



# SELECTED PROCEEDINGS

## LOW COMMUNICATION SKILLS MEANS HIGH RISK FOR AVIATION SAFETY

MSC ANA MARIA VIEIRA, INSTITUTO TECNOLÓGICO DE AERONÁUTICA – ITA  
PROF.DRA.ISABEL DOS SANTOS, UNIVERSITY OF SÃO CAETANO DO SUL - USCS  
PAULO RENATO DE MORAIS, PHD, UNIVERSITY OF VALE DO PARAÍBA - UNIVAP

This is an abridged version of the paper presented at the conference. The full version is being submitted elsewhere.  
Details on the full paper can be obtained from the author.

ISBN: 978-85-285-0232-9

13th World Conference  
on Transport Research

[www.wctr2013rio.com](http://www.wctr2013rio.com)

15-18  
JULY  
2013  
Rio de Janeiro, Brazil

unicast

# **LOW COMMUNICATION SKILLS MEANS HIGH RISK FOR AVIATION SAFETY**

*MSc Ana Maria Vieira, Instituto Tecnológico de Aeronáutica – ITA  
[marianav@uol.com.br](mailto:marianav@uol.com.br)*

*Prof.Dra.Isabel dos Santos, University of São Gaetano do Sul - USCS  
[isa.santos.sjc@gmail.com](mailto:isa.santos.sjc@gmail.com)*

*Paulo Renato de Moraes, PhD, University of Vale do Paraíba - UNIVAP  
[prenato@univap.br](mailto:prenato@univap.br)*

## **ABSTRACT**

This article analyses different types of communication in the aviation environment. The research has a qualitative approach underlined by a documentary analysis of the reports issued by National Aviation Agencies. In the aviation field, communication is a complex system which consists in verbal, non-verbal, written, spoken and also the automatic communication. Communication can be a crucial factor to manage critical situations. According to the results, the lack of communication skills among all those individuals involved in the air operations contribute to the critical failures occurred in most of the aviation accidents and incidents. Conclusions pointed out that: each set of aviation activities requires well-trained people in communication skills besides technical capacity; professionals should be put together as a task force team to work towards aviation safety; it is emergencial to implement Communication Skills Training; professionals trained in communication skills have better conditions to detect threats and communicate the need for support to manage risks and to implement actions as required by the philosophy of the Safety Management System.

*Keywords: Aviation Communication, Communication Skills Training, Safety culture.*

## **INTRODUCTION**

A system can be defined as a set of interconnected elements that interact to perform a function. Every organization is basically a system and the factor that links all parts of this system and related elements are people and the processes they execute.

According to Senge (2006), developing a systemic thinking in an organization demands development of a holistic vision, i.e, to abandon the linear thinking and to work with different levels of influence. The lack of systemic thinking in an organization contributes to form feuds, unbalances the flow between activities, decays the quality of information, and difficults the organizacional communication flow.

Integrating successfully all the components of a system is called synergy. Synergy is a phenomenon that determines that changes in any part of the system will produce effects in the whole system. The higher the synergy the more likely the system will accomplish its

mission and the better will be the efficiency of reaching the objective. On the other hand, a lack of synergy results in bad performance causing system's failure, system crash or a complete loss.

Under a humanist perspective, organizational communication works to mediate employees' expectations and hopes, to mitigate conflicts, and to balance behaviors through positively stimulating perceptions and attitudes.

In high-risk organizations such as airlines companies, a systemic communication must work towards cooperation between all sectors involved in the operations to perform safely. Safety is the reason that makes it necessary the right understanding of communication as part of an extremely complex whole.

The paradigm of the systemic view on communication is the interactive-communicative understanding that presents continuous stages of input, throughput and output.

A closed system does not interact with its environment, does not exchange information and therefore is likely to atrophy and tends to an accident. An open system receives the information, which is used to dynamically interact with the environment. The communication in this respect can be seen as an integrated process that establishes a network of information and influences all around.

The sectors of an airline company can not operate on their own. So, to keep dialoguing and interacting positively with each other is mandatory to manage systemic risks. A systemic understanding of aviation communication will attend the urgency of properly identifying risky situations and behaviors, as well as to control risks in the aviation communication process. A clear understanding of the communication process in Aviation will allow to better developing communication skills towards the assertive communication action which reduces negative impacts of miscommunication effects and enhances security towards the Aviation Safety.

Many of the issued communications have a great impact in the employees' life, but just a few can change their attitudes. Some communications may cause confusion because they have not clearly expressed their contents. Others will never reach their readers because the sender was not specific about the highlighted issue of a given fact he/she wants to stress through a formal communicative action. Therefore, communication is an essential competence to those professionals who work in Aviation.

Developing communication skills can not be seen as an extra option in the training of pilots, crew and aviation ground professionals. The lack of a satisfactory communication skill will easily decay intellectual and technical knowledge.

The aviation sector must have highly skilled teams to identify and control communication failures which may affect negatively the decision making process in dynamic environments.

The risk management in Aviation is based on the comprehension of the danger and possible consequences of the threats and errors caused by the existence of a lack of communication skills. Such comprehension is achieved through an appropriate training program applied to those individuals who work in the Aviation operations environment. The training program has

to attend the need of recognizing risky behaviors, prevent and reduce communication errors, proactively contributing to Aviation Safety, among other contents.

