SAFETY CULTURE ASSESSMENT AND INTERVENTIONS AT LUND UNIVERSITY SCHOOL OF AVIATION

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ABSTRACT

This study describes the safety culture at Lund University School of Aviation (LUSA) at two occasions, separated by a period of approximately one year, and the effects of the interventions that were carried out during this year. The study was conducted by means of two attitude measurement surveys with interviews after the first survey and opportunities for the respondents to propose improvements and give general comments in both surveys. Pilot students, flight and theory instructors, the management group, maintenance technicians and administrators formed the target group.

Two research questions were formulated:
1. Can a safety culture analysis identify system properties, that may induce gaps between procedure and practice?
2. Can the results of such analysis form the basis for organizational interventions that may provide prerequisites to bridge such gaps?

Behavior is closely related to and influenced by a person's attitude to certain matters, such as persons, objects, concepts or properties of a system (Guldenmund, 2000). Changes in attitudes to safety matters of the entire population indicate changes in the safety culture (UK's Health and Safety Commission, 1993). A higher acceptance of safety-enhancing matters provides improved prerequisites to bridge existing gaps between procedure and practice through modification of the procedure itself or by enforcing the adherence to it. The culture of an organization also provides guidelines for behavior to its members.

Among other system properties, the study shows that production pressure (in here equal to "time pressure", or "lack of time") is a prevailing factor that may affect flight safety negatively. The attitude group "Learning" has also received extensive attention. The survey outcome points out that the pilot students do not perceive themselves as equally assessed by the instructors, and many free-text proposals are related to the contents of the flight training programs.

The outcome differences between Survey 1 (in 2012) and Survey 2 (in 2013) indicate that the attitudes to safety matters have changed slightly in a positive direction. It is my conclusion that a safety culture analysis can identify system properties that may induce gaps between procedure and practice, and, based on the same results, that organizational interventions can change attitudes and thereby provide prerequisites to bridge such gaps.

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1. INTRODUCTION

Lund University School of Aviation (LUSA) is a training institution that provides basic flight training for pilot candidates. 12-20 pilots are trained each year, and the school operates 6-10 training aircraft from an airfield, mainly used for training purposes. LUSA employs in total approximately 30 staff: Part- and full-time employees, consisting of theory (ground) instructors, flight instructors (some are both theory and flight instructors), aircraft technicians and administrative personnel. Some of the flight instructors work part-time at LUSA, part-time as pilots for commercial airlines, operating heavy aircraft types. LUSA facilities are allocated to two buildings some 500 meters from each other, and to a hangar.

The school, initially operated by the Swedish Air Force and since 1998 a part of Lund University, had at the time of the analysis a cooperation with University of Tromsö (UiT) in pilot training matters. As a part of this cooperation, flight instructors from UiT conducted training of LUSA's pilot students at LUSA's facilities during the years 2010 and 2011. Both instructor categories have been working in parallel at LUSA with both LUSA's students and UiT's students.

After ten years of incident-free training flight operations, the school suddenly suffered three serious incidents, so called "propstrikes" during the years 2010 and 2011. A "propstrike" is an event where the aircraft is landed with a bounce, compensated by the pilot with too much unintended nose down maneuver, resulting in a propeller contact with the runway surface. Only mechanical damages were caused, but the incidents caused much concern.

In spite of extensive efforts, the accident investigation did not reveal any common factors that could explain the incidents. In the absence of obvious relations between them, they could easily be considered as stochastic events, and, considering the time frame of ten years, they should not cause much alarm.

However, still concerned and not fully convinced by the formal accident reports, management decided to look for a general understanding of the situation by means of a safety culture analysis. It shall be noted that there have been no serious accidents at the school since 1998, when it was integrated in Lund University.

For the analysis, the following research question was formulated: *Can a safety culture analysis identify system properties that may induce gaps between procedure and practice?*

In order to establish whether safety-related interventions can improve the safety culture, the study was conducted as a longitudinal study, and a second research question was formulated: *Can the results of such analysis form the basis for organizational interventions that may provide prerequisites to bridge such gaps?*

2. THEORETICAL FRAMEWORK

In order to establish a base for the analysis, a literature review was carried out to find different research in and definitions of applicable concepts, such as "culture", "safety culture" and "attitude". During the work, it was obvious that production pressure was a critical factor, why additional literature reviews, related to high workload, were made.

2.1. Culture and safety culture

Culture

The term culture is itself an elusive concept with many different meanings, subject to the domain in which it is used. Often the word means a refined mind related to education, art and literature. The concept of culture is also used to describe the characteristics of a group of individuals who together can constitute a nation, an organization, a business or a family. Gert Hofstede describes culture as the "collective mental programming that distinguishes the members of one group or category of people from another" (Hofstede, 1991, p. 5). Human attitudes and behavior are influenced by the culture in which the individual grew up and lives. The culture manifests itself in phenomena such as values, rituals and customs, heroes and symbols (Hofstede, 1991).

Within sociology, culture is described as "the values that the members of a group share, the norms they follow and the material objects they create" (Giddens, 1994, as cited Antonsen, 2009, p 4). Social anthropologists prefer a wider approach and include knowledge, beliefs, ethics and customs (Antonsen, 2009). This provides a more holistic view of the culture. Analyses and descriptions can not be made by only attitude surveys or other forms of measurements, anthropological methods are required.

Diane Vaughan describes a culture as "a set of solutions, produced by a group of people to meet specific problems posed by the situations that they face in common" (Vaughan, 1996). She also claims that a culture generally is typified by a dominant worldview or ideology. For instance, in a technical organization belief in technical redundancy can be dominant. This view puts her closer to the social anthropologist category.

Frank Guldenmund, one of the most prominent contemporary researchers studying safety culture, has given an overview of research and development in the field of organizational

culture, including a number of references to literature and published articles on the subject (Guldenmund, 2000), later followed up in articles 2006 and 2007, and with co-authors Hale, Loenhout & Oh in 2010. The following culture characteristics, based on descriptions by several researchers, have been compilated (Guldenmund, 2000, p. 222-225):

An organizational culture:

- Is a <u>construct,</u> meaning that it is abstract and described by people, not a tangible, observable object. This gives researchers considerable freedom to define and operationalize culture, also resulting in many disagreements.
- Is relatively <u>stable</u> over time. Periods of five years are mentioned.
- Has several <u>dimensions,</u> such as communication, participation and management. How these dimensions are labelled is often subject to the situation and what the researcher is looking for,
- Is <u>shared</u> by the members of an organization,
- Can consist of several <u>subcultures,</u> for example "service culture" and "safety culture"
- Is visible through <u>human behavior, symbols and artefacts</u>
- Is <u>functional</u> in that it provides guidelines for behavior to the members of the organization.

As a contribution to this description, I wish to add that culture can not only constitute guidelines for behavior, but also be a barrier to development.

Some researchers see culture as made up of layers (Schein, 1992, Hofstede, 1992), sometimes compared with the layers of an onion. In the center are the core values, most difficult to reach and most difficult to change. When they are questioned people often get annoyed, sometimes without understanding why. The inner layers are often referred to as *ideas*, or the *core of the culture*, while the outer layers, where we find behavior, attitudes, rituals and symbols, are named *behavior layers* or *climate,* since they are easy to observe and measure with, for example, attitude surveys (Guldenmund, 2006). The further out from the center, the more visible the culture. Attitude surveys can give an understanding of the outer layers, but interviews and anthropological methods are necessary to get further into the onion. Although not all researchers refer to the onion analogy, it is a useful tool to separate the different perspectives. The anthropologists focus mainly on the core as the culture (Giddens, 1994, as cited Antonsen, 2009, p 4), while others consider the entire onion as the culture, from norms and values to procedures (Van Hoewijk, 1988, as cited in Guldenmund, 2006).

A few examples of layers that some researchers have mentioned:

Edgar Henry Schein describes organizational culture in three levels:

” I.   Basic assumptions.

   II.   Espoused values.

   III.   Artefacts.”

(Schein, 1992, as cited in Guldenmund, 2000, p 247)

Other researchers mention more layers and other descriptions:

• Hofstede: Values – rituals – heroes – symbols,

• Deal & Kennedy: Values – heroes – rites and rituals – communication network,

• Van Hoewijk: Fixed convictions – norms and values – myths, heroes, symbols, stories – codes of conduct, rituals, procedures

(as cited in Guldenmund, 2006, p iv).

For the purpose of this study, the compilation, described by Guldenmund (Guldenmund, 2000, p. 222-225), was used as a theoretical base. The fact that it emphasizes that the culture is subjectively described by people and not a neutral object, that it underlines the importance of certain elements, such as communication, participation and management, and that the culture contains sub-cultures of distinguishable employee categories makes it suitable for a study at LUSA. It also allows certain freedom to modify the definition of the culture itself to adapt to different organizations and conditions.

