LUFTHANSA`S NEW BASIC PERFORMANCE OF FLIGHT CREW CONCEPT – A COMPETENCE BASED MARKER SYSTEM FOR DEFINING PILOTS PERFORMANCE PROFILE

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Within the airline industry and pilot associations the importance of non-technical skills and the necessity to train these behaviours is generally well accepted. As a consequence Crew Resource Management Training (CRM) was established within Lufthansa at the beginning of the nineties and meanwhile implemented by the regulating authorities as mandatory requirement for training and assessment of airline crews worldwide. The basis for training and evaluation of individual flight crewmembers performance are usually so-called behavioural markers. These markers are designed to define specific observable behaviours which contribute to superior or substandard performance. A survey carried out by NASA/UT in 1995 classified the positive and negative impact of marker related crew performance on aviation accidents and incidents. The results of the survey analysis provided strong support for the utility of behavioural markers as indicators of crew performance.

Around the globe various well-defined marker systems have been established within the airline industry. In this context within Lufthansa German Airlines the so-called "22 CRM-Quick Reference Items" had been implemented at the beginning of the nineties and provided the baseline for the development of various CRM training courses. Well in advance of the establishment of mandatory regulations Lufthansa implemented CRM seminars, first for flight- and later on also for cabin crews.

One of the disadvantages of common marker systems including the former Lufthansa Quick Reference System however is, that they are solely focusing non-technical skills. As a consequence subject matter experts of the Lufthansa Group and DLR recently established markers for different areas of competence in order to define a more comprehensive competence profile for flight crew members.

This paper describes the input factors which forced the development of the early Quick Reference System in to a completely new universal concept of a competence based marker system. The development process as well as the initial implementation of the new criteria in the existing selection, training and assessment system of Lufthansa will be discussed. The succeeding papers of Cpt. Harry Neb from Lufthansa and Dr. Hans-Jürgen Hörmann from German Aerospace Centre will specify on a derived new concept of pilots assessment within Lufthansa and first results of a usability study.

Needs to develop a new competence based marker system

I. Results of the Lufthansa Flight Safety Survey

From December 1997 until March 1999 a Cockpit Safety Survey was carried out within Lufthansa German Airlines and its subsidiaries Condor, Lufthansa Cityline and Lufthansa Cargo. 2070 pilots answered the questionnaire and reported 1897 safety relevant events that happened within the last five years of their flying career. One of the highlights of this study is the analysis, that "social relationship factors play a greater role than human error, operational or technical problems in the occurrence, risk, and mastery of safety relevant incidents".
A closer look into details revealed the following aggravating social factors:

a) 29 % Quality of communication, e.g. authoritarian behaviour
b) 37 % Information management, e.g. transfer of relevant messages
c) 15 % Social climate, e.g. intimidating behaviour
d) 19 % Impaired fitness for duty, e.g. sleeping deficit prior or during flight duty

These results created a strong demand to specify a competency profile that defines behaviours to address those tendencies in a positive manor.

II. The JAR-OPS requirement to assess CRM skills and development of NOTECHS system

The European Joint Aviation Requirements (JAR) require the training and assessment of pilots CRM skills. JAR Ops NPA 16 states: "The flight crew must be assessed on their CRM skills in accordance with a methodology acceptable to the Authority and published in the Operations Manual. The purpose of such an assessment is to provide feedback to the individual and serve to identify retraining; and be used to improve the training system". This in fact

forced the airlines to establish a marker system within Lufthansa, that copes with the regulatory demands.

As a logical result of those requirements the European regulator demanded a European marker system to fit for the aviation culture of this region of the world. The NOTECHS project then started in 1996 with the goal to establish a prototype of a non-technical skill structure.

Lufthansa felt sceptic because of suspected cultural differences of the airline population within Europe, but highly respected the published results. It was decided to take advantage of the newly presented NOTECHS structure as far as possible, however respecting the Lufthansa company culture and CRM background. A system developed consequently based on the existing 22 CRM Quick Reference Items was likely to assure acceptance by our flight crews and prevents rebuilding a at that time just established CRM company culture.

III. The lack of a sophisticated quality monitoring system

Resulting from the absence of a detailed and complete set of competence criteria for flight crew members, systematic quality assurance was not satisfying Lufthansa demands any more. Also most of the rating forms for skill- and proficiency checks as well as recurrent trainings showed a failed/passed rating only without further grading of the performance demonstrated. Therefore the development of a valid, reliable and sensitive rating system with transparent and easily understandable criteria was essential for Lufthansa.

Development of the Lufthansa Competence Criteria for Flight Crew Members

More than a dozen subject matter experts consisting of experienced check- and training captains, aviation human factor specialists as well as aviation psychologists participated in a working group founded therefore. The initial task was to define the classical non-technical skills in reference to the previously existing and newly presented systems existing world wide. Especially the JARTEL NOTECHS as well as the NASA/UT criteria but also the ANSETT Check Captain Assessment Guide as well as the British Royal Air Force CRM behavioural markers had been evaluated. As a result the Lufthansa markers, initially for the non-technical skills had been defined. In respect of results of the Lufthansa survey analysis, as well as the wording used therein, it was decided to refer these markers to an "area of competence". Competence in this context is used as a synonym for knowledge at hand, as well as abilities and skills in the field of aviation. The competence area of the CRM-skills have been named "interpersonal" in the Lufthansa system.

In a following step a logical and easily acceptable structure of the behavioural markers had to be designed. The results of the Lufthansa survey forced the final decision, to stick to the elements of communication in spite of a different NOTECHS conclusion regarding that item. As known the criteria regarding communication are seen by NOTECHS experts as means to be able to perform in each of the other categories. As mentioned before, the Lufthansa survey showed obvious demand to specify, and of course train, specific communication skills. This refers especially to the criteria regarding communication atmosphere, information transfer and information management.