The development of communication skills is a fundamental resource to prepare future professionals to proactively manage risks caused by poor communication, rather than to act reactively to them.

Aviation Safety must be the main objective of all sectors involved in aviation operations. To reach this objective, individuals have to learn how to integrate and coordinate their duties with other team members. So, relevant information will be effectively shared.

Dickinson and McIntyre (1997) define communication as the focal point of the teamwork, i. e., communication is one of the most relevant components to connect other elements of a system. Communication enables people, tasks, processes and systems to interact cooperatively in order to achieve safety in all sectors and, consequently, generating a safe system as a whole.

Communication skills, therefore, include the verbal behavior and evoke the usage of the right words, at the right time, in an appropriate tone of voice. But also communication skills refer to non-verbal behaviors, i.e., body expression, the look and the gestures, and written communication (VIEIRA and SANTOS, 2010).

## **COMMUNICATION AND THE SAFETY CULTURE**

Torquato (2004) highlights two key elements in the process of communication: effectiveness and efficiency. Referring to effectiveness, Torquato (2004) suggests that, to be effective, the message has to present such characteristics as credibility, appropriateness, relevance, understanding, and synchronicity. To define efficiency, Torquato states that it is the ability of the issuer to affect others behaviors, perceptions and feelings, so as to make them follow his intentions. In addition, Torquato stresses the fact that the message issuer can also be affected by the individuals change behavior, since the message aims to be advantageous to the issuer and to the organization.

The communication effectiveness and efficiency represents the most important pillars to maintain safety in an airline operation. Therefore professionals in Aviation have a great responsibility and they ought to be concerned in providing a fully understandable communication process, otherwise the consequences can be catastrophic.

Such organizations that continuously address resources and efforts to build up a real safety operation through a reliable and shared communication process will create the so called safety oriented culture. The safety culture is guided by values and reinforcements, not by a punishment culture. Therefore, managers have to be able to encourage and recognize communicative actions.

The safety culture is usually defined as a combination of attitudes and open communication. Considering the numbers estimated by the Federal Aviation Administration (FAA), human

errors are responsible for 60 up to 80 of flight accidents and incidents. These numbers give a real dimension of the relevance of developing communication skills and attitude.

Philosophically, it is universally comprehensible that human beings will inevitably make mistakes and that the psychological barrier between error and accident is the ability to recognize, capture and correct errors before they spill all over. This so called learning lessons ability comes with experience and mainly with experience sharing that increases the critical knowledge on risky or tragedy situations without individuals having to experience those situations.

However, some aviation companies highlight more the errors than the sharing experiences. This management style focused on error and punishment strengthens gradually the installation of a culture oriented to risk situations omission, in which workers choose to hide their mistakes while exposing them to err again. The communication process in aviation should be treated professionally.

An example of the culture based on risk and error omission can be observed in the contents of a message sent by email to the crew of a Brazilian Airlines Company which gained the headlines of an important national newspaper. In this communication the flight attendants' Leader justifies that the formula for achieving success in the Airlines Operations was "keeping the mouth shut" (*sic*).

"This memorandum aims to inhibit the crew to report technical airlines situations of any kind", concluded Garcia, secretary of Cabin Crew Members of the Pilots Union of the state of São Paulo (O Estado de S. Paulo, 2007)

This sort of communication reveals a total lack of social skills, and interferes with flight safety because restricts the reporting of important and hazard information which are the basis of the Aviation Safety Management System (SMS) especially designed to assist air transport to achieve better safety indicators through the risk analysis and the establishment of preventive models.

The SMS concept is based on a productive operational safety culture, which promotes the free flow of information in order to improve the flight safety system.

The workforce must rely on their leaders to carry out prevention reports, without fear of reprisal or embarrassment. Leaders must demonstrate that all reports concerning safety procedures and situations are considered valuable, respected, appreciated and rewarded (INTERNATIONAL CIVIL AVIATION ORGANIZATION, 2009).

The correct judgment on a flight accident or incident can reveal that risk situations works as a source of learning and provide strategies to improve communication inside the company which literally means sharing information. The crew-oriented communication in the Airlines field, as currently conducted, seeks much more to provide control and mastery on situations and to establish a positive flow of information and guidelines to the crew than to simply promote safety.

Due to its operational complexity, the airlines company's communication process has certainly more peculiarities in comparison to other organizations in sectors which are

*Low Communication Skills Means High Risk For Aviation Safety*  
*VIEIRA, Ana, DOS SANTOS, Isabel, DE MORAIS, Paulo*

considered less complex. And, when it does not work properly, problems can arise and culminate in an unexpected incident or even in a tragic accident.

The capacity to keep working safely in an Airline is directly associated to how prompt is this company structured to maintain well sustained flows of communication to ensure the decision making process.

In a context characterized by the continuous risks it is fundamental to make sure that people will make use of a relevant communication at the right time. This particular characteristic has significant implications for what can be defined as one of the most important functions of communication focused on Safety: to work as a reminder that helps to access the memory storage of how to deal with emergential situations.

This coming dialog is an example of internal communication without any risk management approach and its impact on Safety.

Date: Mon, March 17, 2008 21:52:31-0300

From: hypothetical XXX

Subject: Training-ELTs- MAINTENANCE PREDICTION

Dear Managers,

We have been informed by the Interior Engineering/ Design that at the XXX e XXX aircrafts start-up operation moment there were no portable ELTs standards in stock. Therefore, these aircraft went into operation with the old ELT models that already have supplied these aircrafts. According to information from maintenance, this material is easy to handle.

