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FLIGHT SAFETY AND HUMAN FACTOR: NEW APPROACH TO PREVENTION OF AVIATION INCIDENTS

This article includes results of new concepts analysis of flight safety

Nowadays ICAO pays more attention to development of new approaches to flight safety and prevention of aviation incidents caused by human factor (faults of the flight crew).

But practice of the latest crashes (Smolensk, Yaroslavl, Indonesia and others) has shown that although there is an attempt to apply new systems of flight safety control on basis of Safety Management Manual, but actually flight practice of crashes investigation is not changed qualitatively.

We represent new approach to prevention of aviation incidents that allows qualitatively change part of incidents caused by human factor and exclude incidents caused by it (fig 1-3).

The approach is analytical, generalizing with new means and new aviation concepts (table 1).

New approach to prevention of aviation incidents caused by human factor (faults of the flight crew) [1]

All nowadays methodologies of flight training and professional training are divided into actions, operations and moves [2].

To the psycho-physiological characteristics of aviation operators the increased requirements on endurance, reaction time, coordination of movements, high noise immunity are demanded. Future specialists must have a strong, balanced and moving nervous system. From a medical point of view they must be able for a work by the health state in their chosen specialty, and from the social – must have a highly developed responsibility for the timeliness and accuracy of their decisions and actions.

During all times the flight processes were the central aviation processes. And also they were preceded by the high negative phenomena and effects. But the main direction in developments in theory of flights safety is explaining of the reasons for the appearance of emergency situations caused by human factor guilt.

I stage

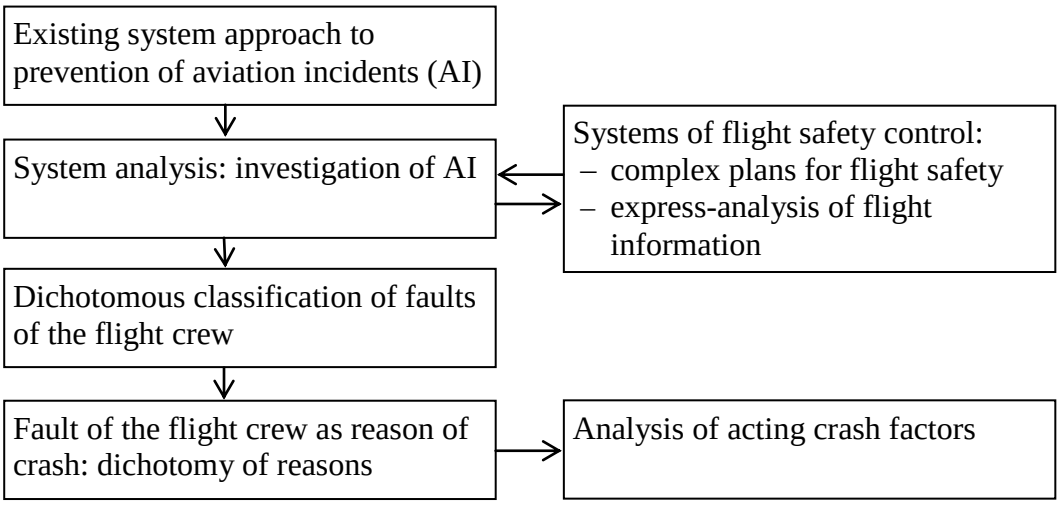

Fig. 1. New approach to prevention of aviation incidents caused by human factor (faults of the flight crew) - I stage.

