

Transition Towards Performance Based Oversight

Stimuli and effects

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Abstract — This paper talks about a new trend in supervising aviation organisations by aviation authorities. It wants to explain the need of transition from compliance based oversight towards performance based oversight.

Aviation regulations define the set of strict rules, which must be followed very closely, no exemptions are accepted. This is a very useful tool, that significantly improves safety especially in last decades. However, aviation evolves into very complex and extensive field that is hard to control as a whole. This fact has brought some difficulties, that finally act as stimuli for introduction novel oversight principles. There must be established some flexibility and introduced some objectives, instead of strict directives. Each subject shall reach them by its own way. Setting up the margins and focussing towards the safety objectives are the essential parts of, so called "Performance Based attitude". Performance Based gives a new form of flexibility in managing safety, which is undeniably needed to handle a complex aviation system.

Each transition is accompanied by many changes, transition towards PBO is not an exception either. Even the small impulse could lead towards many changes within the complexity of networked aviation safety elements. This paper wants to attract the view towards these effects as well.

Keywords - safety, performance based oversight, compliance based oversight, SMS, SSP

I. INTRODUCTION

MAD Group is a group of several postgraduate students that work together, perform research and publish their outputs, educate students and learn themselves. The group is focused on independent branches within aviation – GNSS, Safety, Security and CNS, but their work is integrated by a common topic - the safety. The group has a wide knowledge of safety topics in aviation, keeping its research aligned with actual trends in the world to stay on with a very precipitously evolving subject as aviation safety undeniably is. The group cooperates with Czech NAA, trying to adapt modern safety challenges into national environment.

EASA introduced new concept of safety level oversight of aviation companies in 2012. This concept follows the EASA safety roadmap through the implementation of Safety

Management System (SMS), overseeing the hard laws of compliance with rules and regulations up to the inspection of the safety performance, as a final stage of transition process.

Adapting this concept into everyday life is a challenge for NAA mainly. On the other hand, the aviation companies need to understand the added value of the concept and should want to implement it within their operations self-imposedly. As we have two riverbanks in aviation - the regulatory on one side and the business on the other, meeting somewhere in between, too often with contradict interests; there are also two points of view towards Performance Based attitude. The first one - Performance Based (safety) Management (PBM) means management of risks within the companies and the second - Performance Based (safety) Oversight (PBO) means supervision of companies by authorities. Changes made in one side affect the other and vice versa.

Within this paper, when talking about regulatory point of view we will use PBO and when talking about company's point of view, we will use PBM. When talking generally, we will use Performance Based attitude (PB).

II. PBO - PERFORMANCE BASED OVERSIGHT

In previous paragraph, we have defined the two points of view towards Performance Based attitude, but not yet explained what does this concept means. As it was mentioned in abstract, this paper focuses on regulatory point of view i. e. Performance Based Oversight. PBO represents a new way of thinking about rules and regulations, it is a final step of transition towards new possibilities to oversight aviation companies.

"ONE SIZE DOESN'T FIT ALL"

This collocation is one of the most discussed cliché almost in every text about PBO. There is a wide diversity in aviation industry. Each aviation company is different not just in size or operation but also current safety level is varied, so currently used type of oversight is becoming obsolete.

Performance Based attitude sets common safety goals bringing relative freedom to achieving them. Within the PB ideology, each company should have the very same goal to reach safety operation but, as was stated before, companies endure

different threats and hazards according to size or other prerequisites. Therefore, the idea is, that each company should have the opportunity to follow different optional ways to identify risks, to mitigate them and thus reaching safety goals and improve company's safety level. These optional ways of reaching safety goals must be adequately oversight by authorities.

Nowadays almost every company has introduced SMS but they are not at the same level of implementation, so it would be hard or even impossible to manage safety the same way everywhere. In this case, Performance Based attitude is very contributive, because it provides liberty of choosing the way that is afterwards audited by regulators. During the oversight process, PBO uses more levels of evaluation, not only black or white (as CBO does). Figuratively speaking, PBO brings amber and red light.

The SMS (as a predecessor to PBO) covers mainly procedure and risk management. As an addition to these topics, there are industry standards, prescribed rules and procedures, implemented quality management, training management, data monitoring and safety leadership evoking safety culture, acting all together as elements of the Performance Based attitude.