Safety culture

The concept *safety culture* is relatively modern and is said to have been mentioned the first time in the accident report following the Chernobyl accident 1986 (Guldenmund, 2006). James Reason, a well-known researcher, states: "Few phrases occur more frequently in discussions about hazardous technologies than *safety culture*. Few things are so sought after and yet so little understood." (Reason, 1997, p 191). A quote to consider.

There are a number of different definitions of safety culture, and I include a few of them in this report. James Reason describes safety culture as based on four factors: Reporting, Just, Flexible and Learning. Together these factors form an Informed Culture, which is equal to a safety culture (Reason, 1997, p. 195-197):

In a safety culture people are willing to report own and others' errors and near-misses. The willingness to report is however depending on how the reports are handled by the organization. In a just culture the reporters do not run the risk of punishment unless gross negligence, wilfull misconduct or similar can be proven, which will reduce the willingness to report. Absence of feed-back on submitted reports will have the same effect. On the contrary, people are encouraged, or even rewarded, for submitted reports. Willful misconduct, sabotage and similar actions must however have some kind of negative consequence. If not, it would be considered unfair by people not involved. It should be known by everybody what is acceptable and what is not. It should be possible to make an oral report to someone else than one's own manager, since he or she may be part of the problem. It should also be easy to make a report and have full understanding of what will happen with the report.

A safety culture also means that the organization is flexible. It can quickly re-organize to meet internal and external threats and handle mistakes and errors. Decisions are delegated to where the expertise is, irrespectively of hierarchical level.

Finally, a safety culture is a learning culture. The organization learns from accidents and incidents at all levels, people know about safety regulations and procedures, risk are continuously discussed and safety training is an ongoing process.

Dekker (2007), in contrast, claims that it is not possible to define a line, separating acceptable from unacceptable behavior. The assessment will vary from organization to organization and from case to case and is depending on who makes the assessment.

Human error is considered as a symptom of problems deeper in the system, and individual responsibility, if obvious, can be executed through "forward-looking accountability" by providing information about the event, contributing to learning and the avoidance of similar events in the future.

UK's Health and Safety Commission has formulated the following:
The safety culture of an organization is the product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programmes. Organizations with a

positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficiency of preventive measure (UK's Health and Safety Commission, 1993, as cited in Reason, 1997, p. 194).

Reason's definition of a safety culture (1997, p. 195-197) (see above) was selected as a base for the design of the survey. In addition to its clear structure of different elements forming an informed culture, Reason's work addresses high-risk operations, such as transportation in general and aviation in specific. It is also suitable for this study (a combination of the psychological, analytical and the experience-based), since it is partly descriptive, partly normative, while the anthropological, academic method is purely descriptive. Reason (1997) also emphasizes reporting as one of the main features of a safety culture, often a quantitative outcome of an analysis, a property of the experience-based, applied method.

However, some topics, addressed by other researchers, such as competencies, trust and communication (UK's Health and Safety Commission, 1993), participation and management (Guldenmund, 2000), are mentioned but not identified as main topics in Reason's work. In order to increase the understanding of these topics, I found it necessary to add four new attitude groups. This decision is also based on my previous experiences from similar projects.

The four added groups are:
- "Information and communication", intended to provide a deeper knowledge about information flow from management and communication between management and employees and between units in the organization.
- "Participation", intended to provide a deeper knowledge about the employees perception of beeing a member of the organization, seen as an operational team.
- "Competence and resources", intended to provide a deeper knowledge about the employees perception of, and confidence (trust) in, the organization's ability to handle safety matters in terms of competence, technical and monetary resources.
- "Feedback and assessments", intended to provide a deeper knowledge about pilot student's and instructor's attitudes to how assessments are made and feedback is given. Is there a clear line between "approved" and "not approved"? Since this is a part of the learning process in the organization, it is considered to be a part of the safety culture.

In addition, and in contrast to Reason's statement that there is a clear difference between acceptable and not acceptable behavior, Dekker claims that there is no clear line between the two (Dekker, 2007). On a micro-level, this is applicable also to the assessment of pilot students at LUSA, and was given attention when designing some of the survey questions.

Hence, for the purpose of this study, my definition of a safety culture is a culture, where:

- The reporting system is efficient and works, it catches threats to the organization (technical deficiencies, mistakes, lack of resources, etc.), gives feedback to the reporters and results in the elimination of threats. Management, employees and in certain cases concerned authorities decides whether it works or not.

- There is justness, a balance between safety and accountability,

- The organization is flexible and can quickly adapt to internal and external changes,

- There is learning from incidents and accidents on all levels,

- Information flow and communication between units and the environment is efficient as assessed by the concerned parties (employees, management and outside parties).

- Everybody feels as being a member of the team, informed, respected and influential,

- Competence and resources are on a sufficient level for all employees,

- Open, honest and as fair as possible feedback and assessments are given to all employees.

2.2. Safety culture analysis

Safety culture analyses are traditionally characterized by a psychological approach and includes attitudes and behavior in relation to safety. Besides the psychological approach there is also the engineering approach, which is more related to safety systems to control the behavior in organizations. These methods are often normative and the purpose is to improve the safety culture. There are however trends towards a more anthropologically inspired approach, which will put less emphasis on immediate improvements and more on a description before turning to the improvements (Antonsen, 2009).

Methods for analyzing

Guldenmund describes three methods for analyzing a safety culture (Guldenmund, 2006):

Anthropological, academic approach:
The method is essentially qualitative and seeks to understand rather than evaluate the culture, i.e. it is not normative and not assessing the culture as "good" or "bad" or "need change". It is

based on the idea that culture is something the organization <u>is</u>, not <u>has</u>. In contrast, if an organization <u>has</u> a culture, it indicates that it is something that may need to be changed in some way (Smirchich, 1983, as cited in Hofstede, 1991, p. 180). Edgar Schein (1987) has built on this concept and calls it a clinical research, aiming at an analysis of what an organization want to be and what it is, for instance in terms of safety. Ideally, the study is initiated by a definition of a problem, or something that has turned into a problem. Data emerge from interviews, observations, document studies and similar. The researcher may need to live or work in the organization for a long time to reach sufficient understanding.

Psychological, analytical method:

This method is more quantitative, since it is often carried out with surveys and requires relatively large populations. The idea here is that culture is something an organization <u>has</u>, not <u>is</u>; the outcome is normative and may indicate that there should be a change.

Experience-based, applied method:

This method is normative and aims to describe and rate the safety culture, such as deemed "weak" or "strong", and contains recommendations for actions for improvement. The method can point to a current weak state and a future, desired strong state, and until the strong state has been achieved, the improvement work must continue.

Although it does not give a full understanding of the inner layers and basic values of the organization, a combination of the psychological, analytical method and the experience-based, applied method was used for this study. This combination constitutes a quantitative method supported by interviews and free-text comments with opportunities to provide normative assessments of the culture and proposals for improvements.

Since the outcome to a certain extent will be normative, it is worthwhile noting the following: Among researchers it is discussed whether there is a causality between a good safety culture and a low number of accidents and incidents in an organization. Today's research on safety culture is however based on a strong assumption that there is such causality, although empirical evidence is lacking (Antonsen, 2009, p 2).

Safety Culture Surveys

Bailey & Petersen claimed the following advantages with employee surveys:

1. The effectiveness of safety efforts cannot be measured by traditional procedural-engineered criteria like safety reviews, audits and inspections;

2. The effectiveness of safety efforts can be measured with surveys of employee perceptions;

3. A perception survey can effectively identify the strenghts and weaknesses of elements in a safety system;

4. A perception survey can effectively identify major discrepancies in perception of program elements between hourly rated employees and levels of management;

5. A perception survey can effectively identify improvements and deterioration of safety system elements if adminsistered periodically.

(Bailey & Petersen, 1989, as cited in Ostrom, 1993, p. 164)

The survey has the advantage of presenting a first impression of the reaction of a large number of respondents and is therefore a superficial tool to evaluate the safety culture. Only the outer layers of the onion can be analyzed. This is sometimes called the *safety climate*, which refers to more transient characteristics, which are more visible and easier to change. *Safety culture* is a concept of a higher level of abstraction, showing traits that are more stable over time (Antonsen, 2009). To reach deeper into the safety culture the surveys must be supplemented with interviews and, if possible, on-site studies for a longer period of time (anthropological method). In this study, safety climate and safety culture are considered as one field of research, just as Antonsen does in his works (2009).