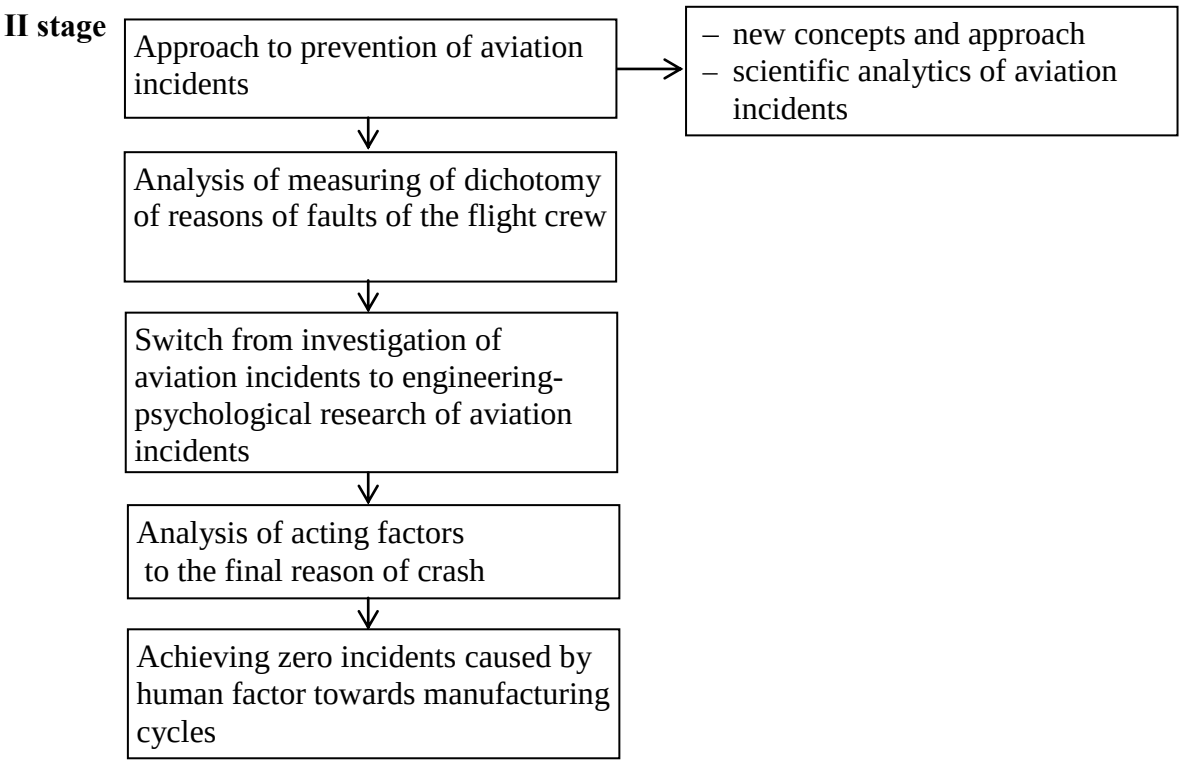

Fig. 2. New approach to prevention of aviation incidents caused by human factor (faults of the flight crew) - II stage.

Considering this question in own researches and publications [1-5], and also relying on statistical data found that about 70% of pilots do not oppose to the factorial loads (FL) (complex failures), which lead to negative consequences such as wrong actions of a pilot in extremely situations; disproportionate and sudden actions by all flight parameters; enter beyond the physiological possibilities. And as a result the pilots unknowledge of way to counteract to factorial loads can lead to flight events, especially at the difficult flight conditions.

At the action of factor loadings there is found a negative phenomenon of a dynamic stereotype amplifying (PDSA) [3-5]. To detection of which is possible by the comparing of the pilot dynamic stereotype (DS) (on the simulator) at the "flight" without failures with its DS under the action of complex failures. That is, if during the process of flight training to achieve the PDSA removal and elimination and to prepare crews to act in extreme situations where they are acted by FL, the human factor in aviation accidents may be decreased.

To increase the general level of safety it's necessary to review, analyze and systematize the ways to improve the pilots flight training and their indicators and criteria.

One of way to improve the pilots training effectiveness is the selection of operators by the criterion of counteraction to FL through elimination of PDSA.

To detect PDSA of a pilot it's necessary to compare his flights under the FL action (complex failures on simulators) and at their absence, at following PDSA elimination by showing of this phenomenon presence for its removal during the next flights. That's why the program for detection of negative PDSA in order to increase flight safety (FS) by HF is necessary.

For the successful operators training to FL counteraction it is necessary to understand the nature of the bilateral process of aircraft.