Thanks.

Training management

(TESTIMONY A, 2008)

The Emergency Locator Transmitter (ELT) is a device that transmits a signal frequency of locators, making it possible to identify and carry out rescue procedures. It can be observed in the message that the equipment was changed without any kind of prior notice. The phrase "this material is easy to handle" is worthless since it does not give a clue on how to handle it.

The expression "easy to handle" reveals a total disregard to the safety of the equipment and the passengers' lives on board. Even being a typical case of a device that nobody would use in a regular situation it would be literally vital in a possible rescue operation. According to the testimony of flight attendants management staff, it was considered unnecessary to keep an on the ground crew just to give instruction on a specific and rare usage equipment.

When communication about the interests of the company does not highlight the flight safety, commonly arises some kind of interference that can be interpreted in a misguided way,

privileging the result and not the safe action, as may have happened in the previous example.

Poor communication can lead to tragic consequences. However, it is still true, as shown in the specialized literature's review, that efficient and effective communication can generate positive outcomes, regarding how to improve information's flow leading to ensure more safety to the processes. Increasing communication skills is possible through a well structured Training Program aiming to facilitate team communication, which includes gathering a substantial quality improvement and errors' prevention.

Managers and leaders that present a low skill of interpretation usually generate teams with low expectations and incomplete skills due to the lack of information's exchange practice, which leads the team to errors or not to perceive its previous signs, which are called red flags. Even those caring professionals tend to be underestimated by the culture.

Detecting red flags on possible risky situations, and being able to communicate the signs of a coming accident, can be seen as criticism rather to be seen as a proactive attitude by the low skilled professionals. The situation exposed below is an example of how a proactive communicative action can be seen as a criticism:

I reported directly to the Safety Managers a risk situation that could cause an accident (in Aviation Operations). As a result, I received a "harsh" response from my manager warning that I should have first reported the risk situation to the Marketing Managers whose is the responsibility to lead flight attendants. For this reason, I was punished and totally discouraged to report new red flags that I would observe in the future. (TESTIMONY B, 2008).

In Aviation, every worker should have in mind the same goal, which is the safety, no matter what department they work to. In Aviation, safety comes first and must be put on a pedestal, above any other organizational priority and also has to be seen as a valuable asset to support business philosophy, which calls everyone accountability as a member of the Safety Team. Safety is more a concept than a functional body and supports the company's mission.

So, to become a fundamental concept to the business, which may express the main customer's expectation, in a daily-based attitude, calls for a developmental program for social skills improvement that allow members of the team to reach high standards of performance and walk through the same challenges, which is the security of the flight.

Communication skills training has as main objective to train individuals with a high degree of interpersonal relations by encouraging communication skills, improving social competence so that conflicts are resolved without anxiety, fear or other emotional losses (VIEIRA and SANTOS, 2010).

## **The Butterfly effect in Communication**

Lorenz (1979) found that insignificant factors can amplify as long as time passes by. They can also radically change a state of being. So, minor changes or minor errors in a pair of

variables can produce tremendously disproportionate effects. Lorenz named his discovery as The Butterfly Effect.

People with highly developed skills in communication are necessary to figure how a message can generate a negative butterfly effect, influencing the operational chain and affecting aviation safety.

It is highly recommended to estimate the impacts of a decision and its effects on the operational system, as seen in the formal memorandum below.

Date: Fri, May 23, 2008 23:40:39-0300

Subject: SAOOC-06608-SYNERGY FROM a CREW Operational Coordination – Commercial Crew-Cabin Crew Operations Coordinator

The XXX Airlines is pointed out as the first company in the flight delays ranking.

Coming with the perception of changing this awful position, we will adopt some initiatives and we count on the collaboration of all managers to implement them.

The group responsible for the largest number of delays will be punished with the non-receipt of the profit-sharing (PPR). A survey will be leaded to verify what have motivated further delays and sector, the sector that is named as responsible, will not receive the PPR.

Pilots, Chief cabin and supervisors shall submit reports as soon as possible, pointing out the team responsible for the delay (dispatch, maintenance, technical crew, crew, and others).

Let us work towards the synergy of teams to end up with the delays and our company will be recognized as the most punctual in the world.

Challenges will transform our good employees today in great employees tomorrow (TESTIMONY C, 2008).

In order to assess the contents and the main consequences generated by the lack of communication skill in this internal memorandum, we analysed its top six mistakes

1. The CRM philosophy was corrupted: what primarily should work to strength synergy actually ends up segregating groups. The decision to reward only one group of officials breaking the sense of the whole involvement in improving the management of threats and errors, turning collaboration into competition among the teamworks as if they were participating in a great rally;
2. Blame cycle: dispatcher points out how responsible the commercial crew, pointing to technical crew, who blames the maintenance which, in turn, blames the DOV, generating what Reason (1997) defines how to blame, does not solve the cycles of delay and contributes to the errors and violations;
3. To win the extra payment, shortcuts are taken and some working stages are eliminated, As a consequence some checking points are: uncompleted maintenance



which is made under pressure, superficial emergency check, briefing elimination, among other emergency issues that are relegated;

4. Uncompleted reports are carried out "at the door of the aircraft" only to show the consequences. The delay is the result, and the root problem remains latent. Some questions would be made in this case: Which factors would be causing delays? Is the number of aircrafts in operation sufficient? Are there missing parts to run with the maintenance? Is the manpower in charge of dealing with the airplane on the ground, and passengers check out enough? Does the personnel have an appropriate training? Is there any kind of communication problem? Is there a combination of two or more of these factors?
5. Stress between those professionals involved in the flight. Everyone willing to solve the problems quickly, and concerned about the punishment instead of worrying about safety;
6. This lack of communication skills raises the hurry up syndrome: team performance is degraded due to the pressure to which tasks are fulfilled quickly.

