which have well-developed industries, especially with high-risk technologies (including influence of human factor) which could be the reasons of negative (catastrophic) events. (France, Germany, Japan, USA, Canada, Israel, China, Brazil, etc.).

A listing of relevant external international organizations or internal parties (other ISO and/or IEC committees) to be engaged as liaisons in the development of the deliverable(s). (In order to avoid conflict with, or duplication of efforts of, other bodies, it is important to indicate all points of possible conflict or overlap. The result of any communication with other interested bodies shall also be included.)

ICAO (Safety Management Panel)

IATA (Standards and Recommended Practices – Programs IOSA and ISSA)

EASA (Europe)

FAA, NASA, Boeing Corp. (USA).

Airbus Corp. (France)

Bombardier (Canada)

FlightSafety International

Embraer (Brazil)

IRIS

It may be interesting to ISO/TC 20, TC 46, 69, 85, 154, 171, 196, 199, 204, 207, 241, 251, 260, 262, 267, 268, 269, 288, 292, 299.

It must be noted that the participation of specialists from different countries (with their experience in risk management) in the proposed International technical committee will provide the unique possibility to create an almost universal approach to determine the safety efficiency of Complex Technical Systems (for different areas of human activities).

A simple and concise statement identifying and describing relevant affected stakeholder categories (including small and medium sized enterprises) and how they will each benefit from or be impacted by the proposed deliverable(s).

Every enterprise (small, medium and large) which deals with the threats and risk factors that may cause negative impacts (events) with material losses and human victims can and should be interested in development, implementation and maintenance of safe conditions of their enterprise activity. Moreover, the criterion "safe efficiency" implies the financial costs optimization, to provide safety risk minimization. The main stakeholders are:

a) the Authorities of National States, they have the objective means for determining the acceptable (allowed) safety risks for their organizations and oversight of their strict observance;

b) international organizations (as ICAO, IATA, EASA, IAEA, etc.) which establish acceptable levels of safety risks for application by the global community (in appropriated areas)

An expression of commitment from the proposer to provide the committee secretariat if the proposal succeeds.

It is proposed to provide the committee secretariat in the Russian Federation (GOST R) with the following designation to the State Scientific Research Institute of Civil Aviation (GosNII GA) as the organization that would provide the secretariat functions. This based on the experience of Russian specialists (developers of proposed safety management standards) and international recognition of their research work (Safety Management of Aviation Activities (report on ICAO Safety Management Panel in July 2015, Paris) and IAC (Russia) – Airbus (France) Meeting (September 2015, Moscow).

Purpose and justification for the proposal. (The purpose and justification for the creation of a new technical committee shall be made clear and the need for standardization in this field shall be justified. Clause C.4.13.3 of Annex C of the ISO/IEC Directives, Part 1 contains a menu of suggestions or ideas for possible documentation to support and purpose and justification of proposals. Proposers should consider these suggestions, but they are not limited to them, nor are they required to comply strictly with them. What is most important is that proposers develop and provide purpose and justification information that is most relevant to their proposals and that makes a substantial business case for the market relevance and the need for their proposals. Thorough, well-developed and robust purpose and justification documentation will lead to more informed consideration of proposals and ultimately their possible success in the ISO IEC system.)

Aviation systems (ASs) are one of the main elements of Global Transport Systems and their safe operations is the main objective. Given the diversity and wide variety of ASs infrastructures, aviation activity of each AS should be considered as activity a Complex Technical System (CTS), the main structural elements of which are **human (operator) – machine – environment**.

The complexity of the system elements and their relationships during safety assessment require the recording and processing of a huge number of parameters to obtain an objective safety assessment. This factor requires the utilization of machine processing with specified parameters, and the development of integrated qualitative and quantitative criteria and algorithms to estimate these parameters for each of a system's elements throughout the Life Cycle of industrial products. Only by using this approach is possible to determine the safety efficiency of aviation activity, based on the risk factor management, developing specific procedures to mitigate the risks to an acceptable level (which is determined by the State) for each AS element. Determination of safety efficiency is also based on utilization of basic criteria – Life Cycle cost of AS, including the aircraft cost and cost of AS ownership.

The target of standardization in the field of safety management for CTS is associated with a high degree of aviation importance, as a part of the global transportation system. This aspect becomes more important from the social point of view for each country, especially those with large territories, which must ensure the safe movement of any citizen through all territory (including security aspects). The big public resonance of negative aerospace events (catastrophes), associated with the loss of human lives should also be noted.

The world aerospace fleet has thousands of vehicles, and its use also contributes to environmental contamination (via the emission of a combustion engine's products). This aspect also requires risk consideration of the global impact on the atmosphere and finding ways to mitigate these risks.

The main target of proposed standardization is the definition of corrective actions with proactive impact on AS activities to prevent conditions of negative events (incidents, accidents) before they can happen.

And, in fact, the proposed approach uses the principles of a system approach which are set out in the basic standard ISO 9001:2015. This is the main reason that this approach could be utilized in the future (with the common efforts of committees ISO, IEC and other worldwide societies) in different areas of human activities.

Signature of the proposer

Mr. Alexander Zazhigalkin
Deputy Head of the Federal Agency on Technical Regulating and Metrology (GOST R)

Further information to assist with understanding the requirements for the items above can be found in the Directives, Part 1, Annex C.