A few remarks about using a survey as a tool: The conditions around the respondent when answering the survey and the possible influence from various sources are difficult to control. Since all the respondents belong to the same organization, the sub-cultures may be difficult to distinguish unless the respondents specify to which sector of the organization they belong. There is also reason to suspect that the respondents have a tendency to answer questions and statements as they would like the culture to be, not as it is in reality. Examples are issues of transparency in the organization, where the respondents easily can give a more positive picture of the openness than the organization deserves (Guldenmund, 2007).

Based on the arguments, presented by Bailey & Petersen (Bailey & Petersen, 1989, as cited in Ostrom, 1993, p. 164), a survey was selected as one of the methods for this study.

Perceptions and attitudes

Bailey & Petersen (1989) refer to employee perception surveys as an effective tool to measure the effectiveness of safety efforts. Current thinking in the field generally is also in line with the idea that attitudes are cognitive representations of a person's positive or negative evaluations of different objects. An object can be another person, a piece of equipment or rules and regulations, but it can also be something else than a physical object, such as behavior or risk (Roberts, 2010). Another categorization of objects is: Hardware/physical environment, software, people and behavior (Guldenmund, 2000, p. 248).

But are perception and attitude the same? Earlier contributions to the field rests on the assumption that attitudes are more than perception and consist of three components: The cognitive component, related to the beliefs of the individual about the object, the emotional component, related to the emotions connected with the object, and the behavior component, related to the behavioral readiness of the individual associated with the object (Krech, Crutchfield, Ballachey, 1962).

For the purpose of this study, I find it necessary to use the earlier, expanded concept of an attitude by also including factors like own knowledge, emotions and behavior. As an example: It is important to know whether an employee dares (emotion) to speak up (behavior) when he/she sees something that may threaten safety. Safety-critical objects at LUSA include objects such as buildings, aircraft, IT-systems, regulations and procedures, people and behavior.
In line with this view, the definition of an attitude can be formulated as "an organization of concepts, beliefs, habits and motives associated with the object" (McKeachie & Doyle, 1966). Attitudes can not be observed directly, researchers have to make inferences about how positively or negatively a person feels about an object, based on the different kinds of information that they can observe (Roberts, 2010). Each statement in the surveys in this study represents an attitude, and the attitudes are structured in attitude groups.

2.3. Changes in safety culture - interventions

In order to change a safety culture, various forms of interventions are required. Examples of such are education, re-organizations, new or revised rules and procedures and replaced or added resources. Guldenmund describes four factors that are considered important for interventions to achieve a cultural change (Hale, Guldenmund, van Loenhout, Oh, 2010, p. 1035):

Energy, creativity and support:

The importance of management's commitment to develop and maintain a safety culture is demonstrated in virtually all studies. Among the companies that managed to improve its safety culture are companies that have undergone difficult periods of investment ban, re-organizations, layoffs and the like, as well as businesses that did not experience these problems. This shows that such problems do not constitute a basis for a failure to improve the safety culture. To achieve results a deliberate and massive effort is required. It takes a critical mass to overcome the resistance to change that exists in all organizations in terms of a large number of independant interventions. The mere establishment of formal safety management system appears to have little or no effect.

Involvement and support of the members in a process of learning and change:

The most important factor is communication between management and employees, often based on an effective reporting system. The organizations that improved its reporting system, and also perceived the increasing frequency of reports as an indication of a higher level of safety rather than a lower, have also improved its safety culture. This included that the reports received feedback, even if the message was "no action" and the reason for that. Training and education are considered as necessary but not sufficient interventions to initiate a change of safety culture. Courses must be conducted in such a way that dialogue, discussions and meetings are encouraged. Written information is also necessary, but not sufficient. A survey of safety culture is in itself a part of learning and a form of intervention. It also provides opportunity for dialogue and learning. An emotional element in the process can also strengthen the process of change. Example of such a feature is to put forward personal consequences of accidents.

Education and motivation of management:

In large organizations, management often has only statistics and KPI:s (Key Performance Indicators) available as a basis for decisions. A better understanding of what these statistics represent in reality can provide improved conditions and increased motivation to solve the problems.

Systematic planning of interventions:

The fourth success factor is the systematic implementation of the interventions (training, organizational and procedural changes, etc.). An unplanned implementation of various actions without a clear context produce no change in the safety culture.

Simard and Marchand (1996) highlights in a survey study the importance of what they call "micro-organizational factors" in terms of safety initiatives. Their results show that the special participation of management personnel in monitoring the process increases the willingness and motivation to promote safety initiatives. (Simars and Marchand, 1996, as cited in Guldenmund, 2000). In fact, such procedure is regulated in aviation and is called "supervision", which means that a chief pilot or a chief flight instructor is flying with and monitoring the pilot evaluated.

2.4. General consequences of production pressure

Following the results of Survey 1, interviews and free-text responses, further literature studies were conducted related to the notion of production pressure and time constraints. According to Rasmussen (1997) the functions of a production organization are locked in by three boundaries; the economic, the workload and the safety boundary. Exceedance of any of these boundaries will result in a breakdown of the production system, which may include unwanted events. In an organization that is exposed to too high production pressure as a result of limited resources and work overload, people tend to find faster and easier ways to do the work. This generally means an approach to the safety boundary. Shortcuts or new, unauthorized procedures and practices may lead to "drift to failure" (Dekker, 2011), an unnoticed deviation from given rules and procedures, or even "normalization of deviance", a to a higher degree accepted and even internally published deviations from established standards and procedures (Vaughan, 1996). The arguments can be "it has worked before" or "if I do not deviate, I will not be able to reach my goal", or similar.

Deviations, however, shall not immediately be considered as something bad. Hollnagel (2009) refers to the "Efficiency-Thoroughness Trade-Off Principle" (ETTO). The ETTO Principle addresses that the reasons for why some things go right and some things go wrong are essentially the same, and the important conclusion is that it is more important to learn from what goes right than from what goes wrong. The principle illustrates that if we are too thorough in what we do, we will fail, we will not finish in time, and if we are too efficient, we may make mistakes that also results in a failure, a balance act that we all have to apply. The message here is that a deviation from an SOP or a routine can lead to a justified development to increased effeciency with maintained safety. The conclusion is that a reporting system can reveal deviations from SOP:s and routines, but that the challenge is to assess whether the deviation shall lead to a modified procedure or enforced practical application.

2.5. Gaps and bridges

Other researchers also emphasize the importance of "bridging the gaps". From the medical field five strategies to handle gaps between procedure and practice are reviewed, all applicable to other domains:

- Model adaptive systems and variability:
  Observe how the operator at the "blunt end" successfully handles challenges through adapting to various circumstances.

- Identify unintended cascading effects from systemic change:
  Be observant of unexpected consequences of system property changes.

- Make activities and communications of team members observable:
  Ensure communication and visibility of the processes' elements for all members.

- Support "sacrifice decisions":
  Ensure that sacrificing decisions (sacrificing efficiency for increased safety) are encouraged and supported.

- Monitor the gap between standard operating procedures and actual practice:
  Identify the gaps and adapt procedure or practice.

(Patterson, E. S., Cook, R. I., Woods, D. D., Render, M. L., & Bogner, S., 2006).

3. METHOD

Two identical surveys were carried out, combined with an intermediate series of in-depth interviews to get further understanding of the Survey 1 results and free-text comments from the respondents in both surveys.

The research questions require not only a safety culture analysis, but also a systems analysis, taking into consideration properties such as physical location of facilities, certain work procedures and production pressure. Such data was retrieved from interviews and free-text comments.

3.1 Survey

Objective

The aim was to identify the employees' and the students' attitudes to safety matters by means of two surveys, "Survey 1" and "Survey 2", and the possible change that has been achieved as a result of the in-between interventions. The surveys were executed with approximately one year in between. Two reminders were sent out during each of the response periods. Due to a disturbance in the Internet availability, the response period for Survey 1 was extended one day. During the intermediate period a number of interventions (see Section 3.6. "Interventions") were implemented by LUSA.

Design

The design was based on the works of Reason (1997), UK's Health and Safety Commission (1993), Guldenmund, 2000) and my own experiences from previous similar work, including not published work in the aviation, maritime and health care sectors. Eight attitude groups were formed:

- Reporting,
- Justness,
- Flexibility and Learning,
- Information and communication,
- Participation,
- Competence and Resources,
- Feedback and Assessments.

For each of these groups a number of statements, each representing an attitude, were formulated, based on examples from Antonsen (2009) and my previous experiences from similar projects, adapted to the operating conditions and environment at LUSA. The statements per attitude group are listed in Appendix 1.

The respondents were asked to agree or disagree to the statements on a six-point Likert attitude scale, one of the most common tools for this purpose. One of the advantages is that it is quickly transferable into numbers (Howitt & Cramer, 2005, p. 246).

