Applicable eventology of safety: inconclusive totals

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27 April 2013

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Abstract. *Totals of the eventological [1] safety system modeling [2, 3, 4] is considered for examples and illustrations, which are intended to demonstrate the main features of the algorithm for calculating the risk of a dangerous event at the company under established the event-related circumstances based on the portfolio of identification indicators of company safety; inter alia the examples and illustrations show the role and functions (in calculating the risk) of the three main event-based figurants in the safety eventological system: the total subject, the total object and the total barrier; and most importantly they reveal the key of eventological approach applicability for the field of safety in the methods for selecting the optimal portfolio of identification indicators of safety providing specified accuracy of estimating risk of the dangerous event for this company by minimal expert costs.*

Keywords. *Eventology, applicable eventology, probability theory, event, probability, set of events, algebra of events, mean probable event, value of an event, Gibbsean event-based model, event identification, total subject, total object, total barrier, portfolio of identification indicators, accuracy of estimating risk, minimum cost of expert.*

Here you come up with the idea.
Like, it is quite insane
to match this crazy world.
And then it comes up to you,
that the world is crazier
than you thought.
And to understand it,
it needs to come up with another idea,
absolutely insane.
The science is growing
with a series of that follies
roughly.
Sir Roger Penrose, 2013.

In this paper I intend to very briefly summarize two years of *eventological* [1] research in the field of safety, which have been published in my works [2, 3, 4, 5, 6, 7, 8], stopping only at the nodal eventological concepts and models to provide a compact and transparent picture again eventological prevailing approach in the development of practical methods in the field of safety and insurance, which led eventually to the establishment of a new *eventological safety system of enterprise*.

Among other things I'm going to sum up the work of this still new and unfamiliar to most researchers field in the examples that illustrate the characteristics of *eventological safety system of enterprise*, for if you want to clarify something new, then to make it clearer in the examples, ruthlessly eliminating unnecessary parts and sending them to the original sources.

The nature of this final work forces me to engage in no small measure self-citations. Some short but important sections cited are unchanged as they appear in the original. In the other - I have made minor editorial changes.

In addition, this review includes some illustrations of my previous works, equipped with self-contained full captions that are not duplicated in the text. However, this work, along with the inevitable new synergies for the first time gathered together the results also contains some new ideas, has never been published, and therefore, I hope, is an independent scientific value for the applicable eventology safety and insurance.

Finally, the pattern of recent eventological research in the field of safety would be far from complete without the results of Arcady Novosyolov [9, 10] for controlling and optimizing the risk of dangerous events, references to which I am pleased to be included in these totals.

1 Eventology of safety

Recently, the paper [2] proposes a new eventological world in the field of safety, which is relative to the subject, event, probability and value.

1.1 Safety: subject, event, probability, value [2, pp. 92-93]

The meaning of the concept of danger[1] is investing only a *subject* (or a *set of subjects*), which defines and describes the danger. No subject is devoid of any concept of danger, it would not make sense. Danger is always a danger for the subject, the *subject danger*. As well as a

[1] Or it is safe as there is no danger.

Oleg Vorobyev (ed.), Proc. XII FAMES'2013, Krasnoyarsk: SFU

safety is always a *subject safety*. Thus, the danger and the safety are *subject categories*.

It has long been noted more than once stated [1] that a *subject* does not exist without the *event*. The event is a *being of the subject*, a *subject being*, a *co-being*, and only in the event subject realizes its existence.

In eventology [1] every event has a *probability*, and the concept of probability does not make sense as long as the event is defined, the probability of which is at stake. Thus, *events do not happen without a probability as the probability does not happen without the event*. The second essential characteristic of subject events in eventology is its value. Just as in the case of probability, the eventological concept of value is meaningless as long as the event is not specified, the value of which is pointed: *event is not without value, as the value does not exist without the event*.

Eventological theory characterizes the subject by this or that *set of events* that are directly or indirectly connected with the subject, reflecting either side of his being. Each such set of events occurs in the form of a *situation* of an *set of circumstances*, of a *combinations* of occurrence or non-occurrence of events from this set of a *terraced events* generated by this set. And each such terraced event occurs with appropriate probability. A *set of probabilities of all the events terraced* generated by a given set of events is called the *probability distribution* of a given set of events, and a *set of values of all the terraced events* is called its *value distribution*[2].

Here we are interested in those aspects of a subject being, those *sets of events*, along with their *E-distributions* that give rise to its *danger* or its *safety*. It goes without saying that the *subject danger* and the *subject safety* is *relative categories* defined as to the *set of events* that each time selects the subject himself.

Conclusions of the subject of a danger or safety at the current juncture is always preceded by a conscious or unconscious *estimating* by subject to the *probability* and *value* of a causing or not causing damage to the subject by a coincidence, *estimating* by subject the *probability* and *value* of the terraced event. Thus, both the danger and the safety are not only *subject* and *relative*, but also *probabilistic* and *value-categories*.

⋆⋆⋆

It is appropriate to once again after [2] and [3] emphasize the important idea of revealing insight eventological *safety* and *insurance*:

- and safety, and insurance is always *subject safety* and *subject insurance*, as measured mathematically based on *eventological model of the subject* and of *subject methods* of accounting and control *probabilistic* and *value* eventological distribution of sets of events in the field of safety and insurance.

⋆⋆⋆

In [3] it has a method of eventological simulation of safety systems within eventological system analysis, the result of which is the eventological safety model of subjects at the enterprise.

1.2 Eventological system of safety

In [3] it presents mathematical models *safety*[3] that are based on the eventological system theory [1] and the latest developments in the field of eventology safety [2]. Systems of (fire) safety exist in every corner of the world, in every industry and in every enterprise. Current approaches to the development of (fire) safety systems [11, 12, 13] regardless of the specific country, sector and individual features of the system have a common event-based system basis. Eventological systems theory allows the development of a mathematical model which makes it possible not only to express in a unit *eventological safety system* and system basis, and the system shell, but also to explain and to measure the structure of the system event-related interactions between them.

To express, to explain and to measure eventologically safety systems as *systems of events* we must first agree that in eventological theory it means by a *system of events*, and, in particular, than the notion of a *system of events* must be different from still central to this theory the concept of the *set of events*.

In eventology mathematical models of safety systems are considered as a part of *eventological system theory (eventological system analysis)* [1]. Since our work [5], a *eventological system (system of events)* proposed a set of events, which is composed of *free set of events* (*system basis*), and events operationally related to events from the basis (*system shell*).

The main landmarks in the development of safety systems, we selected from a rather impressive list of two works. The one [12] can rightly be considered the most famous domestic achievement in the field of fire safety, and the other [13] — exemplary performance of an international project of safety system.

The first work [12] allowed a useful comparative analysis. The second [13], in which the concepts of preventive and reactive *barriers*, prompted by the thought put into the eventological system safety analysis new concepts and terms: events that are related to the activities of providing safety, called *barrier event*, and the eventological model of a set of barrier events — the

[2]The *probability and value distributions* of events together determine the Gibbs characterization of *eventological distribution (E-distribution)* of the set of events.

[3]including *fire* safety systems.

total barrier, which, together with the *total subject* and *total object* is one of the three main *event-figurants* in the *eventological model of safety system of subjects at the enterprise* proposed.

2 Glossary of terms and problems of the applicable eventology of safety

1. **Gibbs model** of eventological system of safety is an eventological model describing the event-based behavior of three total figurants of safety: *the subject, barrier and the object*, and assessing the risk (the probability of a danger event) in the enterprise as a result of expert review of event state of enterprise safety, carried out within the *expert portfolio of I-signs.*

2. **Identification of regulatory parameters of Gibbs event model** — maximum, medium and minimum risk (the probability of a danger event) — for this enterprise together historical, expert and model statistics (see Section 4.3).

