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PLAYING WITH THE SAFETY DUE TO LACK OF RESOURCES

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Abstract: *This paper deals with one of the common issues of the flight safety organization: limited resources for Air Forces. Is it better to look forward for next days or for the next years? That is the question. The article shows how the safety has to be, which are the steps of flight safety in aviation history, and why the defense area from "Swiss cheese model" of J. Reason has to start from the top management of organization. The paper argues that a collective understanding of these issues is essential for those systems seeking to achieve an optimal safety culture to be able to maintain the requested level of capabilities, with minimum resources, in the actual worldwide context.*

Keywords: *safety culture, Air Force, resources, management, capabilities, training.*

1. INTRODUCTION

Flight safety. Two words. In fact it is a condition for airmen. Flight safety will never be just a task in aviation. It should be a way of life from the beginning until the end of "story" for each and any individual linked to aviation (pilots, air traffic controllers, maintenance personnel, managers...).

Its main goal is to prevent the loss of aviation resources.

Flight safety is the desired condition gained by organizations through their individuals in order to be able to forecast air operations risks and produce a positive attitude for safe use of the resources using the right procedures, services, skills and knowledge to reduce to a minimum level the risks to air operations.

Basically, it is a puzzle built by each member of an organization and everyone having their own personality, behavior, and temperament.

2. SAFETY CULTURE

Risks in aviation vary depending on the stage of aviation development. The history of progress in aviation safety can be divided into three eras [1].

Technical era - from the early 1900s until the late 1960s

First attempts to build, fly, and control an object heavier than the air had its tribute. In the beginnings, identified safety deficiencies were initially related to technical factors and technological failures due to the lack of knowledge. The focus of safety was on the investigation and improvement of technical factors. During the two World Wars, aviation was seen as a very effective tool in the battle field and also an important element of the transportation industry that was constantly growing. Technological improvements starting in the early 1950s, were the first step in decreasing the frequency of accidents and the flight safety process started to be upgraded.

Human Factors era - from the early 1970s until the mid-1990s

The 1970s improved technology and materials used in aircraft construction. Despite the progress in aviation, new flight safety threats started to show up after the introduction of many new revolutionary design solutions and the new theories led for researching human factors and issues including the man/machine interface. An example of these types of risks can be found in the causes of events connected with new aircraft automation, or in the increased maneuverability of combat aircraft resulting in frequent incidences of high G-loads which affect the pilot. Despite the investment of resources in error mitigation, human performance continued to be cited as a recurring factor in accidents. The application of the Human Factors science, tends to focus on the individual without fully considering the operational and organizational context. But individuals operate in a complex environment, which includes multiple factors having the potential to affect behavior.

Organizational era - from the mid-1990s to the present day

The research until the early 1990s put first place the human factor as an individual even if this is strongly related with other individuals from the organization. The theories that followed began to highlight that those individuals operate in a fully complex environment which includes multiple factors having the potential to affect behavior, life style, or even knowledge acquisition. As a result, the notion of “organizational accident” was introduced and since then it has gained widespread acceptance and use in many service domains including the aviation safety industry. Many of them focus on so-called “the cumulative act effects”. A new proactive approach to safety was introduced in aviation organizations based on routine collection. Analysis and diffusion of data using proactive and reactive methodologies to monitor known safety risks and to guide all levels of organizations to aim one safety environment.

SAFETY ORGANIZATION

An organization is known as a social entity, such as an institution or an association, which has a collective goal and is linked to an external environment. Members of an organization usually share a common vision, mission, values, and goals.

Members of an air organization have to be seen as a system that includes product and service providers. It is a complex system that requires an assessment of the human contribution to safety and an understanding of how human performance may be affected by its multiple and interrelated components.

Safety is a dynamic characteristic of the aviation system, whereby safety risks must be continuously mitigated in response to the social and technical request. Acceptability of safety performance is often influenced by domestic and international norms and culture. [2] “Being in a situation where the risks of an aircraft accident or air safety incident are reduced to a level as low as reasonably practicable” [3]

As long as safety risks are kept under an appropriate level of control, a system as open and dynamic as aviation can still be managed to maintain the appropriate balance between production and protection. [2]

So, as we see, all definitions of safety include risk management and a solid culture that is supposed to be able to maintain and focus on acceptable level of risk aimed by organization.

Culture is characterized by the beliefs, values, biases and their resultant behavior that are shared among the members of the organization.

Safety management is actually the understanding of these cultural components, and the interactions among them.

Linking the two definitions another concept is defined: “safety culture”.

AIR FORCE SAFETY CULTURE – SOMEWHERE IN THE WORLD

There is no system fully safe. “If you are convinced that your organization has a good safety culture, you are almost certainly mistaken...a safety culture is something that is striven for but rarely attained. The virtue – and the reward – lies in the struggle rather than the outcome” James Reason said.