In the survey, the following scale was used (Howitt & Cramer, 2005, p. 246):
1 = Disagree strongly
2 = Disagree
3 = Agree with great doubt
4 = Agree partly
5 = Agree
6 = Agree strongly

The respondents were also given the opportunity to write free text with suggestions for improvement of flight safety or general comments. Based on their clear roles and functions at LUSA, the first survey target group was divided into the following identifiable categories:

• Current students

• Former students

• Flight and theory (ground) instructors

• LUSA Management Group

• Technicians

• Administrators

The two latter groups were too small to include in the survey, even if they are added to each other. The reason to include them anyway was to get indications of which topics that should be addressed during the interviews.

On request by LUSA management, some target groups were added to the second survey. The reason for this was that groups from UiT were trained at LUSA's facilities for a major part of their training time. The following categories were added to Survey 2 (the numbers refer to the

year when the group of students started their training at LUSA or UiT):

- TFHS 10 (abbreviation of Trafikflyghögskolan, the Swedish name of LUSA.)

- TFHS 11

- TFHS 12

- UiT 10

- UiT 11

- UiT 12

One part of the two surveys was intended only for pilot students and flight instructors.

During the processing of the survey results, it was obvious that a few statements have been misinterpreted or omitted by some repondents, which was also verified during the interviews. In a few cases, this resulted in a large response change from Survey 1 to Survey 2. For some statements, the range of responses were also large, indicated by high standard deviations, possibly the result of serious disagreements in the group, or of misinterpretations. The population is quite heterogenous, and a pilot may interpret a statement different than an administrator.

Bearing in mind the loss of accuracy in data but to exclude the possibility of incorrect improvements, caused by the factors mentioned above, I have excluded statement responses with a standard deviation exceeding 1,2, which corresponds to approximately 32 % of the responses. All effects by this calulation is accounted for next to the spider web diagrams. In most cases it had no or reduced effect on the change from Survey 1 to Survey 2, which shows that the improvements, shown in Graph 56, have not been exaggerated.

3.2. Interviews

Objective

The purpose of the interviews was to deepen the understanding of the results of Survey 1.

Method

The design of the interviews was inspired by the "Critical Incident Debriefing" technique (CIT), initially developed by Sir Francis Galton in the 1930s and further developed by John C. Flanagan as a method to study the behavior of pilots in the U.S. Army aviation during World War II. According to Flanagan, the method is a way of collecting direct observations of human behavior in order to solve practical problems and to design psychological models.

In line with CIT, the interviewees were asked to tell about own experiences of events, that could have threatened flight safety, direct or indirect. However, having told about these events and instead of focusing in depth on them, the interviewees were allowed freedom to tell about anything they found critical for the safety culture at LUSA, thereby switching to a narrative interview technique.

Execution

Six individuals and three groups were interviewed during two days at LUSA. The interviewees were asked to talk about their experiences, related to the factors to be analyzed. Questions asked per category are given in Appendix 4. To avoid restrictions in the responses and dialogue during the interviews, a tape recorder was not used. Notes were made, and immediately after the interview, I used a tape recorder to record as unbiased information from the interviews as possible.

The interviewees were selected according to my specification of categories and availability of respondents on the interview days. All interviews were opened with information about the background, purpose, selection, anonymity and a few words about the interview method.

Interviewed persons were:
1. One technician,
2. One student,
3. One flight and ground instructor,
4. One flight instructor,
5. One group, consisting of representatives of the management group, two students and two flight instructors,
6. One group, consisting of one flight instructor, one student and one representative of the management group,
7. One group, consisting of one flight instructor and one representative of the management group.

The interviews lasted approximately 1,5 hours per interview, after which I recorded summaries on the tape recorder and later wrote and coded the material.

Focus of interviews

In conjunction with a presentation of the Survey 1 results in August 2012 to all LUSA personnel, each statement and the corresponding outcome was commented and discussed. Based on these discussions and proposals from the audience, the following statements from Survey 1 were selected and used for further and deeper analyses during the interviews:

5. I always report when I see something that may threaten flight safety.

7. I always report about conditions that may threaten flight safety, even if I believe that it may affect another student or a colleague negatively.

8. I can report flight safety related occurrencies to which I have contributed myself without risking adverse consequences for me personally.

19. LUSA instructor behavior is always a good example when it comes to flight safety culture.

25. Departments within the LUSA collaborates well when it comes to flight safety issues.

26. In my position and with my tasks in the LUSA I have sufficient competence to monitor and improve the flight safety.

30. Planning of lessons and flight sessions are always done in consideration of flight safety.

32. Cooperation between the departments at the LUSA is characterized of flexibility and without prestige.

41. I always get factual assessments by my instructor/my manager if I have contributed to a situation that threatened flight safety.

42. Students' achievements are always assessed fair and equally, irrespective of which instructor that makes the assessment.

43. There is never pressure for time during flight sessions, there is always plenty of time for, for instance, repetition of a flight manouever.

44. The intentions of the flight instructor during a flight session are always clear and understandable.

45. The relationship between student and the instructor during a flight session is always open and honest.

46. There is always plenty of time for the briefing before a flight session.

47. There is always plenty of time for the debriefing after a flight session.

Five main interview questions were then designed by the author to initiate the interview discussions and to catch comments to the above statements, proposed by the audience at the 2012 meeting:

1. ”What characterizes a safety culture?”

2. ”Tell me about an event, or a condition, that could have threatened flight safety, direct or indirect.”

3. ”What characterizes good and poor briefings, debriefings and good and poor flight sessions.”

4. “Tell me about an event when cooperation i the organization worked very well, and one when it did not work so well.”

5. "Which are LUSA's main challenges?”

3.3. Free-text proposals and comments

The respondents were asked to provide free-text proposals for increased flight safety at LUSA and general comments. The purpose was to assess a possible correlation between the survey responses, the interview question and the free-text answers. Free-text comments in the surveys could be given on three levels: Proposal 1, Proposal 2, Proposal 3 and a fourth section with the opportunity to write general comments. It is reasonable to believe that the respondents stated the most important proposal on level 1, the less important proposal on level 2, and so on, thereby setting a certain priority.

3.4. Coding of interviews and free-text proposals and comments.

During the process of analyzing the interviews and the free-text proposals and comments, the responses were coded, based on their main contents (see Table 1 and 2), and themes were created. This coding and frequency measurement for each theme allowed a comparison between the survey outcomes on one hand and the interview and free-text comments on the other. It also gives an impression of what ”people have on their minds”.

Time Pressure, marked ”TP” in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposal or general comments, that were related in words or meaning to lack of time, irrespective of the reason for this perception (such as ”bad planning”, ”too late information of changes”, etc.)

Learning, marked ”L” in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related in words or meaning to training programs, the contents of them or methods.

Communication, marked "C" in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related in words or meaning to the lack of, or contents of, communication.

Meetings, marked "M" in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related to requests for more meetings or proposals for subjects to be addressed.

Reporting, marked "R" in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related to reporting or reporting procedures.

Organization, marked "Org" in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related to organization, work distribution or economic resources.

Planning, marked "P" in interview comments and in Appendix 3

Comments during the interviews or in the free-text proposals or general comments, that were related to proposals for improvement of planning.

Others, marked "O" in interview comments and in Appendix 3

Comments, during the interviews or in the free-text proposals or general comments, that were not possible to relate to any other category.

3.5. The analysis

From a quantitative perspective, a comparison between the number of times the coded interview responses were mentioned, and the corresponding number of coded free-text comments was made (Table 1 and 2).

From a qualitative perspective, I interpreted and commented from a personal point of view the outcome of the surveys and the quantitative results under five headlines. The results were put in the context of LUSA, and possible biases due to different interpretations by the respondents and weaknesses from a safety culture perspective were pointed out. The five headlines were:

- General trends,

- Time and production pressure, planning,

- Learning and standardization,

- The reporting system,

- The organization.

3.6. Interventions

The interventions were based on the results of the Survey 1, including statistics and free-text comments and proposals, and following discussions and seminars with LUSA employees, management and staff.

Feedback from Survey 1, 22 augusti, 2013

The purpose of this meeting was to give feedback from Survey no 1. During the meeting, the results were reviewed, and the statements to be further addressed during the interviews were identified together with the employees. The reasons to review certain statements were in general that the outcome was surprising and unexpected, or that the statement had been interpreted in different ways by the respondents. A list of the statements can be found in the section "Focus of interviews" in this chapter.

Safety culture seminar January 10, 2013

The purpose of this training seminar was to increase the general knowledge of basic culture concepts with focus on safety culture and some accident theories. After the seminar, the results of the interviews were presented and discussed.