III. TRANSITION

Going back to the history, EASA assumes that aviation is so much variable, that strict universal rules, prescriptive regulation are not very usable. Due to this fact, EASA realized that new attitude towards regulations should be adopted – as addition to prescriptive compliance rules, there should be implemented something like Performance Based indicators that show real outcomes of performance that is reasonable for specific case. Everyone knows that introducing new attitudes, especially in such extensive industry as aviation, is very hard, therefore there is supposed to be transitional period that leads from pure prescriptive rules through hybrid process/system based oversight to fully performance based oversight. The transition flow should look as follows:

Pure prescriptive rules → mainly prescriptive → hybrid → process/system based → fully performance based oversight.

When analyzing EASA regulations, we can see that a combination of prescriptive and performance based regulatory elements have been already presented at different degrees in almost all of them. Prescriptive elements are obsolescent, covering just commonly caused risks and could be mitigated by audits, inspections and compliance oversight. On the other hand, performance based elements are resilient, covering multiple, randomly caused risks, mitigated by assessment, insight and performance oversight.

ICAO has also presented a new strategy - the Global Aviation Safety Plan (GASP). The main topics of the plan are global safety, safety policy and safety objectives. In spite of the variability in aviation, there should be one basic objective - to keep it as safe as (reasonably) possible - is a main idea of the plan. This plan is aimed particularly towards civil aviation authorities. ICAO realized that authorities are lacking basic safety oversight capabilities (i.e. Compliance Based Oversight (CBO)) to certify organisations under their responsibility.

Responsibilities of states, respectively their NAAs with respect to PBO are defined in State Safety Program. State Safety Program is a management system for managing safety by the government. It is a tool for national authorities to oversight aviation companies (industry in general) that have already implemented SMS. This program is one of the safety programs family. ICAO policy on safety is based on Safety Monitoring and Analysis (SMA), industry's policy is based on SMS and governmental policy is based on SSP. In order to implement State Safety Programme (SSP), authorities should implement basic safety oversight functions as a pre-requisite to SSP development. According to GASP, states shall establish fundamental safety oversight competence, should develop risk-based capabilities and achieve an optimal level of compliance with ICAO Standards And Recommended Practices (SARPs). After that, authorities are supposed to incrementally introduce Performance Based Oversight systems.

We have mentioned Compliance Based Oversight (CBO) many times within the paper already, but not yet introduced it. CBO is generally the old way of strict prescribed practices. Compliance means full correspondence of operation according to rules prescribed by regulations. These rules together with industry standards, defined procedures and obligatory demonstration of compliance are the elements of CBO. CBO must be defined to such level of detail and accuracy that compliance will ensure the system is performing safely, what means that within limits it is safe and outside limits unsafe.

IV. STIMULI

A. *CBO is getting useless because of too high safety rate*

Based on different safety definitions, one could imply that safe is a company without accidents or incidents. Nevertheless, it is highly superficial to designate aviation company as safe just because of spotless history. Aviation is one of the safest industries that reach the mythical barrier of one disastrous accident per 10 million events (i.e. 10⁻⁷). Therefore, it is obvious that measuring safety and performing Compliance Based Oversight in traditional way is getting useless. Traditional ways means, the CBO uses the set of checklist, audit questions which are black or white, green or nothing, i.e. company complies with requirement or not. Therefore, as an addition to the CBO's black or white questionnaire evaluation, PBO brings amber and red light. Performance Based Oversight supersedes set of questions by set of goals bringing relative freedom to achieving them.

B. *Trust of the public*

In spite of the high safety rate, there is still need to keep trend of its continuous enhancement. The essential enabler of safety is trust of the public and/or employees we want to protect and their acceptance of necessary changes.

C. *Introducing safety culture*

SMS goes hand in hand with Safety Culture, but what was the first SMS or Safety Culture? Each organisation has a culture. Culture in general consists of psychological, behavioural and system vs. environment elements, thus these elements are

essential within safety culture as well. Culture could drive safety behaviour leading to safety performance. Another aspect of the culture is the culture of information facilitation. Good implemented safety culture must uncover what was hidden, by implementing evolving loop of information sharing from employees towards the company and vice versa. Trust and acceptance are essential parts of safety culture.