Hurry up syndrome is a negative factor often pointed out in reports of accidents and incidents.

In a flight of this airline company, as a result of the hurry, an employee became trapped in the airplane luggage's area. Luckily, a passenger who was on the toilet heard muffled screams coming from the aircraft floor. The airplane had to come back to the airport, further delaying the flight because they lost their time on takeoff, going back to the end of the row.

Considering the human side, it is mandatory that airlines' professionals have a clear understanding on the contents of any communication in high risk environments and perceive its peculiarities. Techniques of communication skills must be taught and practiced in Communication Skills Training (CST), to generate a more assertive communication, in order to prevent an accident or incident In Aviation operations.

## **Types of communication**

In the Aviation field there are several types of communication. The most commonly used are the written communication as internal communication, e-mail, bulletin boards, newsletters, reports, posters and signage.

The synchronous verbal communication used by Flight dispatchers, airport attendant and crew are developed in a person-to-person basis. So, it is different from the verbal communication between pilots and flight controllers that is synchronous but has not physical presence. In this case, the tone of voice and the words issued are the most important elements.

In synchronous verbal communication with the physical presence of the issuer and receiver, the non-verbal communication, commonly referred to as body language, is also important. If

a person, in a person-to-person communication, shakes hands, smiles or blinks this person is communicating or responding a message with other individuals.

Another type of communication, which is intermediated by automatic systems, is the communication developed between pilots – cabin - and the command of the aircraft. This communication can be one-way, when referring to reading navigation instruments, or involve the usage of vision, hearing and talking capabilities aligned with judgement. We must recognize that different approaches are required for different types of communication and situations.

### *The written communication*

The written communication is widely used in air transport operations, such as reports, documents, logbook, operation manuals, etc. However, for an effective written communication it is necessary to be clear, objective and know the language used by the receiver.

Anyway, to express, by writing, ideas, guidelines and information requires ability to write clearly, what should be an ordinary ability among professionals in Aviation. Usually, the goals regarding writing practice are focused on obtaining and providing standard information and promote a specific action.

The usage of a flight dispatcher to fill up the forms and process the flight plans is a daily practice in Aviation. It is expected from flight dispatchers and the crew, high standards in writing skills which is considered necessary to correctly process all the required forms and to provide a clear understanding on the written information therein.

For aircraft maintenance personnel, for example, the communication includes a lot more information than verbal interaction. That's because communication does not include just the face-to-face interaction, but also, and mainly, the written communication such as documents related to the procedures, orders and reports.

The aircraft maintenance is an ongoing process which is carried out in shifts. In this way, changing shifts is usually done through reports and working cards, is an asynchronous communication because it does not occur in real time. So, during their training, it is important that the student is trained for this particular form of communication, knowing not only how to interpretate texts, but also write correctly what should be executed in the next shift.

Nevertheless, in a study developed by Parke, Patankar and Kanki (2003) which approaches communication problems, and that was based on maintenance incident reports, from July 1998 until March 2002, the work cards were singled out as a contributive factor to a greater percentage of incidents involving communication problems. That's because the works cards are related to the transmission of written information to guide the next shift turn on the tasks that need to be performed. Therefore, gaps in understanding in written orders may result in errors.

The current practice of hiring foreign airlines mechanics, aiming to reduce operational costs, is becoming a growing problem. Harris and Smith (2009) pointed out that the vast majority of

foreign airplane mechanics does not have communication skills in English. They present difficulties in writing and understanding written instructions manuals and working cards and even verbal communications of supervisors and this is a big problem for security.

Goglia (WFAA-TV, 2009), who is a member of the U.S. National Transportation Safety Board (NTSB), said that when you bring in a person who can't read the manual you raise the risk. When you bring in a person who doesn't understand the verbal instructions from a co-worker to his supervisor you raise the risk. Of course, the downfall is when a person can not read, write or even understand English. In this case, there is a serious safety problem going on there.

If the mechanics do not have the correct skills to interpret what is written in the papers and books, this lack of skill affects the security as a whole and not just the maintenance sector. For example: one of the reasons cited by investigators in a plane crash was caused by incorrect connection of cables of aircraft control surfaces.

Normally, when mechanics repair a part of the aircraft, they open the manual, consult the logbook and make the repair step by step, as if it were a cookbook. Instructions and illustrations should be clear otherwise it may induce the mechanic to committ error as the example below.

August 2010, I was assigned to the tailcone Emergency Escape Slide (EES). I had not completed this job before. I followed the Job Instruction Card (JIC) and finished the task. As I remember, the jobcard images were small and hard to read. I signed the logbook and jobcards thinking this job was complete and correct. The aircraft was one hour late for the original ready time. I was informed today (June 2011) that this aircraft had a mis-rigged slide lanyard on the tailcone slide. (ACN: 954070, 2010)

Aircraft documentation is an essential tool to achieve the goal of a safe flight. The ability to write and understand this documentation is vital to the safety of airline companies. So, efforts are needed to increase the skills of written communication of all involved.