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Is this organization safe? Does it have a proper "safety culture"? Is there something to improve? If yes, which can be the starting point?

Somewhere, time ago it was a country, NATO member, that had a vast history of aviation; their predecessors were the pioneer of the flight, inventors of the jet plane. Due to the limited resources, in last 20 years, its air power decrease so much and in our days the total number of hour of flight and training for entire fleet per one year is about at the same level where only one single air base was years ago. Despite of that it is still able to maintain, with a minimum number of forces, the Aerial Police for the nation and for NATO. It is still able to maintain minimum of capabilities for air lift. But for how long?! Its pilots who are doing these kinds of missions have an average of 40-45 years old. And now some questions come around. Who will be their replacements? What level of training do they have now? How many hours of flight and training do they need to be fully capable for the kinds of missions their aircraft where designed for? Is it able to respond to NATO request?

The wings men for tomorrow will be the actual 25-30 years old pilots, but the actual culture, from this Air Force organization, said that being young is not an advantage but contrary, it's quite inadequate (it is redundant to remind that the spike of combat pilots in World War II had an average of 25-30 years old), and even it will not be like this, the few resources that it has are used only to accomplish operational needs and to keep the actual level for CMR (Combat Mission Ready) pilots. With a minimum (unacceptable) hours of flight and training it is impossible to maintain a safety environment, and that not only for flying personnel but also for maintenance department, air traffic controllers, ground operations and all elements linked to aeronautical activities due to lack of practice,

absence of lessons learned, premature aging of planes, materials and systems used in aviation activities.

James Reason found that most of the accidents happened because of the weaknesses in all levels of the system, including the decision makers' level: organizational influences, working conditions, unsafe acts (errors and violations) and the (improper) defense layers. The system as a whole produces failures when the weakness barriers align, permitting to the latent condition trajectory (hazard) passes through the holes in all of the defenses leading to a failure [4].

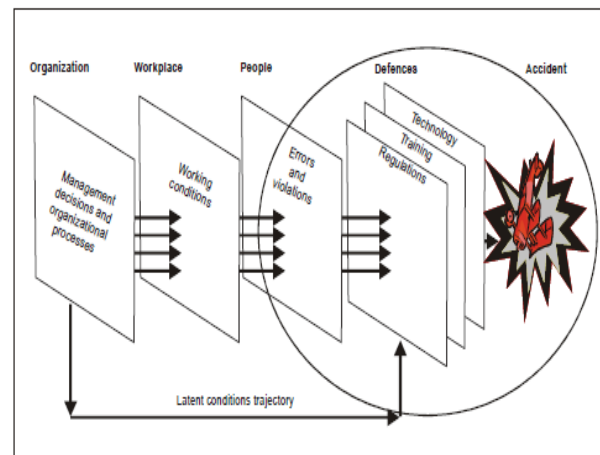


Fig. nr. 1 Swiss cheese model (ICAO)

Main target of this article is the organization by itself mainly focusing on the top level where the management decisions and organizational processes are making according to risk perception in order to reduce the possible accidents. A healthy safety culture relies on a high degree of trust and respect between personnel and management and must therefore be created and supported first at the senior management levels. As you see in the defense area the training and regulations are present but just for one single reason: to be upgraded and improved for a better product of entire members work. Often, regulations and

training are strongly related regarding the objectives, the requests of the actual national or international context and not finally, the necessary level of practice training. We all know that training costs money, but often simple calculations suggest that failing to be safe, or at least having incidents, costs more. Because of the strongly budgetary restrictions, the present training regulations have to be changed to be able to aim the main objectives. How can that be done?! Using the same people that have themselves the necessary skills, knowledge and training; grounding the others, making the youngest an inexperienced next victim. So, in that way, the Air Forces can maintain its priorities, its engagements and objectives. But for how long can it do that? There will be a hole in human resources management. When can be fill that gap and how? Nobody belongs forever to organization and when those who now are ready for mission will be retired, next generation (if there will still be one) will start to learn again without a proper training, by doing mistakes, teaching one each other. It makes no sense to remind that the actual laws will never give the opportunity to the ex-members to come back for teaching from their experience the remaining "future Air Force". Despite of that, more resources will be spent in a short period of time for getting the requested level of capabilities, not mentioning that during this time frame the air power level will be as lowest as it could be or it will not even exists. According to Reason, the elements of safety culture include: learning, informed, just, flexible and reporting culture. [5]



Fig. nr. 2 [6]

The most suggestive representation of Reason's definition is the fig. nr.2. According

to this figure, the mentioned organization risk perception is the same at all its management levels, but attitudes to safety and safety related behavior is completely understood on individual scale and pretty accurate at the tactical level of management. Speaking about that and the Swiss cheese model, in the defense area where regulations, training and technology of organization is supposed to close the existing holes, these will become larger and larger and the hazard passes easier through all of these defending walls and leads to a failure.