NOTECHS seminar January 11, 2013

The main purpose for this seminar was to provide a forum for safety discussions between the flight instructors, based on the survey outcomes and the forwarded requests during interviews and the free-text responses. As the topic for the seminar a training program for NOTECHS, a CRM assessment tool, was used. The practical exercises offered good opportunities for discussions about flight safety matters and standardization.

Supervision flights with all flight instructors

Supervision flights means that the Chief Flight Instructor observes all flight instructors during flight training. The purpose is to ensure standardization and proficiency of the flight instructor.

Co-location of staff members

To counteract the split between LUSA departments, a number of staff members have moved from one of the school buildings (main building) to the other (the hangar). This is the beginning of a long term process, which aims at having all employees co-located.

4. RESULTS

4.1. Results, Survey 1

Response rate:

- Number of distributed questionnaires: 63
- Number of answered questionnaires: 43
- Percentage answered questionnaires: 68%
- Number of free-text comments: 54

Number of respondents per category:

- Current students: 21
- Former students: 4
- Flight and ground instructors: 9
- Flight School Management: 4
- Technicians: 2
- Administrators: 3

The categories "Former students" and "Technicians" and "Administrators" are small groups and give uncertain results. "Technicians" and "Adminstrators" have been put together in one category and the responses were reviewed separately in the interview phase.

The comments to the statements in the following are only commented as "low", "high", "very low", etc., and without validation whether it is "good"or "bad".

4.2. Results, Survey 2

Response rate:

- Number of distributed questionnaires: 97
- Number of answered questionnaires: 58
- Percentage answered questionnaires: 60%
- Number of free-text comments: 64

Number of respondents per category:

- Current students: 3

- Former students (excluded):   1
- Flight and ground instructors: 12
- Flight School Management: 4
- Technicians: 3
- Administrators: 1
-   TFHS 10   6
-   TFHS 11   3
-   TFHS 12   10
-   UiT 10   3
-   UiT 11   6
-   UiT 12   6

The categories in Survey 2 have been structured as follows:

- Former student (excluded):   1
- Current students: Current students+TFHS 10+TFHS 11+TFHS 12 *):   20
  (Two respondents were removed from the total number of 22, due to
  empty survey forms)
- UiT: UiT10 + UiT 11 + UiT 12:   15
- Flight and ground instructors: 12
- Flight School Management: 4
- Administrators and technicians: 4

*) By mistake, the category "Current students", that should have been replaced by the pilot student groups in Survey 2, was not removed from Survey 1. Three students, of which one delivered a blank response, marked the category "Current students" in Survey 2. The other two were transferred to the largest group, LUSA, to minimize the impact of the mistake.

4.3. Results per attitude, attitude group and category

The results are presented as average ratings and standard deviations within brackets. Histograms and data are presented in Appendix 2, in which former students and UiT students are represented by two separate bars (UiT with a striped bar). The spider web diagrams below (Graph 1-8), show changes in average ratings for each category without corrections for high standard deviations as decribed in Section 3.1. The data point "Former students, UiT" shows average ratings for "Former students" in Survey 1 and "UiT students" in Survey 2. Graph 9 shows changes in average for all categories from Survey 1 to Survey 2.

Graph 1: Reporting
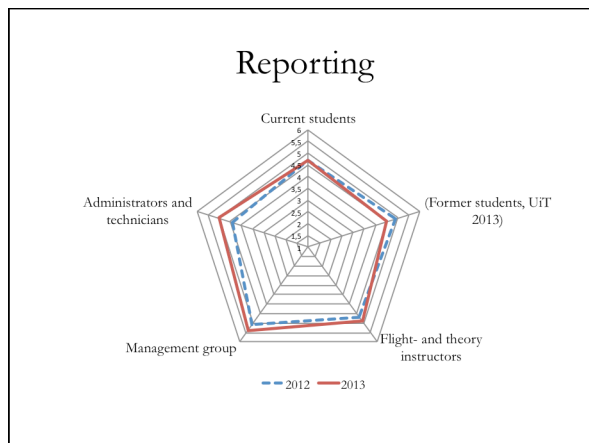
Results of "Reporting"
All statements and categories (except UiT)
Mv 2012:   4,7   s<1,2: 4,9
Mv 2013:   5,2   s<1,2: 5,4
Change: +0,5   +0,5

Graph 2: Just culture
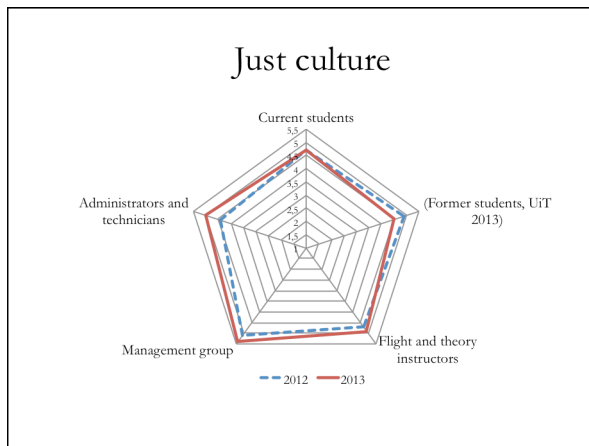
Results of "Just culture"
All statements and categories (except UiT)
Mv 2012:   4,8   s<1,2: 4,8
Mv 2013:   5,3   s<1,2: 5,3
Change: +0,5   +0,5

Graph 3: Information and communication
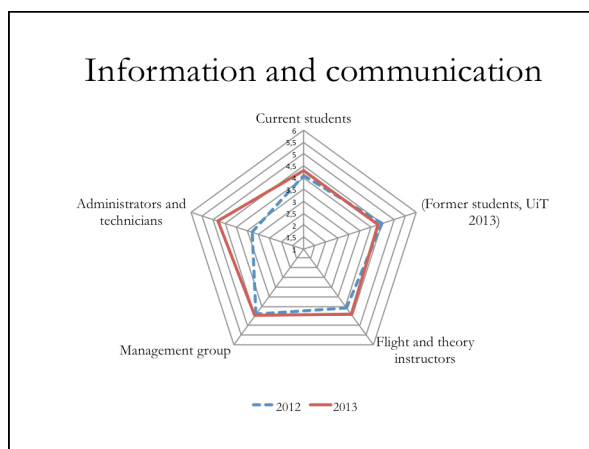
Results of "Information & communication"
All statements and categories (except UiT)
Mv 2012:   4.0   s<1,2: 4,2
Mv 2013:   4,6   s<1,2: 4,4
Change: +0,6   +0,2

Graph 4: Participation
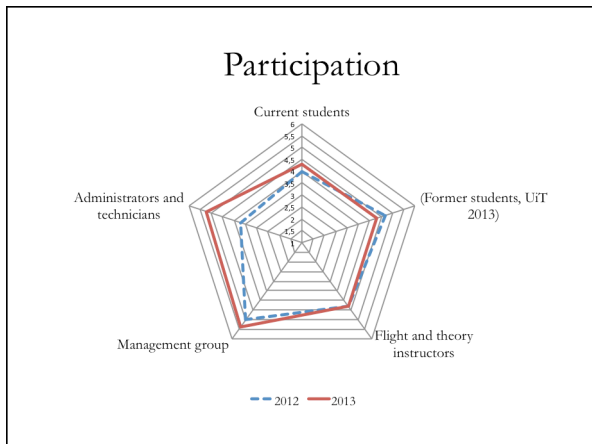
Results of "Participation"
All statements and categories (except UiT)
Mv 2012:   4,4   s<1,2: 4,7
Mv 2013:   4,8   s<1,2: 5,0
Change: +0,4   +0,3

Graph 5: Competence and resources
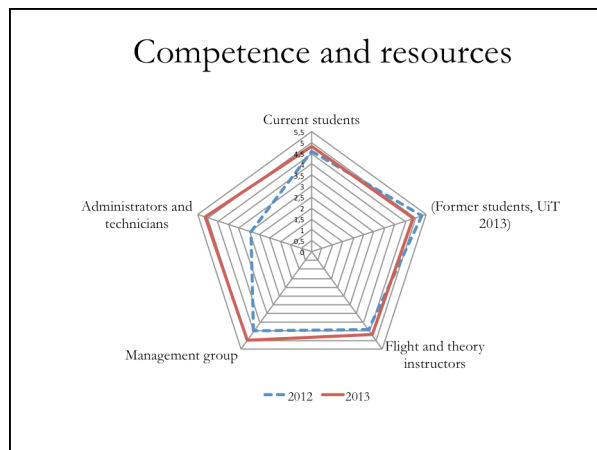
Results of "Competence & resources"
All statements and categories (except UiT)
Mv 2012:   4,4   s<1,2: 4,6
Mv 2013:   4,9   s<1,2: 5,0
Change: +0,5   +0,4