3. **"I-sign"** is a *identification sign of safety* of the enterprise, the values of which are assess by the expert and define execution/non-execution of regulatory safety requirements; synonym for **"I-event"**, *identification event of safety* of this enterprise, the occurrence of which characterizes the performance of the regulatory requirements for safety and is assessed by expert;

4. **"Portfolio of I-signs"** is a set of I-signs $\mathfrak{A}$, used in eventological safety model to assess the risk (probability) of the dangerous event in the field of safety.

5. **Figurant portfolio of "I-signs"** is one of the three subsets of I-signs that characterize each of the three figurants individually: *total subject, the total barrier and total object*, and used in the eventological safety model for risk (probability) assessment of a dangerous event in the enterprise for the appropriate figurants (**subject:** $\mathfrak{M}$**, barrier:** $\mathfrak{B}$**, object:** $\mathfrak{X}$).

6. **Internal figurant subportfolio of "I-signs"** is one of two subsets of I-signs that characterize the two-set state of each of the three figurants: *total subject, total barrier and total object*, and used in eventological safety model to assess the risk (probability) of a dangerous event in the enterprise for the appropriate figurant (**internal subject:** $\mathfrak{M}_1, \mathfrak{M}_2$**, internal barrier:** $\mathfrak{B}_1, \mathfrak{B}_2$**, internal object:** $\mathfrak{X}_1, \mathfrak{X}_2$).

7. **Mean probable portfolio of "I-signs"** is the portfolio *widehat*$\mathfrak{A}$, which approximates the portfolio of I-signs *frakA* in the mean probable, composed of mean probable I-signs, each of which approximates in the mean probable to one subportfolio of portfolio $\mathfrak{A}$ respectively.

8. **Expert portfolio of "I-signs"** is a set of I-signs $\mathfrak{A}^{(e)}$, selected from a total portfolio of I-signs $\mathfrak{A}$ and the proposed for expert review the safety of the enterprise; and similarly defined *expert figurant portfolios and internal subportfolios.*

9. **Minimum expert portfolio of "I-signs"** is an expert portfolio in which each I-sign belongs to the *only* one of the six subportfolios and each of the six subportfolios contains the *only* one I-sign.

10. **Weighted minimum expert portfolio of "I-signs"** is an expert portfolio in which each I-sign belongs to the *only* one of the six subportfolios, and each of the six subportfolios contains *not less than one* I-sign.

11. **Assessment of portfolio weights of I-sign** (based on statistical surveys of experts and based on the *Gibbs model*, from which the log-dependence of portfolio weight of I-sign of the probability of its value), which is characterized by its effect on the risk (probability) of a dangerous event among other I-signs of the portfolio (see Section 4.5).

12. **Assessment of information capacity of I-sign** in the portfolio (based on statistical surveys of experts and evaluation of information obtained during testing of its value), which characterizes the importance of expert review information value of this I-sign.

13. **Assessment of accuracy of the calculation of risk** (the probability of a dangerous event) in the enterprise and its dependence on the number of I-signs in the expert portfolio (see Section 4.6).

14. **The optimal expert portfolio of I-signs** for the enterprise is a portfolio of I-signs $\mathfrak{A}^{(e)}(\delta)$, provides a given degree of *accuracy* of risk assessment (the probability of a dangerous event) at the minimum cost of expert (see section 4.5).

3 An event hierarchy of eventological safety system in pictures

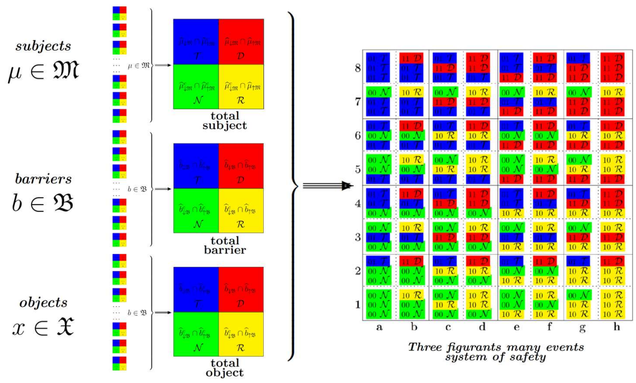

Fig. 1: **An event hierarchy** of eventological system of safety consists of three levels — *Left:* the set of subjects $\mathfrak{M}$, the set of barriers $\mathfrak{B}$ and the set of objects $\mathfrak{X}$; *Center:* three system figurants; *Right:* three figurants eventological system of safety.

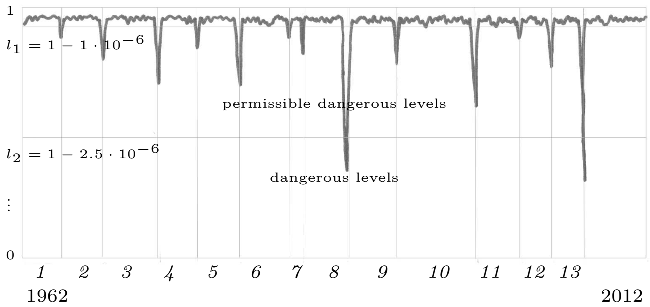

Fig. 2: **Trajectory of safety**. Schedule of probability of safety $0 < l < 1$ (vertical axis in the *nonlinear* scale) for an 50-year sequence of 13 hyper-scenario cycles of safety system. The frequency of fire dangerous events is 0.04 (2 events in 50 years). Safe levels: $l_1 < l < 1$, allowed dangerous levels: $l_2 < l < l_1$; dangerous levels of $0 < l < l_2$.

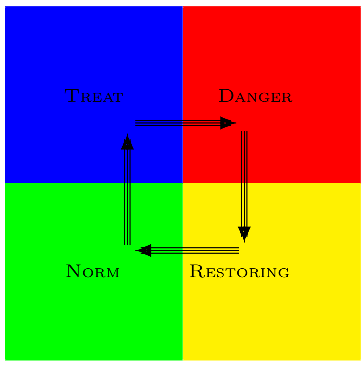

Fig. 3: **Many events cycle.** Venn diagram illustrating many events cycle of safety system, characterized by a succession of mean probable states of its total figurants: **...** → **Norm (N)** → **Threat (T)** → **Danger (D)** → **Restoring (R)** → **Norm (N)** → **...** .

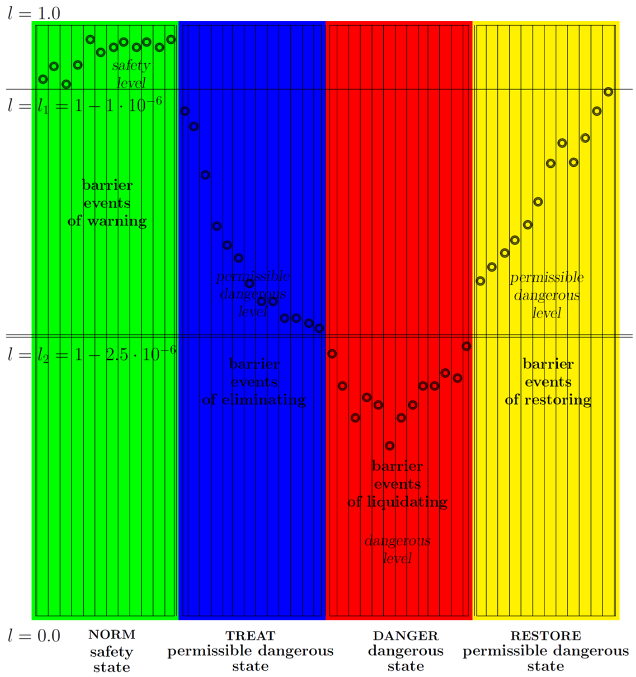

Fig. 4: **Many events cycle in time.** Eventological many events model of the main cycle *(Norm, Threat, Danger, Restore)* of safety system of subjects in the enterprise. Venn diagram of a succession (left to right) of confluence of *mean probable states* of system figurants: the total subjects, barriers and objects. Against the background of ***mean probable state*** of the total object, the total subject implemented ***barrier event***: **warning** (in safe state: NORM (N)), **eliminating** (in permissible dangerous state: TREAT (T)), **liquidating** (in dangerous state: DANGER (D)) and **restoring** (in permissible dangerous state: RESTORE (R)). The vertical axis — *safety* ($0 \leq l \leq 1$ in *nonlinear* scale) of the subjects, the horizontal axis is the time *sequence (left to right) of terraced events.*