Does it need that? No! A real country air power should always be ready to respond to its duties. It has to be prepared at any times, in any weather conditions even if the attack threat is minimum; it exists. "If we lose the war in the air we lose the war and we lose it quickly" [7] . Don't wait to learn from your mistakes, it is better to learn from the others.

The elements of safety culture have to be the guidance within every organization.

a) learning culture – for implementing the major reforms an organization have to have the competence and the willingness to learn from mistakes, so named lessons learned. Flight debriefings, reports even safety issues between the members must be visible at any level.

b) informed culture – if the management understands the hazards and the risks of its members, (and this is the best way), they will be encouraged to identify the safety threat streams and to seek real solutions for overcome them.

c) just culture – people are able to define and clearly understand where must be the line between acceptable and unacceptable behavior. Also there has to be a better understanding that the punishment is not always a solution to improve the safety environment. All is related to circumstances (no blame culture).

d) flexible culture – the ability to reconfigure and take different forms but is characterized as shifting from the conventional hierarchical mode to a flatter professional structure.

e) reporting culture – sharing safety information. This element depend on how the



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organization is able to handle the report, blame and punishment. Having a strong reporting culture is one of the success keys.

It is well known why something have to be changed regarding that organization. Because it has to be efficient for maintaining its capabilities and to increase the safety status. That can only be done by understanding the short chart of safety culture. What should be changed?

One underlying reason why cultural change often fails to succeed is that the new situation is unknown to the participants. If this is added to existing beliefs, such as the belief that the current situation is as good as it gets, then there is little real need to change and failure is almost certain. If these failures are at the level of the workforce, then strong management commitment may save the day. If the problems lie with management, then there is little hope because they will enforce the old situation, which feels most comfortable, on the most proactive of workforces [8]

3. CONCLUSION

"To invent an airplane is nothing. To build one is something. To fly is everything"[9].

Starting from that statement and from the airplane history it's easy to remark and to understand the three steps of the progress in aviation safety. Beside the technical and human factor the most complex one is organization with all its concepts, behavior and cultural values. The first maneuver for improving the safety culture is the quality of communication (reports, briefings, requests, human needs...) inside the company between management and the rest of the members. For a better understanding of communication every part of the command chain has to be familiar with the conceptual environment regarding cultural background, people

behavior, needs and last but not least the top management level has to be filled with airmen. It is easy to say that the most safety stage of Air Force is not to fly. If somebody we'll think like this he will have the most safest air organization in the world, but this should not be the only goal. The leaders must try to maintain the balance between safety and air power. Take a look around the actual political status. Try to act like NATO not only be a part of NATO.

REFERENCES

- [1,2] International Civil Aeronautical Organization, *Safety Management Manual Doc. 9859 AN/474* Third Edition – 2012 p. 12, 13.
- [3] Airservices Australia 2001, *AA-Safe-001*, p. 1.
- [4] Reason, James T, *Human Error*, New York Cambridge University Press 1990, p. 203
- [5] James Reason, *Safety paradoxes and safety culture*, Department of Psychology, University of Manchester, U.K. *Injury Control & Safety promotion – 2000*, p. 12.
- [6] Civil Air Navigation Services Organization, *Safety culture; definition and enhancement process*, p. 3.
- [7] Bernard Law Montgomery.
- [8] Patrick Hudson, *Safety Culture – Theory and Practice*, Center for Safety Science Universiteit Leiden p. 11 Paper presented at the RTO HFM Workshop on "The Human Factor in System Reliability – Is Human Performance Predictable?", held in Siena, Italy, 1-2 December 1999, and published in RTO MP-032.)
- [9] Otto Lilienthal (1848-1896), early inventor of mono-plane and bi-plane gliders .
 1. A-GA-135-001/AA-01, *Flight safety for the Canadian Forces*, (2013).

2. European Organization for Safety of Air Navigation – *Revisiting the “Swiss cheese” model of accidents*, EEC Note 13/06, (2006).
3. IFATCA, *A just culture in safety reporting*, paper presented at the 43rd annual Conference, Hong Kong, China MAR (2004)
4. Panagopoulou, I., *Flight Safety in Combat Training: A revised pilot’s error framework for EU Air Forces*, 5th Biennial Hellenic Observatory PhD Symposium, LSE, (2-3 Jun 2011).
5. Reason, J., *“Human error”*. New York: Cambridge University Press, (1990).
6. Reason J., *Managing the risk of organizational accidents*, Burlington: Ashgate Publishing Company, (2000).
7. Roughton, E. J., Mercurio, J. J., *Developing an effective safety culture: a leadership approach*, Woburn: Butterworth-Heinemann, (2002).