D. Incorporation of flexibility into oversight

Regulations might be performed by seriousness of its impact. There are so called Hard law, the essential safety elements, not being changed very often while they are time-proven. On the other hand, there are so called Soft laws, which should not be mandatory, allowing more flexibility. These non-essential implementation aspects should be left to Certification Specifications (CS) or Acceptable Means of Compliance (AMC). Despite their non-binding nature, the CS and AMC play an important role in providing sufficient flexibility in the implementation of the European Union's requirements.

E. Overregulation and safety gaps

Aviation is very strongly regulated industry, however these regulations make it very safe. Nevertheless, nowadays we are in situation when we have many regulations implemented and accepted, but there are still some safety gaps. To fill these gaps, new regulations are produced making the system overregulated.

Regulations must be universal, because aviation is very varied industry. Therefore, the new approach towards Performance Based Oversight is needed.

F. No needs for more, but better oversight

According to the statement of EASA representatives, Europe has an excellent safety performance thanks to partnership between EC/ECAC/EASA, NAA's and all other stakeholders. The question arises, whether we need MORE oversight and regulation? As mentioned in previous paragraph, there is no need for new bureaucracy, rules, laws and regulation. Instead of that, current conditions (i.e. regulation) should be harmonized and moved towards better risk assessment, balance between quality and quantity and Performance Based Oversight system. We do not need MORE, but BETTER oversight.

G. New demands on regulators

Generally said, the regulation is a legal provision, that creates limits, constrains, duties and allocates responsibilities. Within the transition process, new demands are placed on regulators. They should show added value for invested money, demand for de-regulation, demand for new public management and predictive approach. This new attitude of regulators together with more cleverness in solutions are the essential needs for modern complex systems and are commonly enhancing implementation of Performance Based attitude.

V. ACTIONS REQUIRED AND EFFECTS

A. Acceptance of the new system

As it was mentioned in previous section, the essential enabler of safety is the trust of the public and/or employees we want to protect. This acceptance could be supported by promoting best examples, while people need to see the results of their behaviour. One could imagine different activities under the safety promotion. The list can start from communication of risk portfolio, safety proceeding, recommended practices from company management towards employees via web pages and issuing safety bulletins. Regular, annual trainings according to dedicated safety manuals e.g. operation implementation manual, are of importance as well.

B. Behavioral changes

In the light of transition towards Performance Based Oversight and safety culture implementation, the transition into people's behaviour is necessary as well. Not only technological changes, human machine interfaces, graphical user interfaces but also behavioural changes have to be implemented as well. Giving an example - children are more skilful in working with IT technologies than adults are. These children come to the productive age soon, what will imply operational changes in companies. Different companies have different operations, creating different environment thus different culture. The PB management system has to be flexible to cover all these differences. This can be done using flexible safety indicators. By implementing changes in the companies, implementing new indicators, we drive the people behaviour change and adapting people's thinking. This is a very delicate situation, which must be done smartly and patiently.

C. Data needed for right decision

Implementing PB would impose another giant leap in decision-making process. It is hard to make decisions, when not having sufficient data. Making decisions based on insufficient or poor data is pure gambling, on the other hand too much data may cause data overload. In order to make good decisions, decision-makers should have enough data with appropriate focus. When the decision is already made, it might be very hard to decide whether the decision was good or bad, especially when talking about long-term decisions. It is crucial and difficult for any leader to measure suitability of decisions and solution. Therefore, in order to maintain aviation safety on required level, there should be made safety knowledgebase that is shared, analyzed and accessible. There is nothing worse than the data graveyard.

D. Collaboration in data sharing

As there are so much different stakeholders within aviation, there should be also new means of cooperation and sharing of information that should be analyzed on bigger scale. Industry owns extremely valuable safety data that shall be used for better identification of hazards.

Compliance with regulation alone does not ensure safety, therefore exchange of safety data for continuous improvement and data driven approach is required. Data have to be in good

quality and right focus while life without safety data is just guesswork. Safety improvements can only be achieved through a collaborative effort of communication and data sharing within stakeholders and a continuing dialogue on selection, prioritization and mitigation of risks. The best way for that should be development of a unified information centre, which should gather information from audits, accidents investigation reports, data recorders, Mandatory Occurrence Reports as well as voluntary reports, FDX (the flight data exchange) and many other sources.