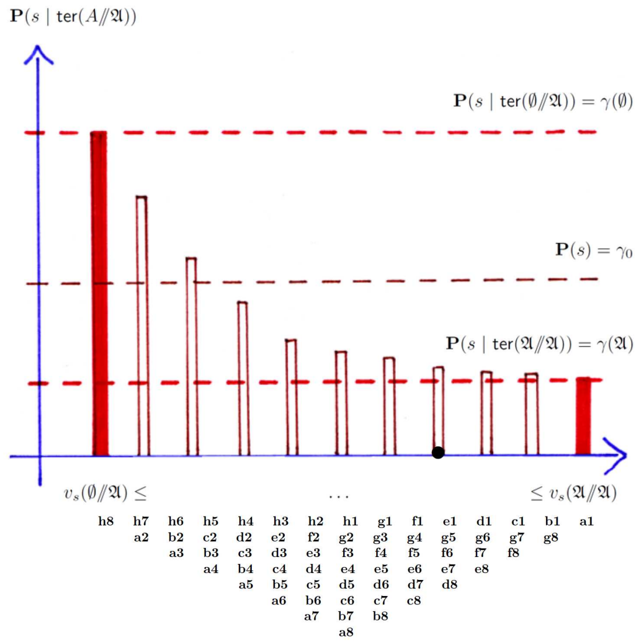

Fig. 6: **Model of Gibbs dependence of risk** $\mathbf{P}(s|\mathsf{ter}(A/\!/\mathfrak{A})) = \gamma(\emptyset)\exp\left(\frac{|A|_{v_s}}{|\mathfrak{A}|_{v_s}}\, ln\frac{\gamma(\mathfrak{A})}{\gamma(\emptyset)}\right)$ of dangerous event s on a confluence of circumstances of safety event $\mathsf{ter}(A/\!/\mathfrak{A})$ (combinations of values of I-signs of safety) for each figurants $\mathfrak{M}, \mathfrak{B}, \mathfrak{X}$ or for $\mathfrak{A}$, the entire enterprise. On Gibbs characterization of a set of I-events $\mathfrak{A}$ is based regulatory identification risk of danger event on the known standard values *worst:* $\gamma(\mathfrak{A}/\!/\mathfrak{A})$, *best:* $\gamma(\emptyset/\!/\mathfrak{A})$ and *average risk:* γ_0. The horizontal axis represents the portfolio weight (relative to the danger event *s*) $v_s(A/\!/\mathfrak{A}) = |A|_{v_s}, A \subseteq \mathfrak{A}$, of terraced I-events $\mathsf{ter}(A/\!/\mathfrak{A})$, arranged in ascending order. Under the horizontal axis in accordance with the values of the risk of a dangerous event has "chess notation" of 64 mean probable safety states.

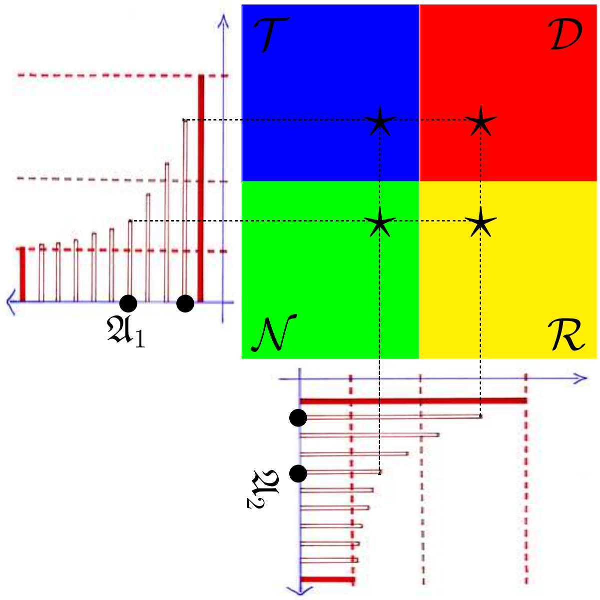

Fig. 5: **The identification of a state of one of the three figurants** $\mathfrak{A} = \mathfrak{A}_1 \cup \mathfrak{A}_2 = \mathfrak{M} = \mathfrak{M}_1 \cup \mathfrak{M}_2, \mathfrak{B} = \mathfrak{B}_1 \cup \mathfrak{B}_2$ and $\mathfrak{X} = \mathfrak{X}_1 \cup \mathfrak{X}_2$ of safety system of the enterprise based on expert review, which identifies ($\star$) mean probable state $\mathcal{T}$**reat**, $\mathcal{D}$**anger**, $\mathcal{R}$**estoring** or $\mathcal{N}$**orm** for the figurant $\mathfrak{A} = \mathfrak{A}_1 \cup \mathfrak{A}_2$.

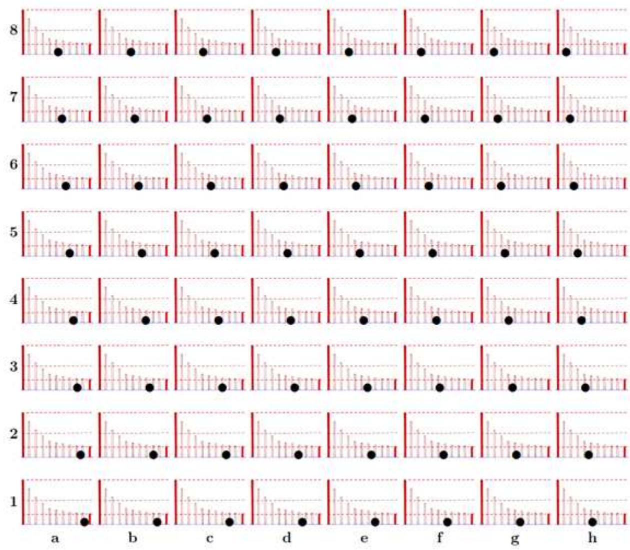

Fig. 7: **Gibbs dependence of risk** of a danger event on the value of the current mean probable state of safety of typical enterprise. Black dots on the horizontal axis shows the values of each of the 64 mean probable states of safety, which on the basis of Gibbs event model the conditional probability of a hazardous event is defined under the current state of safety. The safest state — **a1**, the least safe state — **h8**.

4 Four stages of the assessment of risk of a dangerous event by eventological safety system

The procedure for assessment of the current risk of a dangerous event by eventological safety system of the enterprise consists of four stages.

I *Preparation of the portfolio of I-signs (identification* *signs) of safety* optimal for the enterprise (see Section 4.1).

II *Expertise of I-signs* of optimally prepared the portfolio (see Section 4.2).