### *The Internal Communication In Air Operations*

An accident results from a combination of latent failures - organizational aspects - and active failures - human performance (REASON, 1990). Such failures, whatever their nature, need to be detected in time.

It is good to note that the latent failures, which can lead to a catastrophic event in Aviation, are not unique to aircraft projects. Many times, they are included in faulty or obsolete communication processes, which are not changed in its due time. Concern is also in badly written messages which lead to errors in procedures, which are executed and assumed as true, along the time. "Thus, latent failures may accumulate invisibly" (REASON, 1990).

The excerpt below was pasted from the Final Report-067, which attributes to the lack of communication among organizational sectors as one of the most contributive factors of a Brazilian aeronautical accident.

As an worsening circumstance, as the safety management in each sector organized autonomously, there were different approaches and distinctives criteria to procede within the company, what denotes a lack of standardization and implies no possibility of crossing relevant safety information across the sectors, such as in the cases of lack of communication between the "Safety (Dept.)" and the "Training (Dept.)" and in between "Safety" and the "Maintenance" (CENIPA, 2009).

It is very risky to issue safety communications through e-mails. It can also become a problem if it is dissociated from an overall communication policy effectively designed, built and planned, that seeks for key stakeholders´ participation, especially, in this case, from the staff of an airlines operation. This lack of ability in internal communication is illustrated in the excerpt below, taken from the Final Report number 067, for a Brazilian plane crash:

"Safety Communications" with the crew were made only through corporate e-mail, without an instrument of control that would certify that the information provided would be effectively read, giving away an important element of communication: feedback (CENIPA, 2009).

Mouden (1992) exposes his point of view on the need for properly trained professionals, trained and sensibilized to handle internal communication in an airline company. He noted that internal communication is less effective than it was believed. Nevertheless, the matter is to be found out just after an undesirable event.

Despite the fact that organizations define collecting information as a routine to assist communications assertive process, most of them never use that information. Managers seem to suffer of a "communicative rush ill", eventually deciding to communicate before evaluating the best way to do it and how this communication can affect the airline operations.

It is also important to develop methods and techniques for auditing internal communication in Aviation. A tool that allows making a complete assessment of Safety issues, detecting the origin point and probable causes for arrisen errors committed by a crew member.

This tool can reveal serious risks to safety, if it is proven that the communication raised by the company is dissociated from a safety policy. Communication auditing should cover issues such as listed below:

- Do the managers demonstrate a systemic vision of the communication? Do they have communication skills to generate messages?
- Is the safety communication written in a comprehensible form?
- Is there a communicative feedback?
- Is there an open access to the upward communication (lower hierarchical levels to the superiors) and horizontal communication (between people considered equal in the organization's hierarchy)?
- Does The airline generates a planned communication?

*Low Communication Skills Means High Risk For Aviation Safety*  
*VIEIRA, Ana, DOS SANTOS, Isabel, DE MORAIS, Paulo*

- Are there communications regarding the rewards schemes, production and productivity? If so, how do the professionals are committed to security?
- Is the information clear, in particular when it comes to orders and instructions?
- Are the messages set to the values of Safety in Aviation regulations?
- Is the pace of information changing fast-paced?
- Does it allow an intelligent decision-making process?
- Does the process generate some opportunities to correct errors and restore credibility?
- There is an information overload? (Noting whether they are excessive or deficient of appropriate volume)Is there information overload?
- Are There multiple outbreaks of internal communication causing communication conflicts? (several managers sending messages without consulting each other)

The incipience of internal communication can eliminate the credibility of published information. The lack of confidence in the information disclosed by the organization generates a natural channel and parallel source of information that start being more reliable than the formal communication — a serious problem, cited as one of the most contributive factors of a Brazilian plane crash in Final Report-067:

As a result of this lack of integration, informal communication ended up prevailing in the company, made often in an embodied manner, rather than in formal procedures with the usage of previously established channels, which could not work in favour of an effective management of operational safety. And, once this atmosphere was reflected in the aircraft cockpit actions safety may be affected. In the case of the operator, the lack of integration in the communication between (companies) sectors was given the impression that communications were neglected, badly defined, conflicting, and the formal communication should be overcome by informal rules and values, generating confusion within the organization (CENIPA, 2009).

The lack of adequate internal communication can generate the following undesirable consequences:

- a) The decay of the quality of the work and index of performance;
- b) Losses regarding time and money, considering errors that come from important information that never come, messages that are misread;
- c) Frustrations and high levels of stress.

Investment in training, in order to develop the communication skills is the role of any organization in search of a solution to reduce conflicts in the organization that widespread within the Organization and that interfere directly in the Safety approach.

### *Automation and communication*

This kind of communication requires an interpretative capacity, experience and judgment. As even being nurtured by the avionics control systems that, for safety, are usually redundant, it is necessary to distinguish, at least, the inconsistencies between the information coming from different electronic tools and sources.

Studies on incidents and accidents in aircraft's advanced technology have shown that the properties of the automation system can even create difficulties if they are not combined with effective communication and competences, what is required to coordinate those professionals involved in the operation (SPARACO, 1994).

