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### **Improving Pilot-Controller Communication**

*The article is devoted to the human factor in civil aviation. The attention is focused on the “pilot – air traffic controller” communication errors. Case studies and role plays are mentioned as the main methods of pilots and air traffic controllers training. The analysis of aircraft accidents and incidents is considered to be its essential part.*

The explosion of automation and the continuous improvement of aviation technology create the prerequisites for improving the level of flight safety. However, the reduction in the number of accidents and incidents due to technical malfunctions is accompanied by an aggravation of the human factor problem. In aviation, human error can have huge consequences. “Human or operator error has arguably been identified as the primary causal factor of accidents and incidents. Speaking of systems in general, about 60 to 80 per cent of accidents are attributed to operator error”. [1]

The number of accidents due to the lack of professional preparedness of air traffic controllers and, in particular, the inability to conduct reliable radio exchange on international flights in emergency situations for which standard phraseology is not provided, is growing.

According to the definition of the International Civil Aviation Organization [2], the task of Human Factor training is to prevent errors in radio exchange, that is to ensure error-free transmission of messages and their correct decoding. Ambiguous, misleading, inappropriate or poorly constructed communication, combined with expectancy, have been mentioned as elements of air accidents.

The Department of Flight Standards of the Civil Aviation Authority of Great Britain annually registers more than fifty cases, when the inability to conduct reliable radio communication becomes one of the causes of the incident [3]. There is a long list of accidents in which one of the causes was the problem of conducting radio interchange on the international air routes. At the same time, the analysis of aviation accidents proves that the main cause of them is not just pilots' and air traffic controllers' low level of English, but inability to apply existing knowledge, skills and abilities in a critical situation.

The research of the Institute of Aviation and Space Medicine have shown that, in critical situations, the level of the operator's neuro-emotional tension increases dramatically: 20% of operators cannot ascertain the situation, and therefore do not make decisions, 10% make wrong decisions, 22% – fall into a stupor and are inactive, 34% – perform unnecessary actions and just exacerbate the situation, etc. The need to conduct radio communication in a non-native language leads to an additional growth of neuro-emotional tension and inhibits the operator's basic professional functions.

With the annual growth in global air traffic and the passenger-carrying capacity of aircraft, the scale of fatal aircraft accidents is growing. And with the

continuous improvement of aviation technology, the inability to reliably control air traffic in extreme situations on the international air routes is increasingly becoming not a contributing factor but the main cause of aviation accidents. The victims are often passengers of spacious Boeing aircraft. In the two largest accidents in aviation history, 895 people died. In both cases, the language barrier was called one of the main causes of the tragedy.

Particular attention to the problem of ATC reliability in extreme situations on the international air routes began to be paid after the collision of Il 76 aircraft (Kazakhstan) and Boeing 747 (Saudi Airline) killed 312 people in 1996 in the sky over India.

Despite the fact that much attention is now being paid to this problem, it remains unsolved. According to ICAO specialists, the typical problems of radio communication are:

- erroneous interpretation of the transmitted messages;
- non-English speaking pilots' and air traffic controllers' insufficient level of the international aviation language of radio exchange, and using their native language that leads to a phenomenon called "code switching";
- misunderstanding because of the ambiguous messages;
- errors related to the peculiarities of the international aviation language of radio exchange and inability to use and recognize similar structures in non-standard radio exchange;
- the transposition of numbers, namely reproducing them in the wrong order;
- errors due to the peculiarities of pronunciation or intonation;
- feedback errors when the pilot confirms the ATC's instructions inaccurately, and the controller does not notice that; doubtful information is not specified;
- errors of auditory perception;
- difficulties caused by the medium of transmission (e.g. background noises or distortion of the information);
- failures due to interference between the rational and emotional levels of communication (e.g. arguments);
- physical problems in listening or speaking (e.g. impaired hearing or wearing of the oxygen mask);
- use of English among native and non-native speakers; and
- encoding/decoding/noise.
- violations in the use of standard phraseology [4, 5, 6, 7, 8, 9, 10, 11].

### **Conclusion**

The problem-based learning must be an essential part of the pilots and air traffic controllers training. The methodology should include analysis of aviation accidents, case studies and role plays. The best approach to assessing the students' knowledge must be role-playing games since they allow to evaluate the capacity to apply the acquired knowledge, skills and abilities in air traffic control in extreme situations and provide with the conditions close to the real professional activity.

Such a technique will help overcome the psychological barrier, reduce the psychophysiological expenditure for radio communication conducting in a non-native language and release the time for making appropriate decisions. In case of an emergency, it will ensure the ability to conduct reliable non-standard radio communication, as an activity that accompanies the main one.

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