The resulting structure of the non-technical skills is called "area of interpersonal competence" and consists out of the four elements:

1. communication,
2. leadership and teamwork,
3. workload management
4. situation awareness and decision making

So called "Descriptions" specify the more detailed behaviours related to those elements.

Expanding the competence system to a complete performance profile

As mentioned earlier, Lufthansa looked forward to establish a sophisticated quality assurance system covering flight crew members overall performance over the years of service. Therefore not only the interpersonal, but also technical and procedural competence seems to be essential. This led to the conclusion, that for the assurance of a safe and efficient flight basically three areas of competence seem to be essential:

- Technical
- Procedural
- Interpersonal

Une compétence sous entend un apprentissage. Ce n'est pas le cas de certains éléments "Interpersonal. Ce n'est pas choquant: question de choix.

The structure chosen for the "Area of Technical Competence" includes the elements:

1. Manual Aeroplane Control
2. Knowledge of Systems
3. Use of Automation

The structure chosen for the "Area of Procedural Competence" includes the elements:

1. Knowledge of Procedures
2. Adherence to Procedures

Optimum overall performance is achieved by integrated application of the nine elements attached to three competence areas.

The major advantage of this integrated kind of presentation of the competence descriptors is a better understanding and acceptance of the interpersonal skills by training personal, examiners and line pilots. CRM or interpersonal competence is no longer an isolated add on to the standard performance criteria for pilots, but an integrated part of the performance profile.

Lufthansa interpersonal competence versus NOTECHS

As the Joint Aviation Regulations refer to the respective NOTECHS system, Lufthansa wanted to assure that all the CRM-behaviours required by NOTECHS are covered by the company called interpersonal elements and their markers, called descriptors.

A Content Analysis of the respective definitions of NOTECHS Elements and Lufthansa interpersonal competence (LIC) Descriptors therefore was performed by Dr. Hörmann from German Aerospace Centre. This analysis shows the amount of overlap between the two systems.

At this stage the correspondence between the two concepts seems to be quite high, which confirms the plausibility and comprehensiveness of LICs. However, the distinction in the NOTECHS system between social skills (Cooperation, Leadership & Managerial Skills) and cognitive skills (Situation Awareness and Decision Making) is less obvious in the LICs. Especially, the LIC-category Communication is bridging the gap between social and cognitive skills (see Attachment Table 3, column Communication). Furthermore, in some aspects the Lufthansa descriptors appear to be more clear than the NOTECHS elements or even go beyond them (e.g. Information Transfer and Information Management).

One of the most difficult categories in the NOTECHS system for the process of observation is Situation Awareness. It can only be concluded indirectly from a pilot's actions or from the communication between crew members. Therefore, it seems advantageous to integrate this category into two other categories which can be observed with a higher degree of objectivity: Communication and Decision Making (see Attachment Table 2, column SA).

Measures taken

The new competence system is published in the Operations Manual under the headline "Basic Performance of Flight Crew". Thereby the competency profile defined by the three areas of competence and the respective descriptions is a mandatory standard to be fulfilled by every flight crew member.

The criteria are easily accessible for all Lufthansa instructors and pilots via distributed booklet and individual electronic notebooks. In addition as a reference for briefing and debriefing the Basic Competence Criteria are installed as large poster in every simulator briefing room.

The implementation of the competence profile of course requires to embrace and modify all the processes of a typical pilot career within Lufthansa. In close cooperation with the German Aerospace Centre (DLR) it is assured, that all criteria specified in the system are referred to during pilots selection. The Lufthansa subsidiary Lufthansa Flight Training GmbH guaranties, that all criteria are systematically implemented in training programs for the basic pilot training at the flight school in Bremen and Phoenix. All CRM training courses will be modified according to the new system. Last but not least the Postholder Training of Lufthansa will assure, that all of the basic and recurrent line- and simulator training is designed to meet the requirements according to the basic competence criteria. As a tool for quality assurance in this context, a new assessment concept was developed within Lufthansa and will be presented by my colleague Cpt. Harry Neb.

Every system however is only as good as the trainers are who teach it or the examiners who use it for assessment. Therefore the basic training for newly hired type rating- instructors and examiners as well as line check airman will be modified so as to train for teaching, observing and assessing the competence criteria of all areas. For all of the members of the training and checking corps within Lufthansa a additional training course will be provided to improve proficiency in handling the competence criteria and using the tool of the newly designed assessment system.

Outlook and conclusion

There is no quality assurance without measurement. Therefore a first usability study of the new pilots proficiency reporting system at Lufthansa was already performed. The results of this study will be presented by my colleague Dr. Hörmann from German Aerospace Centre.

Our focus within Lufthansa is, to establish a electronic data base system for continuous monitoring of pilots performance throughout a typical career. The ultimate goal is a traceable contribution to better performance and therefore enhanced safety in the aviation system. At Lufthansa we look forward to analyse the

respective results of future flight safety surveys following improved training based on the three areas of competence and their respective elements and descriptions.

Attachments: Lufthansa interpersonal competence versus NOTECHS
Table 1,2,3

References

Braun, P., Kemmler, R., Eckerle, T., Neb, H., Lee, I. (1999) *Forschungsprojekt Flugsicherheit*

Helmreich, R.L., Butler, R.E., Taggart, W.R.,& Wilhelm, J.A. (1995). Behavioural markers in accidents and incidents: Reference list. NASA/UT/FAA Technical Report 95-1. Austin, TX: The University of Texas

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