III *Identification of the current state of safety* on the results of this expertise of I-signs (see Section 4.3).

IV *The calculation of the risk of a dangerous event* at the enterprise for the current state of its safety, identified on the basis of expertise of the I-signs (see Section 4.4).

4.1 Preparation of the optimal portfolio of I-signs

Preparation of the portfolio of I-signs must meet two criteria of optimality:

1. Portfolio of I-signs of safety should provide the minimum permissible expert cost of checking the I-signs (see Section 4.5);
2. The accuracy of risk assessment of dangerous events on the basis of the portfolio of I-signs should be no worse than a specified level (see Section 4.6).

Preparation of the optimal portfolio I-signs is a solution of eventological optimization problem, which optimizes the cost of expert test-portfolio of I-signs that provide a given accuracy of the risk assessment of a dangerous event (see Section 4.6), where under the expert optimization of costs means the search for optimal volume, structure (see section 5) and the information capacity of the portfolio of I-signs (see section 4.5).

4.2 Expertise of I-signs

Expertise of I-signs of the portfolio optimally prepared is an expert assessment of the binary values of I-signs: present or absent, according to experts, this I-sign in the characterization of the current state of enterprise safety.

4.3 Identification of the current state of safety

The results of the expertise of I-signs of optimally prepared portfolio are the initial data for the identification of the current state of safety of enterprise. By the same standard algorithm [3, 4] based on the Gibbs event model (4.4.1) for $\mathfrak{A} = \mathfrak{M}, \mathfrak{B}$, or $\mathfrak{X}$, the identification is carried out of the current *mean probable state* each of the three figurants in the safety system (see Fig. 5 in Section 3): *the total subject* $\mathfrak{M}$*, the total barrier* $\mathfrak{B}$ *and the total object* $\mathfrak{X}$, thereby identifying the current *mean probable state* of safety system (see . Fig. 1 in Section 3). Identification of the current state of the system is based on the same Gibbs event model (4.4.1) for $\mathfrak{A} = \mathfrak{M} \cup \mathfrak{B} \cup \mathfrak{X}$.

4.4 Calculation of the risk of a dangerous event

On the basis of the Gibbs event model [3, 4] it is offered to calculate the risk of a dangerous event s at the enterprise under the current state of its safety $\mathsf{ter}(A /\!\!/ \mathfrak{A})$ using the following formula for conditional probability:

$$\mathbf{P}(s|\mathsf{ter}(A /\!\!/ \mathfrak{A})) = \gamma(\emptyset) \exp\left(\frac{|A|_{v_s}}{|\mathfrak{A}|_{v_s}} \ln \frac{\gamma(\mathfrak{A})}{\gamma(\emptyset)}\right), \quad (4.4.1)$$

where $\gamma(\emptyset)$ is the worst risk, $\gamma(\mathfrak{A})$ is the best risk, $\gamma_0 = \mathbf{P}(s)$ is the average risk of dangerous event (see Fig. 6 in Section 3).

4.5 Optimizing the expert costs for expert review of portfolio of I-signs

To solve the problem of optimizing the costs of expert for checking the portfolio of I-signs it is required the notions of *a portfolio weight* and *an information capacity of the I-signs.*

The portfolio weight $w_a = \mathbf{V}(a)$ *of I-sign/I-event* $a \in \mathfrak{A}$ is based on the Gibbs model which connects it with the probability of $p_a = \mathbf{P}(a)$ of occurrence of the I-event $a \in \mathfrak{A}$ by known formula [1]

$$p_a = \frac{1}{\mathcal{Z}} \exp\{\alpha\, w_a\}, \quad (4.5.1)$$

where α and $\mathcal{Z}$ are Gibbs model parameters of portfolio of I-signs.

The formula (4.5.1) can solve two mutually inverse probability problems:

- from known portfolio weight w_a of I-event $a \in \mathfrak{A}$ to seek the probability p_a;
- from known probability p_a of I-event $a \in \mathfrak{A}$ to seek the its portfolio weight

$$w_a = \frac{1}{\alpha} \ln(p_a \mathcal{Z}), \quad (4.5.1')$$

as well as the control problems for the risk of a dangerous event under various restrictions on expert costs [9, 10].

The information capacity of I-sign/I-event is measured by entropy of I-event $a \in \mathfrak{A}$ by the known formula [1] (see Fig. 8)

$$\mathcal{I}_a = -p_a \ln p_a - (1 - p_a) \ln(1 - p_a), \quad (4.5.2)$$

where $p_a = \mathbf{P}(a)$ is the probability of I-event $a \in \mathfrak{A}$.

The interpretation of this information specifications of I-event lies in the fact that if the probability of I-event is close to 0 or 1, the expert review of its occurrence provides little additional information and its inclusion in the expert portfolio is not too justified. The criteria for selection of I-sign $a \in \mathfrak{A}$ of the portfolio $\mathfrak{A}$ in *optimal expert portfolio*

$$\mathfrak{A}^{(e)}(\delta) = \{a \in \mathfrak{A} : \mathcal{I}_a \geq \delta\} \subseteq \mathfrak{A}, \quad (4.5.3)$$

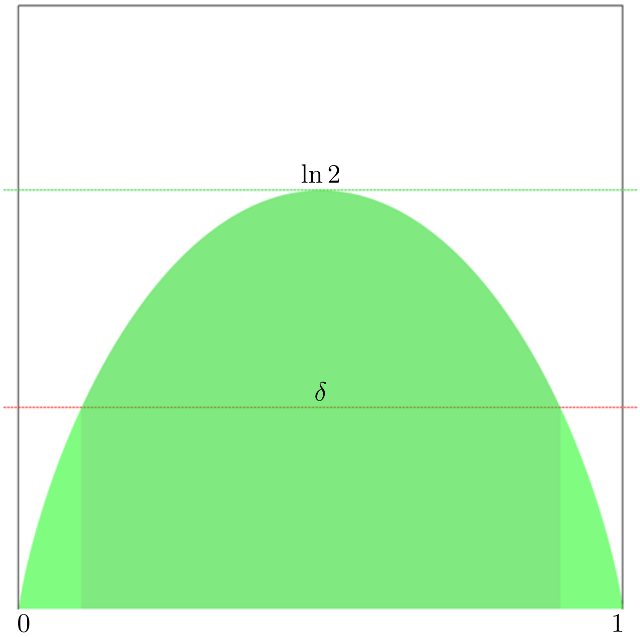

Fig. 8: On the unit square $[0,1]^2$ hypograph shown (green) of the information capacity $\mathcal{I}_a$ of I-sign a, depending on the probabilities p_a (horizontal axis) (4.5 .2), used for the selection of the best expertise in the portfolio of the I-signs, the probability of which is not less than the threshold δ.

is a significant amount of its information capacity $\mathcal{I}_a$ surpassing the threshold $\delta \in [0, \ln 2]$ which depends on the desired accuracy of the risk assessment of a dangerous event.

4.6 Optimizing the accuracy of assessment of the risk of a dangerous event

Error ε of the assess $\widehat{P}(s)$ of the risk $\mathbf{P}(s|\mathsf{ter}(A/\!\!/\mathfrak{A}))$ of dangerous event s based on the selected expert portfolio $\mathfrak{A}^{(e)}(\delta)$ can be computed using the formula:

$$\varepsilon = t_{(1-\alpha)/2,N-1}\frac{\sigma}{\sqrt{N}},$$

where $t_{(1-\alpha)/2,N-1}$ is the $(1-\alpha)/2$-quantile of the Student t-distribution with $N-1$ degrees of freedom, σ is a standard deviation, α is the required level of confidence usually taken equal 0.95, and $N = |\mathfrak{A}^{(e)}(\delta)|$ is the power of expert portfolio, i.e. amount of I-signs including in $\mathfrak{A}^{(e)}(\delta)$. Thus the error ε, which is the smaller, more square root of its power N, determines the confidence interval

$$\widehat{P}(s) - \varepsilon \leq \mathbf{P}(s|\mathsf{ter}(A/\!\!/\mathfrak{A})) \leq \widehat{P}(s) + \varepsilon,$$

where the value of risk of a dangerous event falls with the probability which is not less than α.