Graph 6: Flexibility
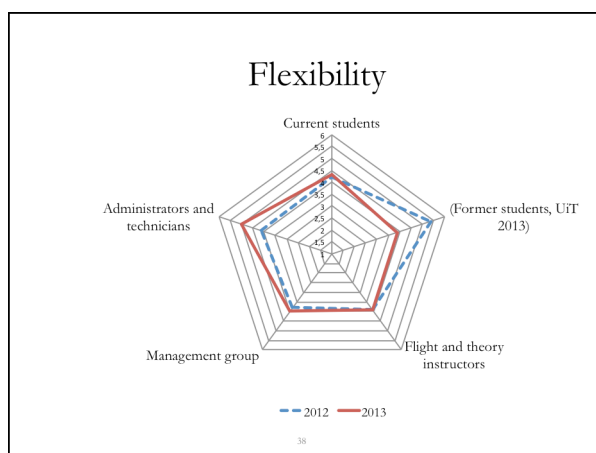
Results of "Flexibility"
All statements and categories (except UiT)
Mv 2012:   4.0   s<1,2: 4,1
Mv 2013:   4,5   s<1,2: 4,7
Change: +0,5   +0,6

Graph 7: Learning
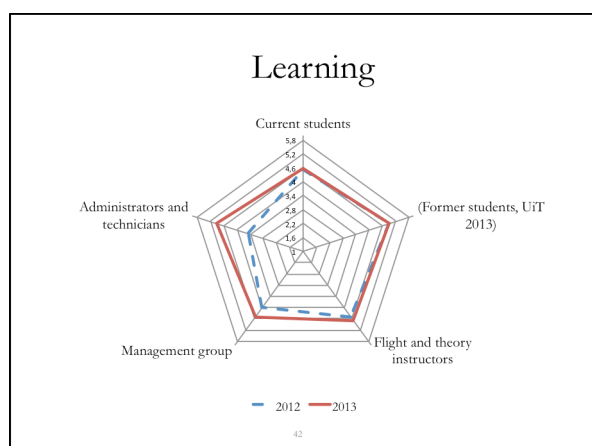
Results of "Learning"
All statements and categories (except UiT)
Mv 2012:   4,2   s<1,2: 4,4
Mv 2013:   4,7   s<1,2: 4,9
Change: +0,5   +0,5

Graph 8: Feedback and assessments, school flights
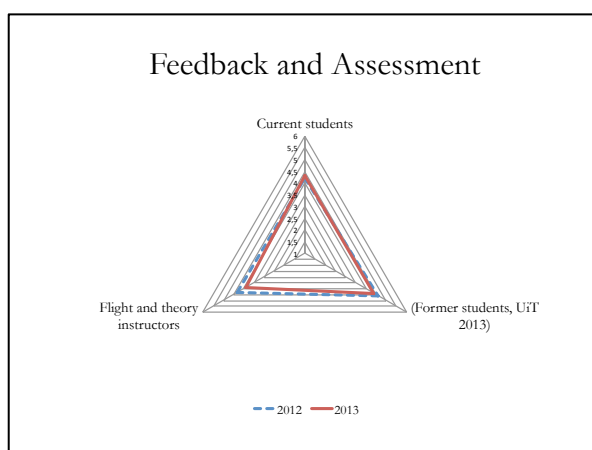
Results of "Feedback and Assessment"
All statements
Pilot students and flight instr. only (except UiT)
Mv 2012:   4,2   s<1,2: 4,3
Mv 2013:   4,1   s<1,2: 4,2
Change: -0,1   -0,1

Graph 9: Summary of results
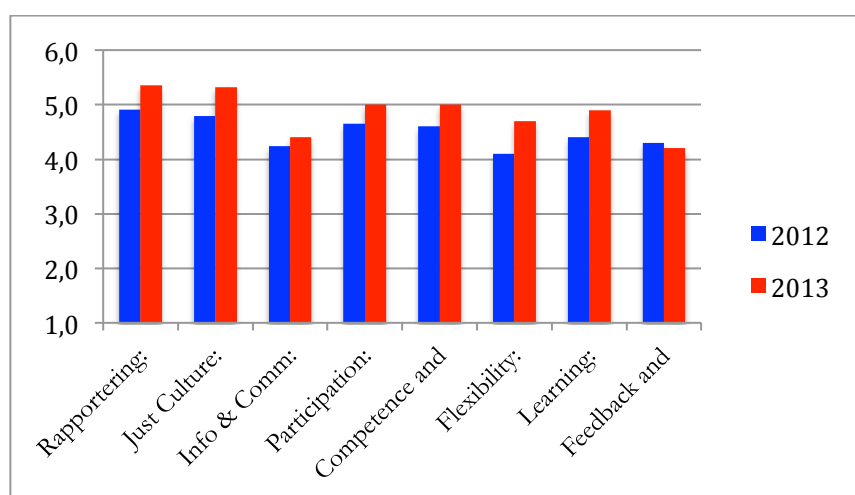
Mean values per attitude group, all categories (except UiT) with standard deviations below 1,2, corresponding to 32 % of the responses. The purpose of excluding standard deviations above 1,2 was to avoid exaggerated impressions of improvement. (see Section 3.1).

4.4. Results, interviews

The results are presented in a fairly rich way to give as adequate representation of the dialogues and group discussions as possible. Although they are presented as quotes they are summaries, made immediately after the interviews by means of a tape recorder, as described in Section 3.2. The responses were translated to English at a later date. My estimation is that the contents represent an 80 % accuracy of what was said during the interviews. All interviewees have responded to the questions and participated actively in the subsequent discussions.

The opening questions were inspired by the Critical Incident Technique (Flanegan, 1954), and during the discussions, topics that were prioritized at the employee seminar Aug 2012 (Section 3.2) were addressed.

The response codes are (see also Section 3.4.):

TP: Time Pressure

L: Learning, marked "L" in interview comments and in Appendix 3

C: Communication

M: Meetings

R: Reporting

Org: Organization

P: Planning

O: Others.

Interview question 1:

"What characterizes a safety culture?"

A high frequency of reports, such as NCOR (Non-Compliance Occurence Report) is a sign of a good safety culture. Quality systems, checklists, established procedures, orderly and moderate spontaneity is also considered part of the safety culture. An explicit priority of safety is perceived as a desire to create a culture of safety (Management Group member) (R, Org)

The concept of "mindfulness" (to be present, to be informed, to know what I myself and others do) was mentioned as a characteristic of a safety culture, as well as that financial resources are available. Effective communication, processes for the work to be performed,

consistency in behavior and harmony in the organization are other important factors. The existence of informal discussions about operational risks are also seen as a sign of a safety culture. (Management Group member). (M, C, Org)

All members of the organization are carriers of the culture, but most people are affected by the behavior of the immediate manager or instructor and see it as a "top-down" process. The top of the hierarchy sets the standards. To lead by example is also part of the safety culture, and the fact that no one says "it's not my problem." (Administrator) (L)

A sign of a <u>weak</u> flight safety culture is students and instructors moving around in the hangar during aircraft maintenance work. It is disturbing to frequently get the question "when is the aircraft ready?" Other signs are violation of procedures, checklists and regulations. Another sign is that "there is always a hurry." (Aircraft technician) (TP, Org)

The fact that we are physically separated can affect the safety culture negatively. The perception of cooperation is disturbed, the informal communication is hampered, subcultures are easily developed and it becomes more difficult to influence the culture. (Administrator) (Org)

The organization culture have changed over time. In the beginning there were plenty of resources, but these have been reduced step by step. Flexibility has decreased, regulations have become more extensive. (Administrator) (Org)

Interview question 2:

"Tell me about an event, or a condition, that could have threatened flight safety, direct or indirect."