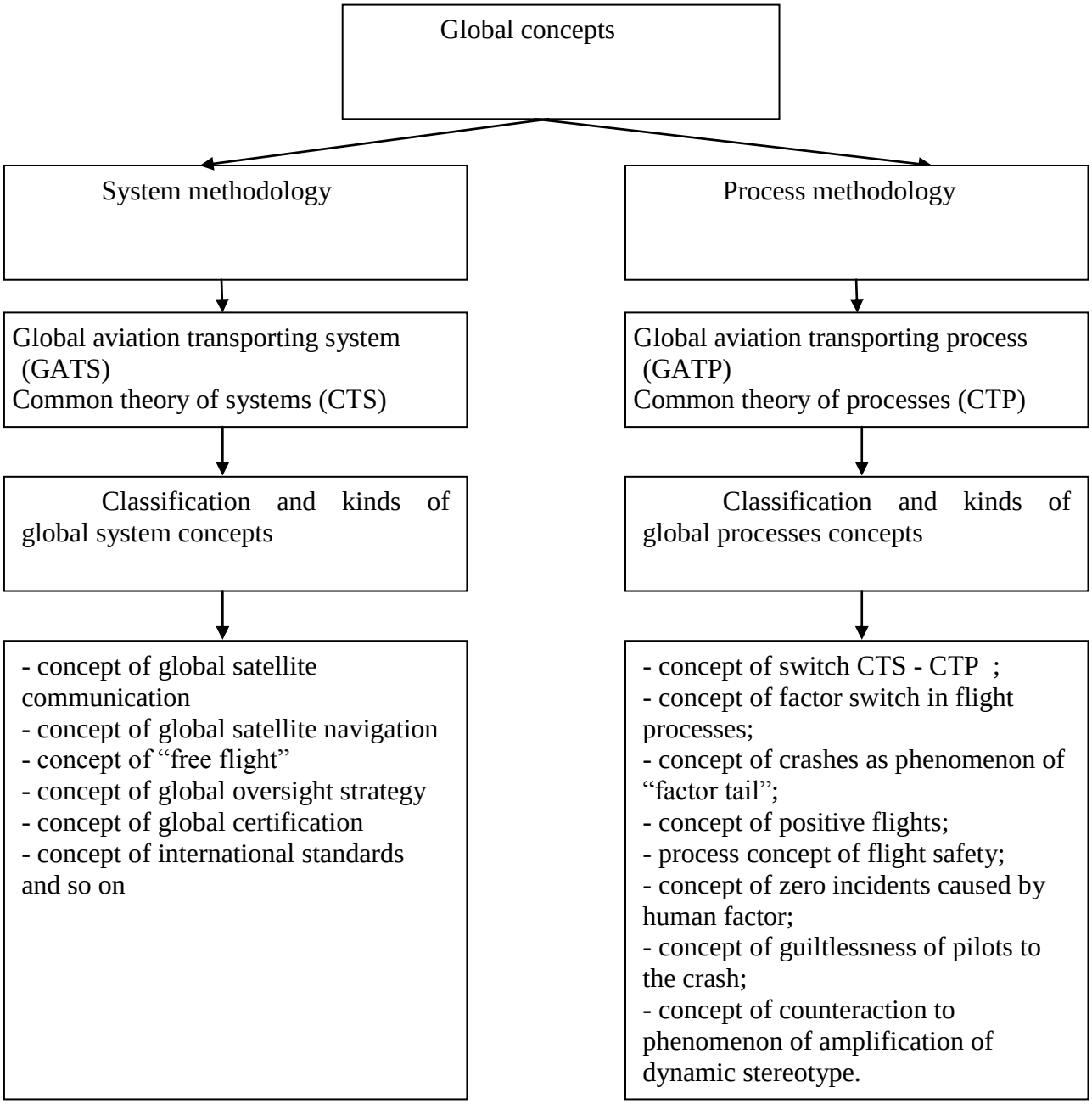

Fig.3. New global aviation concepts that are basis of new approach.

According to curves types, that fix the motor dynamic stereotype (DS) due to the flight parameters changes, under the action of FL and their absence it's possible to judge about the quality of piloting technology, and do not to identify the deviations from the tolerances. The DS can be divided on to favorable (flight handwriting) and not favorable in the case PDSA occurrence that in any case must be eliminated. However, even during the stage of DS formation, knowing its typical species, it's should be formed the favorable DS, although it doesn't in any case exclude the studying for elimination of the negative PDSA.

Counteraction to FL by the way of PDSA elimination does not mean that the operator must simply stop any motion by the control organs. During DS analysis we consider the final result of quality of piloting technique in real and training flights under the influence of environment (at the simulators by own desire the influence of environment can be excluded). The influence force of vertical air flows turbulence and the pilot skill can be defined, for example, by ailerons deflection (δ a) and by parameter of bank angle (γ) on the airplane [2-4].

Table.1

General characteristics of global concepts GATP in the process approach in 1998

№	Type of global concept	General characteristics of area of application
	Concept of switch CTS - CTP	It is necessary for taking into account a cyclic recurrence of scientific progress while switch from 20 to 21 century
	Concept of medius terminas of flights as processes	Centralization to statistics of processes
	Process concept of flight safety	Elimination of negative evaluation of flight safety in the end of 20 century in regions and aviation companies
	Concept of crashes as phenomenon of "factor tail"	Elimination of crashes not as event but as phenomenon by classification of Hohlov
	Concept of classification of positive flights	Taking into account of results (effects) of flights without remarks
	Process concept of flying automatic electronic complex	Representation of processes of new generation aircraft
	Concept of zero incidents by human factors	Eliminating of system reasons of crashes (75-90%) by crew actions to zero level
	Concept of guiltlessness of pilots for the crash	Elimination of fault of flying crew to crash and switch to constructive-technological concept of causality
	Concept of amplifying of dynamic stereotype of pilots	Stress decreasing of flying crew on basis of antistress training

Conclusions

1. On basis of developing Safety System Management Manual, which are old complex plans, with help of which, as 50 years practice showed, it is impossible to change negative results of crashes .

2. For positive qualitative changes in statistics of flight safety, new progressive methods generalizing existing approach of process analysis are needed

3. Applying of suggested approach can let reaching of zero index of incidents caused by human factor while technical cycles.

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