In addition to the power of expert portfolio N, the error ε of risk assessment greatly depends also on how the relationship between the I-signs characterized by the portfolio of selected I-signs. To control interdependence between I-signs in the portfolio may be, controlling its probability-event structure. Control principles of probability-event structure of the expert portfolio that lead to a reduction of error set out in section 5.

5 Help: *eventological model of expert portfolio of I-signs of safety*

The key to the applicability of eventological approach in safety is the eventological model of the structure of expert answers to a set of normative questions about the safety of the enterprise, in other words, the structure of *expert portfolio of identifying signs/events (I-signs/I-events) of enterprise safety*[4].

Such an event-probability structure of *I-signs of safety* should be organized optimally so that at minimum expert cost to provide the required accuracy of risk assessment (probability) of a dangerous event. In theory, it is clear that a large body of regulatory questions is due to the greater accuracy of risk assessment. However, with the increase of the totality of questions, first, rising costs of obtaining expert responses, and secondly, the information capacity of each answer added decreases. The proposed optimally organized structure of *expert portfolio of I-signs* solves this dilemma by providing the required accuracy by the minimum cost.

5.1 Eventological model of the portfolio of I-signs

Eventological safety model proposed in [2, 3, 4, 5, 6, 7, 8], is an event-probability model of the safety enterprise system, which is formed by event-driven reaction of three system total figurants, each of whom is responsible for the event-behavior of the corresponding set of: $\mathfrak{M}$ — *subjects*, $\mathfrak{B}$ — *barriers* and $\mathfrak{X}$ — *objects* of the enterprise, joint event-state of which form the safety state of the enterprise as a whole.

Eventological risk (probability) of a dangerous event at the enterprise depends on the event-state in which there is an enterprise safety. This event-state is characterized by portfolio of I-signs of safety of this enterprise, which is usually a set of answers to the specially selected regulatory questions. The composition of the portfolio of I-signs and organization structure of these I-signs in the portfolio largely determine the accuracy of the expert assessment of risk and the amount of the cost of the expertise of state of enterprise safety.

The general structure of the portfolio of I-signs is defined by the hierarchical structure three-figurants eventological safety model, where each of the three total figurants has its own two-set-structure. This hierarchical

[4]The definitions of the basic concepts and concise formulations of the problems *(usually highlighted in italics)* associated with the optimal choice of the expert portfolio of I-signs of enterprise safety listed in the reference section 2 on page 106.

structure is formed by three *figurant portfolios I-signs*

$$\mathfrak{M},\ \mathfrak{B},\ \mathfrak{X},$$

each of which is formed by the union[5] of two *inner figurant subportfolios of I-signs*[6]:

$$\mathfrak{M} = \mathfrak{M}_1 \cup \mathfrak{M}_2,\ \ \mathfrak{B} = \mathfrak{B}_1 \cup \mathfrak{B}_2,\ \ \mathfrak{X} = \mathfrak{X}_1 \cup \mathfrak{X}_2. \quad (5.1.1)$$

As a result, the structure of *portfolio of I-signs* of enterprise safety is characterized by the totality

$$\mathfrak{A} = \mathfrak{M}_1 \cup \mathfrak{M}_2 \cup \mathfrak{B}_1 \cup \mathfrak{B}_2 \cup \mathfrak{X}_1 \cup \mathfrak{X}_2, \quad (5.1.2)$$

which is formed by the union[6] of six *figurant subportfolios of I-signs.*

The problem of choosing the optimal structure of the expert portfolio is to choose six *figurant expert subportfolios of I-signs* (5.1.2), forming a general *expert portfolio of I-signs of the enterprise* $\mathfrak{A}^{(e)} \subseteq \mathfrak{A}$, which provides the required accuracy of the risk assessment by minimal expert costs.

5.2 Full expert portfolio of I-signs

The Table 1 illustrates the minimum *full expert portfolio of I-signs*

$$\mathfrak{A} = \mathfrak{M}_1 \cup \mathfrak{M}_2 \cup \mathfrak{B}_1 \cup \mathfrak{B}_2 \cup \mathfrak{X}_1 \cup \mathfrak{X}_2 \subset \mathcal{A}, \quad (5.2.1)$$

compiled by combining six subportfolios, each of which is defined by the relevant *subset of I-events*

$$\mathfrak{M}_1,\ \mathfrak{M}_2,\ \mathfrak{B}_1,\ \mathfrak{B}_2,\ \mathfrak{X}_1 \text{ и } \mathfrak{X}_2 \subset \mathcal{A}. \quad (5.2.2)$$

This full expert portfolio $frakA$ is an interesting event-based interpretation, perhaps the only correct only when using the concept of a kind of mean event-based characteristics of *subsets of I-events.* The role of the mean characteristics can be successfully implemented, for example, recently introduced to eventology the concept of the *mean probable event* [7, 8]. In this interpretation, the entire expert portfolio is approximated by a set of just six *mean probable I-events*

$$\widehat{\mathfrak{M}}_1,\ \widehat{\mathfrak{M}}_2,\ \widehat{\mathfrak{B}}_1,\ \widehat{\mathfrak{B}}_2,\ \widehat{\mathfrak{X}}_1 \text{ и } \widehat{\mathfrak{X}}_2 \in \mathcal{A}, \quad (5.2.3)$$

each of which approximates one of the six *subsets of I-events* (5.2.2), which, for example, for *subset of I-events* $\mathfrak{M}_1 \subset \mathcal{A}$ is interpreted as follows:

$$\widehat{\mathfrak{M}}_1 = \mathcal{E}(\mu/\mathfrak{M}_1) = \widehat{\mu}_{\mathfrak{M}_1} \in \mathcal{A}.$$

[5]Not necessarily disjoint.

[6]Each pair of inner figurant subportfolios of I-signs is required mainly in order to assess the condition of the 4 states of the safety cycle (norm, threat, danger, restore) is one of three figurants involved and, consequently, in which condition of 64 is the whole safety system of the enterprise. In addition, inner figurant subportfolios of I-signs can be used to estimate the *private risks* of dangerous events for each figurant involved in isolation, or for each of a pair of sides[7] of the figurant separately.