I remember one occasion, when a crew took off without the logbook. When an aircraft is not serviceable, the crew submits the logbook to us for action. If the next crew forgets to pick up the logbook the following morning, they are consequently not aware of the complaint. This is of course a big threat to flight safety, and it has happened several times. Sometimes we have called the flight instructors together to review the rules instead of filing an NCOR. So we have both violated procedures. The reasons were probably time pressure and forgetfulness. (Aircraft technician) (TP)

I am sometimes uncertain of whether a complaint should go into the logbook or be reported as an NCOR. Take a broken sun shade, for example. Is it a threat to flight safety or just an annoying, broken mechanical device? (Pilot student) (L)

Often, information about new or changed flight sessions comes too late. It has happened that it did not come until the morning of the same day as the flight session should take place, giving too little time for preparation. Typically, such information shall be provided no later than at 1500 hrs the day before before a flight session. (Flight instructor) (TP)

There are three planning levels: Level 1: One semester, overview, Level 2: One semester, detailed, Level 3: Three weeks prior to the activity. In my opinion, the detailed planning of the semester is "unstructured", not really good data for the third level. Delays occur at all three levels, which of course puts great demands on the third level. In turn, it leads to increased stress and, in the worst case, elimination of some items in the lesson plan. (Flight instructor) (TP)

Once, I had four different instructors in seven sessions. There were really no consistency between them on some items, and afterwards I felt quite confused. I do not think this is satisfactory, but I guess it has to do with planning. (Pilot student) (L)

Fixed days for graduation ceremonies and coordination with "host airlines" (companies with which cooperation takes place in the Multi-crew Pilot License program, MPL) and their crew planning offer little flexibility and induce difficult planning challenges. The instructors that we hire per hour are not willing to be scheduled long time in advance. Some are retired and want planning flexibility in their lives, which creates difficulties for the planning department in terms of reduced back-up resources, leading to stress We are, however, dependent on these categories for our production. (Administrator) (TP)

I have seen instructors refraining from writing a note on an aircraft because an AOG (Aircraft On Ground) have such large and negative consequences in terms of delays. (Pilot student) (TP)

I remember another case, that worried me. In 2008, the National Board of Transportation decided that an upset-session (aircraft in unusual attitudes) should be included in the flight

training. LUSA decided that there should be two upset sessions instead of one, and added one. When delays occurred, the extra session was discarded and the school continued with just one. Too bad, it was a good decision to have two, but production pressure did not allow that. Similar has happened to the practice of cross-wind landings. Delays in the program and too little crosswind forced the school to move the landings to a second airport and then to a third, but the prescribed crosswind landing training was not completed. (Flight instructor) (TP)

Once, the EK-students (EK = own command, first solo flights) flew into bad weather and lost orientation. After that it was decided that there should always be a person on the ground as a coordinator and weather observer. Later it was decided that this feature was not needed, an instructor might as well take care of it from the air via radio. Instead, there shall be an EK-administrator in place when students get back to base. So far this is only documented in minutes of meeting, and I would not be surprised if this is also discarded due to lack of resources. (Flight instructor) (TP)

I think most people understand that the weather can cause problems in planning. I know that we could be more efficient if those who are both flight and ground instructors could teach ground training in case a flight session is cancelled. However, the teaching is done in half classes and synchronization can be difficult. Sometimes the reverse occurs, flight sessions are scheduled into a week of theoretical lessons. Since many instructors are employed by the hour it can be difficult for a flight or a ground instructor to adapt to that kind of flexible planning. (Administrator) (Org)

It is said by management and among ourselves that there is no production pressure to fly if you're hesitant about the weather. But everybody is aware of all the negative consequences of a canceled flight session. Take the risk of icing, for instance. I have seen experienced instructors say "let's go up and check!". But there is always the risk that an experienced instructor overestimates the student's ability. And I have also seen the other way around. The experienced instructor cancels the flight session with reference to the weather, while the less experienced may say "let's go up and check!", maybe under the influence of a macho culture. Then other, less experienced instructors may feel a pressure to fly, even if it is deemed not suitable. Students will of course see this, and the above may have contributed to the low value of the statement (no. 19). (Flight instructor) (TP)

I am concerned that all students are released for EK-flights at the same time. This may be caused by fixed dates in the schedule, but we must be aware that some are fast learners and some are slow learners. The release should be based on an observed maturity and proficiency. (Flight instructor) (TP)

I perceived a big difference in standards between the flight instructors from the Tromsö University and our own instructors. Tromsö University's flight instructors were more on a "flying club level" compared with our own, that I consider more professional. Eventually, this could create a threat to flight safety. (Pilot student) (L)

There is too little time for discussions between the flight instructors about how the training shall be conducted and about existing risks. We shall meet every Friday, but the meetings are rarely good. Some do not attend at all or leave early in a hurry to get home Friday afternoon. These meetings are of great importance to the safety culture and should be prioritized. (Flight instructor) (TP)

A decision made at a flight instructor meeting is often documented only as email, which is then easily forgotten. When the next class starts the decision will not be applied. (Flight instructor) (M)

In many cases, the discussions in the flight instructor meetings are concluded with a decision to "let's do this or that." I think more should be delegated to the flight instructors to decide according to their own, individual judgment. Of course, there is then the risk that the students get different instructions from different instructors. (Flight instructor) (M)

Different instructors have different standards for "passed" for the same maneouvre. Some instructors assess the performance with some margins, while others require a perfect maneouvre in the same situation. Of course I feel stressed and nervous about that and I feel I could have performed better if all instructors had the same requirements. Personal relations can of course sometimes be tense, but it is not a problem. (Pilot student) (L)

I have experienced several situations that could have resulted in propstrikes. If the student comes down with a little bounce after having landed long and tries to compensate for that with an immediate nose-down instead of a go-around, it can easily result in a prop-strike.

(Flight instructor) (L)

Once, when I was too high over the runway threshold, the instructor told me to reduce engine power to idle. Next time when I came in on the correct height but with another instructor, I did the same, although this is not correct according to the manual, which says "successive reduction"). There was no comment from the instructor. Then I thought this was the correct technique, and several of my classmates thought the same. There are also various instructions on where on the runway the aircraft shall be put down, immediately after the threshold or further down the runway. (Pilot student) (L)

The maintenance department is sensitive to sick-leave, and I think this could be a threat. Of course, we have backup from another maintenance supplier, but it takes time to get them here, and there is always the decision to be made: "Am I enough sick to just drop out? I know they have a big production pressure, and more delays will get some bad consequences". In general, I think that the redundancy for diseases, AOG, etc. at the school is very small. (Aircraft technician) (TP)

I don't understand how the response to the statement "I can report flight safety related occurrencies to which I have contributed myself without risking adverse consequences for me personally" (8) could be so low. I think it is a misunderstanding or simply a typing error when responding to the survey. (Aircraft technician) (O)

Interview question 3, flight instructors and students:
"What characterizes good and poor briefings/debriefings and good and poor flight sessions."

A good briefing is…:
>…when a student tells me what will happen during the session, especially the parts that requires thorough preparations. I raise one or two critical questions. The briefing does not have to be an exact review of the contents of the session, but a discussion about what may be difficult or risky. (Flight instructor) (L)

>…when the student (and perhaps also the instructor) perceives that something has been learnt. It was simply not just "good", but contains an analysis of what was good and why. (Pilot student) (L)

Sometimes "long briefings" (when the briefing covers several flight sessions or larger parts of the program with the entire class, not just one crew) are not always carried out. Then we have to cover a number of theoretical items in the briefings before each session. This takes time and sometimes there is not time enough to do it, those items are simply discarded. Once we had to go out to flying before the control surface effects and phraseology had been covered. (Pilot student) (TP)

A poor briefing is…:

…in general the result of bad preparations. There may not be enough time for a full briefing, or you do not make it into the core of the briefing. (Flight instructor) (TP, L)

A poor debriefing is…:

…probably the result of that the student does not accept his/her mistakes, which is a part of the training. Someone else or an external factor is responsible for the mistakes. (Flight instructor) (L)

A good flight session…:

…is when the crew is a little bit ahead of the schedule, so that they can take care of any mistakes and repeat some manouevres. (Flight instructor) (TP)

A poor flight session…:

…can be the result of bad preparations by the student or the instructor, or both. (Pilot student) (L)

Time pressure often occurs in connection with delays, but I think that it has improved the last six months. The time between flight sessions is extended to 40 minutes, but if delays occur, it is solved by reducing to 30 minutes, which can affect the time for briefing and debriefing. The number of double bookings has decreased, which also indicates that planning has improved. (Flight instructor) (TP)

The duration of briefings and debriefings are normally the planned 15 minutes. Sometimes it is sufficient, sometimes not, depending on the contents of the flight sessions. I think that briefing and debriefing time should be adjusted to the contents of the flight session and not be a standard time period. In general, I think that the time is well spent. (Pilot student) (TP)

Time pressure in flight sessions has decreased, they have become a little longer, but at the same time the number of sessions per day has increased from three to four sessions, thereby increasing the time pressure. Lack of time during the flight sessions often occurs during long navigation flights. (Pilot student) (TP)

Interview question 4:

"Tell me about an event when cooperation in the organization worked very well, and one when it did not work so well."