Creating the unified information centre, could start locally. Based on the idiom - think globally, act locally; the NAAs should start to develop national knowledgebase. As it was mentioned, one source of data are data gathered by companies. Big airlines will generate too many redundant data. On the other hand, small airlines and/or general aviation are not able to gather enough data in right quality and right focus. This leads either to data overload and system outage or data insufficiency respectively. To cover this data outage, the NAA should generate so-called general knowledge about the regional safety situation, based on the data and intelligence collection from all other local companies. This knowledge should be further shared to supplement global information centre. Safety data and their interpretation in form of information support the right decisions on oversight. There should be enough safety data that serves as indicators and basic knowledgebase, but it is very hard to set proper focus and methodology of this data gathering. This information centre should be a foundation to build best practices that might be than implemented in day-to-day operations in globalized aviation environment.

By opening up a positive reporting culture, authorities need to be prepared to hear bad news. Many organisations would realize this fact, thus it is most likely presumable that many of them are not willing to share data. In spite of that fact, aviation industry and regulators and states should work together to achieve best possible methodologies and operational practices of collecting right data (already mentioned national knowledgebase and unified information centre). Because only right data lead to right decisions. Too much data might lead to ambiguity and whole system of hazards identification and data analysis would get overloaded.

E. Resources cut down

In current state of industry, main goal of every company is cost reduction. Resources are cut down, but operations are still increasing. What is more contradictory, the main activity in implementing SMS is to allocate risk to resources and vice versa. PB is a method that assigns risk to resources as well. Therefore, there may appear some safety gaps; Reason's model defines it as latent condition mishaps or crack in safety defences. The PB deals with the fact that every operation consist some risks. That means there is always some hazard that must be identified, measured and after that accordingly managed. Taking in mind the PB assigns risk to resources, this management can be understood as resource management.

The proper change management of implementing Performance Based should have following signs: cost benefit, effectiveness (in mitigating safety risks, achieving safety

objectives), equity and fairness, clarity and transparency and maturity of the management system.

F. Implementation smart intelligence, no resources reduction needed

PBO requirements says there should be developed safety monitoring and analysis system, integrated risk-based approach, possibilities for measuring safety performance and evolving toward a comprehensive assessment of safety. These tools are generating costs when measured. We can term these costs as an "information costs". Costs should be reduced by implementing smart intelligence, smart measuring tools and knowledge sharing, instead of resources reduction.

G. Authorities should perform monitoring of performance

Civil aviation authorities should now adopt their measurements and regulations to be able to perform PBO of aviation companies. During the audit inspection, authorities should perform monitoring of performance and targeting risks by each individual company. This monitoring should be focused especially to the random and emerging threats, which arise, except other, from novel technologies. It place higher demand on expertise of auditors, which should completely understand of the whole system, objectives, emerging threats and novel technologies.

H. How to evaluate quality of implemented SMS

One of crucial Safety Management System purposes is to describe the whole system of operations in company and evaluate possible risks that should be mitigated. Therefore, the auditor should reveal whether safety manager perform hazard identification and risk assessment sufficiently.

This could be done by set of simple audit questions that are easy to answer if SMS is implemented good and impossible to answer if it is not:

1. What is most likely to be the cause of company's next accident or incident?
2. How do you know that?
3. What are you doing about it? (e.g. Are there any safety plan and/or action plan implemented?)
4. Is it working?"

Every auditor should follow these questions during auditing implementation of SMS. Therefore when safety manager does not have sufficient answers for these questions he did not perform hazard identification and risk assessment sufficiently.

The manual of how to measure Safety Management System's efficiency could be found in appendixes to ICAO Doc 9859 (SMM). It is a type of specific surveys in form of questionnaires, which determines implementation level of the inspected company.

I. How to measure correct implementation of PBO

Because of variability in between aviation companies, not every company need to reach all greens when undergoing

authority oversight. Companies should be able to adopt only optimal compliance simultaneously with phased implementation of the SSP.