$\mathfrak{A} \overset{mp}{\sim} \widehat{\mathfrak{A}}$	$\widehat{\mathfrak{M}}_1$	$\widehat{\mathfrak{M}}_2$	$\widehat{\mathfrak{B}}_1$	$\widehat{\mathfrak{B}}_2$	$\widehat{\mathfrak{X}}_1$	$\widehat{\mathfrak{X}}_2$
ter$_{--\mathrm{T}}$	○	○	○	○	○	●
ter$_{--\mathrm{R}}$	○	○	○	○	●	○
ter$_{--\mathrm{N}}$	○	○	○	○	●	●
ter$_{-\mathrm{T}-}$	○	○	○	●	○	○
ter$_{-\mathrm{TT}}$	○	○	○	●	○	●
ter$_{-\mathrm{TR}}$	○	○	○	●	●	○
ter$_{-\mathrm{TN}}$	○	○	○	●	●	●
ter$_{-\mathrm{R}-}$	○	○	●	○	○	○
ter$_{-\mathrm{RT}}$	○	○	●	○	○	●
ter$_{-\mathrm{RR}}$	○	○	●	○	●	○
ter$_{-\mathrm{RN}}$	○	○	●	○	●	●
ter$_{-\mathrm{N}-}$	○	○	●	●	○	○
ter$_{-\mathrm{NT}}$	○	○	●	●	○	●
ter$_{-\mathrm{NR}}$	○	○	●	●	●	○
ter$_{-\mathrm{NN}}$	○	○	●	●	●	●
ter$_{\mathrm{T}--}$	○	●	○	○	○	○
ter$_{\mathrm{T}-\mathrm{T}}$	○	●	○	○	○	●
ter$_{\mathrm{T}-\mathrm{R}}$	○	●	○	○	●	○
ter$_{\mathrm{T}-\mathrm{N}}$	○	●	○	○	●	●
ter$_{\mathrm{TT}-}$	○	●	○	●	○	○
ter$_{\mathrm{TTT}}$	○	●	○	●	○	●
ter$_{\mathrm{TTR}}$	○	●	○	●	●	○
ter$_{\mathrm{TTN}}$	○	●	○	●	●	●
ter$_{\mathrm{TR}-}$	○	●	●	○	○	○
ter$_{\mathrm{TRT}}$	○	●	●	○	○	●
ter$_{\mathrm{TRR}}$	○	●	●	○	●	○
ter$_{\mathrm{TRH}}$	○	●	●	○	●	●
ter$_{\mathrm{TN}-}$	○	●	●	●	○	○
ter$_{\mathrm{TNY}}$	○	●	●	●	○	●
ter$_{\mathrm{TNR}}$	○	●	●	●	●	○
ter$_{\mathrm{TNN}}$	○	●	●	●	●	●
ter$_{\mathrm{R}--}$	●	○	○	○	○	○
ter$_{\mathrm{R}-\mathrm{T}}$	●	○	○	○	○	●
ter$_{\mathrm{R}-\mathrm{R}}$	●	○	○	○	●	○
ter$_{\mathrm{R}-\mathrm{N}}$	●	○	○	○	●	●
ter$_{\mathrm{RT}-}$	●	○	○	●	○	○
ter$_{\mathrm{RTT}}$	●	○	○	●	○	●
ter$_{\mathrm{RTR}}$	●	○	○	●	●	○
ter$_{\mathrm{RTN}}$	●	○	○	●	●	●
ter$_{\mathrm{RR}-}$	●	○	●	○	○	○
ter$_{\mathrm{RRT}}$	●	○	●	○	○	●
ter$_{\mathrm{RRR}}$	●	○	●	○	●	○
ter$_{\mathrm{RRN}}$	●	○	●	○	●	●
ter$_{\mathrm{RN}-}$	●	○	●	●	○	○
ter$_{\mathrm{RNT}}$	●	○	●	●	○	●
ter$_{\mathrm{RNR}}$	●	○	●	●	●	○
ter$_{\mathrm{RNN}}$	●	○	●	●	●	●
ter$_{\mathrm{N}--}$	●	●	○	○	○	○
ter$_{\mathrm{N}-\mathrm{Y}}$	●	●	○	○	○	●
ter$_{\mathrm{N}-\mathrm{R}}$	●	●	○	○	●	○
ter$_{\mathrm{N}-\mathrm{H}}$	●	●	○	○	●	●
ter$_{\mathrm{NT}-}$	●	●	○	●	○	○
ter$_{\mathrm{NTT}}$	●	●	○	●	○	●
ter$_{\mathrm{NTR}}$	●	●	○	●	●	○
ter$_{\mathrm{NTN}}$	●	●	○	●	●	●
ter$_{\mathrm{NR}-}$	●	●	●	○	○	○
ter$_{\mathrm{NRT}}$	●	●	●	○	○	●
ter$_{\mathrm{NRR}}$	●	●	●	○	●	○
ter$_{\mathrm{NRN}}$	●	●	●	○	●	●
ter$_{\mathrm{NN}-}$	●	●	●	●	○	○
ter$_{\mathrm{NNT}}$	●	●	●	●	○	●
ter$_{\mathrm{NNR}}$	●	●	●	●	●	○
ter$_{\mathrm{NNN}}$	●	●	●	●	●	●

Tab. 1: Six subportfolios of I-events: $\mathfrak{M}_1, \mathfrak{M}_2, \mathfrak{B}_1, \mathfrak{B}_2$ and $\mathfrak{X}_1, \mathfrak{X}_2$ forming a *minimum full* portfolio $\mathfrak{A} = \{\mathsf{ter}_{A /\!/ \widehat{\mathfrak{A}}}, A \subseteq \widehat{\mathfrak{A}}\}$ of all possible (for a portfolio of $\mathfrak{A}$) 63 *terraced I-events of the II kind* generated by six mean probable events (5.2 .3) of the sextet $\widehat{\mathfrak{A}}$, approximating $\mathfrak{A}$ in the mean probable: $\widehat{\mathfrak{A}} \overset{mp}{\sim} \mathfrak{A}$ (on abbreviation of NNN, ..., TTT, ..., RRR for subsets of $A \subseteq \widehat{\mathfrak{A}}$ see Remark 2 on page 112).

I will outline

$$\widehat{\mathfrak{A}} = \{\widehat{\mathfrak{M}}_1,\ \widehat{\mathfrak{M}}_2,\ \widehat{\mathfrak{B}}_1,\ \widehat{\mathfrak{B}}_2,\ \widehat{\mathfrak{X}}_1,\ \widehat{\mathfrak{X}}_2\} \subset \mathcal{A} \qquad (5.2.4)$$

the set made as of the elements of the six mean probable events (5.2.3), and *approximating in the mean probable* a whole expert portfolio $\mathfrak{A}$ and $A \subseteq \widehat{\mathfrak{A}}$ generated by $64 = 2^6$ *terraced I-events of the second kind*

$$\mathsf{ter}_{A/\!\!/\widehat{\mathfrak{A}}} = \bigcap_{a \in A} a \in \mathcal{A},$$

the probability of which form *probability distribution of* II-*type*

$$\left\{p_{A/\!\!/\widehat{\mathfrak{A}}}, A \subseteq \widehat{\mathfrak{A}}\right\}$$

of *sextet of I-events* $\widehat{\mathfrak{A}}$, where

$$p_{A/\!\!/\widehat{\mathfrak{A}}} = \mathbf{P}\left(\mathsf{ter}_{A/\!\!/\widehat{\mathfrak{A}}}\right).$$

Remark 1. *All* I-events from the full portfolio $\mathfrak{A}$ are *joint* and are generated by six *mean probable* I-events of the sextet $\widehat{\mathfrak{A}}$ as the different results of *terraced*[8] operation of the II-kind over sextet $\widehat{\mathfrak{A}}$, indexed by its different subsets[9] $A \subseteq \widehat{\mathfrak{A}}$.