The interaction and the search for results create the requirement of shared attention. This dyad "communication + shared attention" generates more effective decisions. Shared attention, according to Krieger (2005), is a state of consciousness achieved together in that communicative interaction in which the individuals involved will remain in an active state aiming to attend, respond and realize the information correctly. As a result, they remain continuously updating the incoming data, including the unexpected, unlikely, uncomfortable, implicit or controversial data, keeping them in line with their perceptions.

Since the beginning of the formation of the future professional of aviation, it should be emphasized that computer mediated communication does not replace the interpersonal communication, nor in the cockpit and between the pilot and air traffic controllers, nor in other sectors of the airline.

People and automated systems, both in flight and on the ground, are closely connected to each other and have to work in harmony to solve tactical problems: if there is a break down in the communication process between people and automatic systems, the lack of information can lead to an accident, as the example reported below. It is based on the final report about the accident occurred in June 29, 2006, typified as in-flight aircraft crash.

From this moment on, the transponder will no longer broadcast until he returned, approximately 58 minutes later. In this situation, based on existing rules, the controller should inform pilot about the disability on the reception of the aircraft's transponder. However, even with the directions seen on the screen, on the aircraft's board radar about the ineffectiveness of the transponder, it was not taken any attitude, both from the controller and from the pilot, to be certified the on-board equipment disability, and, if it was necessary, to increase vertical distance between the two aircraft involved. During the interviews, the crew said they have not realized any warnings referring to the STAND-BY condition of the transponder (BRAZIL, 2008).

Although most pilots recognize the need for more cross-checking procedures and the need of changing computer systems and programs, the data collected by experts during some flights of commercial airlines indicated that, even after the class when instruction have been given regarding the organization's philosophy about automation, there are many cases in which pilots do not communicate and take a long time to recognize programming changes (HELMREICH; HINES; WILHELM, 1996).

Automation has created new needs of communication skills, which added to the other requirements and skills. Training programs and devices can be designed and adapted and developed according to what is congruent within the local culture. An example is a Brazilian airline company in which the on-board computer was planned to issue the warning signs with a woman's voice. This option for a female voice has caused surprises and problems for foreign countries' pilots where men have not get used to obey orders from women.

The man-machine communication is extremely important, so much so that psychologists highlight the need to fit an automatic system for man, and not the other way around, as usually happens.

### *The communication vis a vis*

The planning stage, the briefing and preparation of a pilot a flight dispatcher, is an important tool to keep your information up-to-date and assist drivers in your questions.

In this stage, both written as well as person-to-person communication occur between both issuer and receiver and the perfect understanding of what is expected to be executed is critical to aviation safety.

The person-to-person briefing is an important support for the understanding of written documents. The transfer of personal information when accompanied by gestures and tone of voice expressing intentions is more eloquent than the formal written documents specifying past events and initiatives to be accomplished.

To develop communication skills and include this item in the scholar curriculum for pilots, airplane crew and ground professionals is justified by information collected on flight recordings and safety reports, suggesting that many accidents are not due to failures of aircraft systems, or technical failures on part of the crew.

In general, accidents are caused by interpersonal factors, such as, for example, inadequate communication between the crew members and other sectors, which in its turn leads to the loss of situational awareness and leads the team relationship to deterioration, culminating finally in a wrong decision or a series of decisions that result in serious or fatal accidents.

Ultimately better interpersonal communication between the CA and FO is needed. A strong factor in this loss of radio communication with ATC was a high level of animosity between the CA and FO. Throughout this rotation the FO was consistently hesitant and slow to perform her duties and when she did so she was often inaccurate and defensive. On the final leg of a multi-day trip, this less than professional performance by the FO began to wear on the Captain. There was minimum communication between the two by this point and when the FO was not willing to update the FMS as the CA requested the CA became very frustrated (ACN: 860386 2011).

The International Civil Aviation Organization (ICAO) encourages all professionals, in any situation, to listen, think and speak. These are the three major instances of verbal communication, and each of them is essential to create a message.

The potentially rich context of face-to-face communication can present risks of conflict when the words have a specific meaning and non-verbal indicators indicate the opposite.

Many companies advise employees to avoid approaching personally their leaders, suggesting the usage of the company's portal on the internet. What the crews have to communicate frequently is very important and relevant for flight safety. Virtual communication has smashed face-to-face communication, contributing to lose a number of important non-verbal communication, gestures, accents etc.

To increase the knowledge of management on security-related problems, an airline company has a reliable and great source: its employees. Employees hold a considerable collection of experiences, troubleshooting cases and applied knowledge that, once analyzed, can provide indicators of the strengths and weaknesses of a system. This source is available to managers, without any additional financial costs (ICARUS COMMITTEE BRIEFING, 1998).

### *Communication between ATC and pilots*

Communication between air traffic controllers and pilots continues to be a vital part of the Aviation. Communication problems between them may result in hazardous situations. A first step in reducing the incidence of problems in communication between these characters is to understand how and why the problems happen.

The spoken word and the voice are the only interpersonal elements available while exchanging information between controllers and pilots. It is necessary to consider that they are in different environments, with different needs and expectations, and their attention is shared with other tasks that must be performed simultaneously — and the number of channels of communication between them is limited, according to the European Air Traffic Control Harmonisation and Integration Programme (EATCHIP, 1996).