Based on control set of questions for SMS mentioned in previous paragraph a new set of questions that examine correct implementation of Performance Based Oversight could be as follows:

1. Have the right outcomes been agreed?
2. Have the right actions been initiated?
3. Are there right measures in place?
4. Have the right risks been identified?
5. And does it all add up?

Another manner for measure the implementation of PBO is the Safety Management System Evaluation Tool. This tool consists of a set of questions asking whether they are present, suitable, operating and effective (PSOE). The tool was published by Safety Management International Collaboration Group (SMICG) integrating human factor oversight together with safety management oversight into oversight of the Performance Based. This integration could be afforded because safety management oversight as well as PBO applies same principles and knowledge. The principles were mention many times within the paper - measuring safety performance, risk management, best use of resources (proportionate and budgeted) and total system approach.

J. How to plan an audit process

MAD Group tries to find out whether there are any best practice of implemented PBO within any national authority. One has been found in Canada. Their PBO is based on risk indicator database, which is used also in audits planning. The basic pillar of the planning process is a company's safety risk profile. This composite of two parts a risk indicator level and an impact value. Risk indicator level is derived from risk indicator database. The impact value is generated by considering the size and scope of an operations, e.g. how many certificates does the company hold, how many employees and bases does it have, how many different types of aircrafts etc. These indicators generate the picture of the complexity of the company. The higher complexity we have, the higher risk level company supposed. The risk indicator level and impact value acts as a rows and columns in a surveillance interval matrix. The matrix is used to evaluate frequency of audits in each company. There are two types of intervals - the flexible (floating) intervals, based on the results of interval matrix and regular, continuously ongoing monitoring.

K. Harmonization of the risk portfolio

As it was already mentioned in previous section, the ICAO policy on safety is based on Safety Monitoring and Analysis (SMA), industry's policy is based on SMS and governmental policy is based on SSP. The core function of all of them is Safety Risk Management (SRM). Different organisations may have different attitude towards SRM and may have identified different risk portfolio. This is a threat that arises from different nature of

ICAO, operators and government. Thus, this implies the need for risk portfolio harmonisation within SMA, SMS, and SSP.

States should focus on the implementation of State Safety Programme (SSP) and Safety Management Systems (SMS) in such a manner that will harmonize risk portfolio. ICAO should be helpful in this and should focus on creating meaningful indicators of the status of implementation SSP.

L. Puzzled industry

When talking with industry about PB we conclude, that representatives of industry are puzzled by the freedom of choosing the own way how to reach the safety goals, because there are still no "signposts" to follow. Mere announcement of regulators - giving freedom of safety activities, evaluating introduced safety measures of companies and advising whether it is satisfactory or not; is very hard to accept.

M. Motivation of the companies to implement Performance Base

One possibility how to motivate companies is discrimination in favour of those ones that performed well during evaluation of risk factors by reducing frequency of inspections and audits. This method is based on confidence in doing the best the audited companies can. This confidence could be lost then the punishment in form of frequent audits would come.

N. Annex 19

Safety is a shared goal and responsibility, it is commitment of all stakeholders. All stakeholders must work together as "One world" – implementing and integrating a global Safety Management System with clear performance goals (as a predecessor to PBO). ICAO realized its responsibility and leadership in "One world" integration. The same rules must be delivered around the globe to bring efficiency, to raise a signposts, not only for the puzzled industry, on the way to reaching safety goals. To fulfil this, ICAO need to define a new Standards And Recommended Practice (SARP) in form of a new Annex to Chicago convention. From the accessible information, ICAO talks about Annex 19 Safety Management System. It will collect in one document all the safety management requirements now spread across various Annexes (e.g. SSP issue, competencies and skills of key safety actors within all stakeholders, etc.). The key words of the Annex 19 are intelligence, measure performance, risk assessment, good cost benefit analysis, sharing know-how and effectiveness. ICAO plans to adopt Annex 19 in November 2013.

VI. CONCLUSION

To conclude what was mentioned, the need for new way of thinking about rules and regulations was stimulated by useless old way of strict compliance with prescribed practices prescribed by regulations, need to keep trend of continuous enhancement of safety rate by introducing safety culture and arising trust of the public, need for better oversight with more flexibility and cleverness.

Behind the transition process hide many challenges that must be overcome by all involved stakeholders. Appropriate actions were mentioned in the "action required and effects".

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