Remark 2. In Table 1 abbreviation used to denote subsets of the sextet $A \subseteq \widehat{\mathfrak{A}}$ refers to the states of Norm (N), Threats (T), Restore (R) and Danger (D) of each of the three total figurants of safety system as follows. For any total figurant involved $\mathfrak{F} = \mathfrak{M}, \mathfrak{B}$, or $\mathfrak{X}$, approximated by doublet of mean probable events $\{\widehat{\mathfrak{F}}_1, \widehat{\mathfrak{F}}_2\}$, its empty subset $\emptyset \subseteq \{\widehat{\mathfrak{F}}_1, \widehat{\mathfrak{F}}_2\}$ corresponds to the *mean probable state* of Danger (D), the subset $\{\widehat{\mathfrak{F}}_1\}$ — *mean probable state* of Threat (T), the subset $\{\widehat{\mathfrak{F}}_2\}$ — *mean probable state* of Restore (R), and the subset $\{\widehat{\mathfrak{F}}_1, \widehat{\mathfrak{F}}_2\}$ — *mean probable state* of Norm (N). So, for example, the abbreviation "-TN" corresponds to *mean probable state* of safety when the *total subject* $\mathfrak{M}$ is in an arbitrary *mean probable state*, the *total barrier* $\mathfrak{B}$ is in the *mean probable state* of Threat (T), and the *total object* $\mathfrak{X}$ is in the *mean probable state* of Norm (N). Examples of the use of abbreviations are:

$$\mathsf{ter}_{\text{- - -}} = \mathsf{ter}_{\emptyset/\!\!/\widehat{\mathfrak{A}}},$$

$$\mathsf{ter}_{\text{-T-}} = \mathsf{ter}_{\{\widehat{\mathfrak{B}}_2\}/\!\!/\widehat{\mathfrak{A}}},$$

$$\mathsf{ter}_{\text{-TN}} = \mathsf{ter}_{\{\widehat{\mathfrak{B}}_2, \widehat{\mathfrak{X}}_1, \widehat{\mathfrak{X}}_2\}/\!\!/\widehat{\mathfrak{A}}},$$

$$\mathsf{ter}_{\text{-RN}} = \mathsf{ter}_{\{\widehat{\mathfrak{B}}_1, \widehat{\mathfrak{X}}_1, \widehat{\mathfrak{X}}_2\}/\!\!/\widehat{\mathfrak{A}}},$$

$$\mathsf{ter}_{\text{T-T}} = \mathsf{ter}_{\{\widehat{\mathfrak{M}}_2, \widehat{\mathfrak{X}}_2\}/\!\!/\widehat{\mathfrak{A}}},$$

$$\mathsf{ter}_{\text{NNN}} = \mathsf{ter}_{\widehat{\mathfrak{A}}/\!\!/\widehat{\mathfrak{A}}}.$$

[8] *Terraced* called such a set-theoretic operations on sets of events which resulted is the terraced event of one of six standard kinds [1], generated by this set of events.

[9] The results of terraced operations of II-kind on the events of $\widehat{\mathfrak{A}}$ are terraced events of II-kind $\mathsf{ter}(A/\!\!/\widehat{\mathfrak{A}}) = \bigcap_{a \in A} a \subseteq \Omega$, indexed by subsets of $A \subseteq \widehat{\mathfrak{A}}$.

5.3 Minimum expert portfolio of I-signs

Minimum expert portfolio of I-signs (see Tab. 2), though allowing to solve all the problems facing the eventological safety system, but does not guarantee the accuracy required for risk assessment.

I-signs	★★★	**Filling subportfolios**					
		$\widehat{\mathfrak{M}}$		$\widehat{\mathfrak{B}}$		$\widehat{\mathfrak{X}}$	
		$\widehat{\mathfrak{M}}_1$	$\widehat{\mathfrak{M}}_2$	$\widehat{\mathfrak{B}}_1$	$\widehat{\mathfrak{B}}_2$	$\widehat{\mathfrak{X}}_1$	$\widehat{\mathfrak{X}}_2$
D-opposition of the object?	$--T$	-	-	-	-	-	•
D-resistance of the object?	$--R$	-	-	-	-	•	-
D-opposition of the barrier?	$-T-$	-	-	-	•	-	-
D-resistance of the barrier?	$-R-$	-	-	•	-	-	-
D-opposition of the subject?	$T--$	-	•	-	-	-	-
D-resistance of the subject?	$R--$	•	-	-	-	-	-

Tab. 2: Example of filling figurant subportfolios of I-signs in the *minimum* expert portfolio, which consists of six I-signs with weights: 1,1,1,1,1,1 (top-down). In the column ★★★ subsets of the abbreviation (see Remark 2 on page 112), by which the corresponding I-event (terraced event of II-kind) are numbered.

5.4 Minimum weighted expert portfolio of I-signs

Minimum weighted expert portfolio of I-signs (see Tab. 3) also solves all the problems facing the safety system, can provide the required accuracy of the risk assessment by varying the weights of I-signs in the portfolio, but unable to consider interconnections between I-signs in the portfolio.

I-signs	★★★	**Filling subportfolios**					
		$\widehat{\mathfrak{M}}$		$\widehat{\mathfrak{B}}$		$\widehat{\mathfrak{X}}$	
		$\widehat{\mathfrak{M}}_1$	$\widehat{\mathfrak{M}}_2$	$\widehat{\mathfrak{B}}_1$	$\widehat{\mathfrak{B}}_2$	$\widehat{\mathfrak{X}}_1$	$\widehat{\mathfrak{X}}_2$
Amount of entrances-driveways in SS?	$--T$	-	-	-	-	-	•
Level of duty in SS?	$--T$	-	-	-	-	-	•
Dates of power plants in SS?	$--T$	-	-	-	-	-	•
Level of danger zones в SS?	$--T$	-	-	-	-	-	•
Systems of inner safety in SS?	$--T$	-	-	-	-	-	•
Potential source of danger in SS?	$--T$	-	-	-	-	-	•
Distance to SAR?	$--T$	-	-	-	-	-	•
Amount of primary-protect. means?	$--T$	-	-	-	-	-	•
Maintenance of inner-safety syst.?	$--T$	-	-	-	-	-	•
D-opposition of the object?	$--T$	-	-	-	-	-	•
Auto alarm system in SS?	$--T$	-	-	-	-	-	•
Life-support systems in SS?	$--T$	-	-	-	-	-	•
D-resistance of the object?	$--R$	-	-	-	-	•	-
Safety-guard on duty?	$--R$	-	-	-	-	•	-
Power plants in SS?	$--R$	-	-	-	-	•	-
Protection of energy communications?	$--R$	-	-	-	-	•	-
Carrying out dangerous work in SS?	$--R$	-	-	-	-	•	-
No danger zones?	$--R$	-	-	-	-	•	-
System of inner safety?	$--R$	-	-	-	-	•	-
No potential sources of danger?	$--R$	-	-	-	-	•	-
Service against the risk?	$--R$	-	-	-	-	•	-
Level of safety-guard on duty?	$--R$	-	-	-	-	•	-
Dangerous materials in SS?	$--R$	-	-	-	-	•	-
Kind of life-support systems in SS?	$--R$	-	-	-	-	•	-
Municipality - City?	$--R$	-	-	-	-	•	-
Temporary dangerous devices in SS?	$--R$	-	-	-	-	•	-
No transport. of danger.materials?	$--R$	-	-	-	-	•	-
No substances that may be D?	$--R$	-	-	-	-	•	-
D-opposition of the barrier?	$-T-$	-	-	-	•	-	-
Protection system is working?	$-T-$	-	-	-	•	-	-
Primary-protection means in SS?	$-T-$	-	-	-	•	-	-
Primary-protection means?	$-R-$	-	-	•	-	-	-
Protection system?	$-R-$	-	-	•	-	-	-
D-resistance of the barrier?	$-R-$	-	-	•	-	-	-
Protect.of energy-communicat. in SS?	$-R-$	-	-	•	-	-	-
Amount entrances in SS?	$-R-$	-	-	•	-	-	-
D-opposition of the subject?	$T--$	-	•	-	-	-	-
D-resistance of the subject?	$R--$	•	-	-	-	-	-

Tab. 3: Example of filling figurant subportfolios by I-signs in the *minimum weighted* expert portfolio, which consists of 38 I-signs corresponding to 6 terraced I-events of the II-kind with weights: 12,16,3,5,1,1 (top-down). In the column ★★★ the abbreviation of subsets shown (see Remark 2 on page 112), by which the corresponding I-event of II-kind are numbered. SS — safety standards, D — dangerous.