According to ICAO, between 1976 and 2000, more than 1,100 passengers and crew lost their lives in air crashes and accidents in which the issues of language had a contributive role (MATHEWS, 2004).

Incorrect or incomplete communication between controllers and crew is a direct or circumstantial factor in 80% of incidents or accidents, according to a survey compiled by NASA using ASRS database (FLIGHT SAFETY FOUNDATION, 2000, p. 1).

The communication channels between pilots and controllers are limited, and, despite numerous transmission networks, with highly technical data, the spoken word remains the most important tool in between these professionals: the speech is the only resource available for the interpersonal exchange of information between pilot and controller.

To be skilled in the communication process means that the pilot information and requirements will be properly comprehended. The ATC communications will be formulated with accuracy and the possible ambiguities will be solved through active listening. Research and clarification, when necessary, will also help. A standard procedure to reduce and prevent accidents is to verify if the contents of a communication routine have been well received and comprehended. Did you copy that?



Pilots and controllers can avoid misunderstandings giving each other timely information in advance and asking again whenever they notice the lack of any information, confirmation or correction. Therefore, the ATCs must be notified as far in advance as possible, so that they can make a timely recognition. When the interlocutors do not seek to resolve such discrepancy, in which there is an unanswered question, they are communicating without critical thinking.

Kanki and Smith (2001) stated that when the receiver does not understand an instruction, a feedback to the speaker can generate a correction or clarification. If the response does not match the need, the speaker should ask for clarification until the need is fulfilled: the insistence on the approach can ensure the correct understanding.

Red flags indicate disagreements or misunderstandings. Whenever a listener disagree or feel any reaction of uncertainty from the issuer, as different voice tone, questions rather than statements, or even the silence, that might mean hesitation, he should immediately try to clarify the situation before it becomes too late.

The professional should be trained to understand words or expressions that set up red flags, although the dynamics of communication contributes to renew the collection of this type of words. In short, riders and drivers must learn to recognize the failures of communication processes and stay alert for the moments in which a red flag arises.

The training in active listening should be introduced early in the training of controllers and pilots in order to contribute to the identification of small details that can transform such failures in assertiveness rather than catastrophes.

Flight controllers and pilots must be skilled communicators and develop the sensitivity to capture the greatest range of signs available. They must be flexible enough to quickly change their own attitude, in order to change a communication that may deteriorate and cause an accident. Unqualified communicators tend to present a narrow range of behavior.

Flight controllers must possess the skills needed to establish immediate communication and against any kind of significant change, including weather conditions, wind speed or direction of the wind, surface, visibility, to name a few; in addition to convey other important information that may assist in the trial and pilot planning.

It is imperative to monitor and anticipate unwanted situations that may occur during the flight and communicate correctly hazards and risks in a timely manner, to manage appropriate measures in order to solve the problems detected.

Narrative: 1

[...] Since both aircraft were northwest bound, I assigned the second aircraft a heading that would turn him inside the on course heading of the first aircraft due to the second aircraft going to further northwest then the first, I waited until the Departure Controller had the information on both of the aircraft prior to transferring communication of either aircraft. While both aircraft were initially separated and coordination was written on the strip of the second departing aircraft it was not written on the strip of the first aircraft or verbally coordinated, which would have prevented

the Departure Controller from turning the first departure on course before turning the second departure and prevented a loss of separation. Recommendation, call the RADAR Controller to inform him of the plan (ACN: 931957, 2011/02).

Narrative: 2

I was working RADAR with little traffic. The Tower sent to me 2 back to back departures. When the 1st aircraft called, I gave him a turn left on course to the north northwest and as he un-keyed his radio, the 2nd aircraft called about 600 FT lower and 12 mile behind and left of the 1st. Improper or missing strip marking and no verbal coordination. Recommendation, the Local Controller should not have tried to shoehorn the 2nd aircraft up the 1st because there was no need for it whatsoever. Thirty seconds of additional separation and it would not have happened (ACN: 931957, 2011/02)

Therefore, it is essential to the safety of a controlled flight, a perfect communication between the pilot and controllers in all phases of the operation to increase situational awareness, helping the pilot and controller to develop a mental picture of what is happening.

Also, in the context of the dynamics between controllers and supervisors there is a need for efficient communication. Problems in this area can adversely influence the decision-making, resulting in inadequate and ineffective actions, which reflects an ineffective coordination of resources on the team.

According to Caballo (2006, p. 104), the communication skills training makes it possible to develop cognitive skills that enable the development of more precise expectations about the behavior of the other; expectations of more positive consequences; more tolerance in relation to conflicts; more auto verbalizations positive; look at the situations from multiple perspectives; and greater content knowledge assertiveness.

## **CONCLUSIONS**

The theoretical approach and the cases here explored allowed visualization of logical foundations that support the approach of how it is crucial to develop communication skills for Aviation Safety, managing teamworks with efficacy is a matter that should be emphasized in all training aviation professional.

Effective communication provides a cohesive and supportive structure and helps to promote a safety culture. The systemic vision of the communication provides a strategic understanding on the need of interacting people from different sectors to work cooperatively. Communication Skills training provides the mechanism by which knowledge and understanding can be improved to avoid risky behavior and this was illustrated through examples provided throughout this study.

People who present well developed communication skills can effectively communicate themselves and develop other mechanisms that are essential to involve employees in safety activities and to obtain cooperation and support for maintaining a positive safety culture.

Leaders must generate positive models of integrated communication, aiming to reach: a) assertive decision-making and troubleshooting; b) emotional balance (sync); c) cooperation collaboration connection; and d) promotion of changes.

Communication should be audited and explored at all levels of the organization mainly to assess the quality of the communication.

All types of communications contribute to aviation safety. For this reason the industry need people with high communication skills in all sectors.

## **REFERENCES**

- ACN: 860386 (2011). ASRS. FAA. Washington, DC, USA.
- ACN: 931957 (2011). ASRS. FAA. Washington, DC, USA.
- ACN: 954070 (2010). ASRS. FAA. Washington, DC, USA.
- CABALLO, V. E.(2006). Manual de técnicas de terapia y modificación de conducta. Madrid: Siglo Veintiuno.
- CENIPA - Centro De Investigação E Prevenção De Acidentes Aeronáuticos. (2008). Relatório Final A-022. Brasília, DF, Brasil.
- CENIPA - Centro de Investigação e Prevenção de Acidentes Aeronáuticos.(2009). Relatório Final A-067, Brasília, DF, Brasil.
- Dickinson, T. L., & McIntyre, R. M. (1997). A conceptual framework for teamwork measurement. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team Performance Assessment and Measurement, Theory, Methods, and Applications* (pp. 19-43). Mahwah, NJ: Lawrence Erlbaum Associates.
- EATCHIP. European yearbook, [S.l.], v. XLIV, 1996.
- Flight Safety Foundation.(2000). Approach-and-landing accident reduction. *Flight Safety Digest*, v. 19, n. 8-11, p.1-196, Aug-Nov 2000.
- Harris, B. And Smith, M. (2009). Airplane Mechanics Unable to Read Repair Manuals Written in English. WFAA-TV, on Saturday, May 16, 2009.
- Helmreich, R. L.; Hines, W. E.; Wilhelm, J. A.(1996). Common issues in crew resource management and automation use data from line audits. Austin: University of Texas.
- Icarus Committee Briefing. (1998). A Briefing For Airline Senior Management. *Managing for Safety*: publication of FSF, Alexandria, Virginia, USA, n. 4, Mar. 1998.
- International Civil Aviation Organization.(2009) *Safety Management Manual (SMM)*. Montréal: International Civil Aviation Organization.
- Kanki, G. B.; Smith, M. G. (2001). Training aviation communication skills. In: SALAS, E.; BOWERS, A. C.; EDENS, E. *Improving teamwork in organizations: applications of resource management training*. Mahwah: Lawrence Erlbaum Associates.

*Low Communication Skills Means High Risk For Aviation Safety*  
*VIEIRA, Ana, DOS SANTOS, Isabel, DE MORAIS, Paulo*

- Krieger, J. L. (2005). Shared mindfulness in cockpit crisis situations: an exploratory analysis. *The Journal of Business Communication*, v. 42, n. 2, p.135-167.
- Lorenz, E. (1979). *Predictability: Does the flap of a butterfly's wings in Brazil set off a tornado in Texas?* Cambridge, MA, USA: MIT.
- Mathews, E. (2004). New provisions for English language proficiency are expected to improve aviation safety. *ICAO Journal*, vol. 59, 2004, p. 4-6.
- Mouden, L. H. (1992). Management's influence on accident prevention. Paper presented at 37th The Management of Safety Seminar, Baltimore, MD, Apr. 1992.
- O Estado de S. Paulo, (Ago, 21, 2007). "Companhia aérea sugere boca fechada e revolta comissários". Beth Moreira.
- Parke, B.; Patankar, K.; Kanki, B. (2003). Shift turnover related errors. In: SYMPOSIUM OF AVIATION PSYCHOLOGY, 12nd, 2003, Daytona, OH, USA. Paper... [S.l.]: ASRS.
- Reason, J. (1990). *Human error: models and management*. New York, NY: Cambridge University Press.
- Reason, J. (1997). *Managing the risks of organizational accidents*. Aldershot : Ashgate.
- Senge, P. (2006). *The fifth discipline: The art and practice of the learning organization*. New York, NY: Currency/Doubleday.
- Sparaco, J. (1994). Human factors cited in French A320 crash. *Aviation Week and Space Technology* [S.l.], n. 30 , 1st Mar. 1994.
- Testimony A. (2008). Electronic Message sent to the airline's crew members and granted to the authors, the deponent has requested confidentiality in the identification of the source.
- Testimony B. (2008). Verbal information, personal interview granted to authors under condition of confidentiality in the identification of the source.
- Testimony C. (2008). Electronic message, sent to the airline's crewmembers and courtesy of to authors, the deponent has requested confidentiality in the identification of the source.
- Torquato, F. G. (2004). *Tratado de Comunicação Organizacional e Política*. São Paulo: Thomson.
- WFAA-TV. (2009). News 8 Investigates: Airline mechanics who can't read English 10:03 AM CDT on Saturday, May 16, 2009 by Byron Harris / WFAA-TV.
- Vieira, M. A; Dos Santos, I.C. (2010). Communication skills: a mandatory competence for ground and airplane crew to reduce tension in extreme situations. *Journal of Aerospace Technology Management*. São José dos Campos, V.2, N.3, p. 361-370, Sep-Dec, 2010.