5.5 Arbitrary expert portfolio of I-signs

The arbitrary expert portfolio of I-signs (see Tab. 2), containing a minimum weighted portfolio, allows us to solve all the problems facing the eventological safety system that can provide the required accuracy of the risk assessment, and has the option to account for the relationship of I-signs in portfolio with the help of I-signs contained in more than one of the six subportfolios.

I-signs	★★★	**Filling subportfolios**					
		$\widehat{\mathfrak{M}}$		$\widehat{\mathfrak{B}}$		$\widehat{\mathfrak{X}}$	
		$\widehat{\mathfrak{M}}_1$	$\widehat{\mathfrak{M}}_2$	$\widehat{\mathfrak{B}}_1$	$\widehat{\mathfrak{B}}_2$	$\widehat{\mathfrak{X}}_1$	$\widehat{\mathfrak{X}}_2$
Amount of entrances-driveways in SS?	$--T$	-	-	-	-	-	●
Level of duty in SS?	$--T$	-	-	-	-	-	●
Dates of power plants in SS?	$--T$	-	-	-	-	-	●
Level of danger zones в SS?	$--T$	-	-	-	-	-	●
Systems of inner safety in SS?	$--T$	-	-	-	-	-	●
Potential source of danger in SS?	$--T$	-	-	-	-	-	●
Distance to SAR?	$--T$	-	-	-	-	-	●
Amount of primary-protect. means?	$--T$	-	-	-	-	-	●
Maintenance of inner-safety syst.?	$--T$	-	-	-	-	-	●
D-opposition of the object?	$--T$	-	-	-	-	-	●
Auto alarm system in SS?	$--T$	-	-	-	-	-	●
Life-support systems in SS?	$--T$	-	-	-	-	-	●
D-resistance of the object?	$--R$	-	-	-	-	●	-
Safety-guard on duty?	$--R$	-	-	-	-	●	-
Power plants in SS?	$--R$	-	-	-	-	●	-
Protection of energy communications?	$--R$	-	-	-	-	●	-
Carrying out dangerous work in SS?	$--R$	-	-	-	-	●	-
No danger zones?	$--R$	-	-	-	-	●	-
System of inner safety?	$--R$	-	-	-	-	●	-
No potential sources of danger?	$--R$	-	-	-	-	●	-
Service against the risk?	$--R$	-	-	-	-	●	-
Level of safety-guard on duty?	$--R$	-	-	-	-	●	-
Dangerous materials in SS?	$--R$	-	-	-	-	●	-
Kind of life-support systems in SS?	$--R$	-	-	-	-	●	-
Municipality - City?	$--R$	-	-	-	-	●	-
Temporary dangerous devices in SS?	$--R$	-	-	-	-	●	-
No transport. of danger.materials?	$--R$	-	-	-	-	●	-
No substances that may be D?	$--R$	-	-	-	-	●	-
D-opposition of the barrier?	$-T-$	-	-	-	●	-	-
Protection system is working?	$-T-$	-	-	-	●	-	-
Primary-protection means in SS?	$-T-$	-	-	-	●	-	-
Primary-protection means?	$-R-$	-	-	●	-	-	-
Protection system?	$-R-$	-	-	●	-	-	-
D-resistance of the barrier?	$-R-$	-	-	●	-	-	-
Protect.of energy-communicat. in SS?	$-R-$	-	-	●	-	-	-
Amount entrances in SS?	$-R-$	-	-	●	-	-	-
Anti dangerous obstacles?	$-RR$	-	-	●	-	●	-
Stairwells?	$-RR$	-	-	●	-	●	-
Materials of the object?	$-RR$	-	-	●	-	●	-
Emergency exits?	$-RR$	-	-	●	-	●	-
D-opposition of the subject?	$T--$	-	●	-	-	-	-
Personal safety?	$TT-$	-	●	-	●	-	-
Evacuation routes are OK?	$TT-$	-	●	-	●	-	-
Emergency exits are OK?	$TT-$	-	●	-	●	-	-
Evacuation systems are OK?	$TT-$	-	●	-	●	-	-
Groups of low mobility are trained?	$TT-$	-	●	-	●	-	-
Level of education in SS?	$TT-$	-	●	-	●	-	-
Level of evacuation drills in SS?	$TT-$	-	●	-	●	-	-
Instructions at workplace in SS?	$TT-$	-	●	-	●	-	-
Working with D-substances in SS?	$TT-$	-	●	-	●	-	-
Evac.routes are equipped with SS?	$TT-$	-	●	-	●	-	-
Sudden Danger is possible?	TTT	-	●	-	●	-	●
ETW training about safety?	$YR-$	-	●	●	-	-	-
ETW training on workplace safety?	$YR-$	-	●	●	-	-	-
D-resistance of the subject?	$R--$	●	-	-	-	-	-
Personal protection?	$RR-$	●	-	●	-	-	-
Evacuation routes?	$RR-$	●	-	●	-	-	-
Emergency entrances?	$RR-$	●	-	●	-	-	-
Evacuation systems?	$RR-$	●	-	●	-	-	-
No group of low mobility?	$RR-$	●	-	●	-	-	-
ETW education on safety?	$RR-$	●	-	●	-	-	-
ETW education on workplace safety?	$RR-$	●	-	●	-	-	-
Evacuation training?	$RR-$	●	-	●	-	-	-
Production discipline is enforced?	$RR-$	●	-	●	-	-	-
Workplace instructions?	$RR-$	●	-	●	-	-	-
Plans involving emergency services?	$RR-$	●	-	●	-	-	-
Automatic safety is present?	RRR	●	-	●	-	●	-
Social situation in village in SS?	RRR	●	-	●	-	●	-
Automatic safety is OK?	NNN	●	●	●	●	●	●

Tab. 4: Example of filling figurant subportfolios by I-signs in the *incomplete* expert portfolio, which contains a minimal portfolio (see Tab. 2) and the minimum weighted portfolio (see Tab. 3) consists of 69 I-signs corresponding 13 (instead possible 63) terraced I-events of II-kind with weights: 12,16,3,5,4,1,10,1, 2,1,11,2,1 (top-down). In the column ★★★ the abbreviation of the subsets shown (see Remark 2 on page 112), by which the corresponding I-event of II-kind are numbered. SS — safety standards, D — dangerous; ETW — engineers and technical workers.

To match all kinds of relationships between I-signs in the portfolio can be using the expert portfolio, including the *weighted full portfolio of I-signs of safety*, that includes I-signs corresponding to all possible terraced events of II-kind generated by the corresponding *mean probable expert portfolio.*

6 Totals

The proposed succinct statement of the results of eventological studies on the safety turned out, though far from exhaustive, but rewarding venture, during which opened stripped of unnecessary details, the overall design of eventological safety system that produced new ideas related to key safety procedure of applicable eventology — the preparation of optimal portfolio of I-signs. Detailed research and development of these eventological ideas will be discussed in subsequent papers.

Acknowledgements

Thank to *Arcady Novosyolov* for reliable resistance, which allowed sharpen almost axiomatic rigor to new theoretical ideas in eventology safety, and *Sergey Amelchugov* for constant advancement of new fire safety problems and their useful discussion, which invariably led to new approaches in eventological modeling and safety control.

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