The introduction of MPL (Multi-crew Pilot License system), the acquisition of new aircraft and the change of MPL host airline from one to another have worked extremely well (Management Group member) (Org)

The ferry flights to our contracted maintenance facility do not function well. Although they are planned well in advance of the maintenance department, there is seldom someone in the flight operations department that can perform the flight. (Aircraft technician) (TP)

I think the decision to acquire iPads for the flight instructors for use during the training flights is an example of good cooperation between management and production. I understand that we technicians will also get such tools to facilitate the work on the aircaft. (Aircraft technician) (Org)

The aircraft technicians have their own culture, but their cooperation with other departments works well. I perceive the change readiness as low. Yes, there have been problems with prestige in our organization, but not any more. There may be a fear of conflict in the organization. The quality system handles only the aviation side, not the university side, which I perceive as a weakness. (Administrator) (Org)

Interview question no 5:

"Which are LUSA's main challenges?"
Responses, not in order of priority:
- To get all personnel together in the same building
- To maintain the good spirit and belief in the future
- A business concept and a vision for the future. What happens when the Tromsö

University starts their training production?

- To maintain the competence within LUSA when the future looks unclear,
- To get closer to the Lund University again, get researchers and graduate students back,
- Improved age distribution in the management group,
- Clearer management structure,
- To recruit good instructors.

General comments given by the respondents during the interviews:

The feedback and actions on NCOR:s have become better the last six months, but the process is sometimes not completed. An action is decided and implemented, but not evaluated whether the measure was effective or not. (Flight instructor, personal communication, Oct 25, 2012.) (R)

It is my opinion that there is an open climate at LUSA and that people dare to speak up when they see something that is wrong. (Pilot student) (C)

The cooperation between flight and maintenance departments has been tense, but now it is much better. The technicians are quickly ahead and fix things when something is wrong with an aircraft. (Administrator) (Org)

I can not explain the low response value for the statement "I can report flight safety related occurrencies to which I have contributed myself without risking adverse consequences for me personally." Maybe a mistake when filling out the form. (Aircraft technician) (R)

I can not see a problem in staff turnover, except for the category flight instructors. It takes a long time to train a new instructor, and if the new instructor is not happy with the introduction, there is a risk that he or she moves to another employer. (Flt instructor) (Org)

I do not have the impression that anyone consciously refrains from reporting, even if it may affect himself, or a colleague. (Aircraft technician) (R)

Referring to the statement "Cooperation between departments at LUSA is characterized of flexibility and without prestige" (32): I believe that the prestige between departments has been a problem, but not any more. Some people in the organization act in a prestigeous way, but it is not a big problem. I also think some may have interpreted the question as related to LUSA's organization as such, and that "we probably consider ourselves a little better than

other pilot schools." (Administrator) (Org)

I am concerned that time for meetings has decreased, both formally and informally. Flight instructors need more meeting time, and formal meetings with all staff were once held once a week or every other week, now it is just once a year. Members of the organization miss the informal communication in joint coffee breaks. (Flight instructor) (M)

There is some fear of conflict in the organization. Conflicts in the organization can not be managed by the reporting system, and LUSA's quality system only monitors the aviation side, not the university side. (Administrator) (Org)

The preparedness to change in LUSA is low. To some extent, the rigidness of the university's large bureaucratic apparatus contribute. The possibility to change something in the relationship with the university is small. (Aircraft technician) (Org)

The interest in activities in other departments at LUSA has decreased with increased workload. A few years ago there was an educational theme day at Lund University. 10 % of working time should be assigned to personal development and training. This has not commenced, rather "run out of steam." (Administrator) (L)

I think the flight instructors should receive additional pedagogical training. I know that many of us want better understanding of the aircraft maintenance work and more "disaster drills". The latter may not be so extensive each time, rather local exercises with greater frequency. (Administrator) (L)

The maintenance department have receded and formed their own subculture in the hangar. However, it seems not to have influenced the relations with other units or the performance of the department. (Administrator) (Org)

I am concerned about that the frequency of all types of meetings has decreased. (Administrator) (M)

4.5. Results of free-text responses.

All free-text proposals and comments (except one, excluded due to improper personal contents) are presented in Appendix 3. A few significant examples are (per theme):

Learning:

- More sessions in the traffic pattern, even in the later parts of the VFR phase and not only around EK-release. (Replace some TT-nav exercise or similar) (L)

Organization:

- Collaboration between landside and airside is the most important improvement I saw the school has to do. Planning ahead is something everyone needs to do to carry out their flight sessions in a safe way. (Org)

Planning:

- It feels strange that the planning is so different for the different classes. While some have two simulator periods per week, others have two simulator periods or flight sessions per day. (P)

Meetings:

- That you get the whole class together after a day or a week flights and tell each other what you have been doing and what you have learnt. (M)

Communication:

- Better communication between instructors, planning and students at the change of flight sessions/aircraft/session times, for instance by providing information via SMS or email if a change occurs after a certain time the day before the day with flight session, or on the same day. This would reduce the stress of planning and preparation, as well as reduce the risk of a missed session or that you do not have time to eat properly. (The latter can, in my opinion, make big impact on flight safety during long flight sessions) (C)

Reporting

- Encourage reporting of events even if they seem unimportant. Do this maybe once a week in connection with the briefings to be really clear about it. (R)

Time pressure

- No buffer time between sessions in case of delays. Not always time for a decent lunch, often just 20 min lunch. (TP)

Others

- Some of the questions in the form could not be answered by a former student. The form may be adapted to the category you choose at the beginning. (O)

4.6 Summary of results, interviews and free text comments:

Tab. 1: Number of times the referred themes have been mentioned during the interviews:

Theme	Number of times
Time pressure (TP)	19
Learning (L)	15
Organization (Org)	14
Meetings (M)	5
Reporting (R)	4
Communication (Org)	2
Others (O)	1
Planning (P)	0

Tab. 2: Number of free-text proposals and comments per theme:

Theme	Survey 1 (2012)	Survey 2 (2013)	Survey 1+2
Learning (L)	14	14	28
Organization (Org)	11	15	26
Planning (P)	13	10	23
Meetings (M)	8	6	14
Communication (C)	3	7	10
Reporting (R)	3	7	10
Time pressure (TP)	3	3	6
Others (O)	1	0	1

Note: One free-text comment has been excluded due to improper person-related contents.

5. ANALYSIS

5.1. First research question: "Can a safety culture analysis identify system properties that may induce gaps between procedure and practice?"

The analysis has revealed several gaps between standard operating procedures, or what is considered as best practice, and actual practice (Patterson, E. S., Cook, R. I., Woods, D. D., Render, M. L., & Bogner, S., 2006). Examples of such deviations, as extracted from interviews and free-text comments, are:

- Deviations from intended training plans,

- Shorter rest time between flight sessions than intended due to delays,

- Shorter time for briefings and debriefings than intended,

- Information about schedule changes later than intended,

- Not returning the log book to the aircraft (and flying away without it),

- Not submitting an AOG note due to the production consequences thereof,

- Different assessment of students by different instructors,

- Not closing the NCOR cycle,

- Instructor meetings not held regularly as intended.

System properties, that may have contributed to these deviations, are analyzed in the following.

Time and production pressure, planning:

Production pressure is a system property that causes some concern. In both the surveys (43, 46, 47), as well as in the interviews and the free-text comments, lack of time for preparations, briefings/debriefings and flight sessions is mentioned by both pilot students and flight instructors. Among reasons mentioned are that it is the result of change of planning at short notice, in turn induced by weather, aircraft on ground, (AOG), late release of planning, sick-leave or other factors. Irrespective of how caused, lack of time is of general concern in the organization.

LUSA is exposed to a production pressure, resulting in time pressure, like any production organization. Critical questions are whether the pressure is increasing risk and jeopardizing flight safety or not. The attitude may be found in any organization, nevertheless it should be recognized as an important factor.

During the interviews, there are several references made to events, caused by time pressure, and some of them are perceived as threats to flight safety by the interviewees. Although LUSA's policy says that production pressure must not affect safety, and that the flight instructors themselves decide whether a flight session shall be cancelled or not, all instructors are well aware of the negative consequences of a cancelled session; it means more pressure and stress. Delays mean that lost sessions have to be compensated for at a later date, and there is always a "hard" deadline.

The interviews also revealed that there are, in fact, deviations from rules and regulations, and sometimes they are not communicated. Several decisions at LUSA are changed due to production pressure, such as the cancellation of the extra upset training session and the reduction of number of contact persons during initial solo flights.

Production pressure can also be induced by cuts in available resources. Initially, LUSA was a part of the Swedish Air Force, and as a part of the military system had all necessary resources and a little bit in excess of that. In 1998, the school was transferred to Lund University, and a more stringent cost control was introduced. During the last five years, even more severe cost cuts were implemented as a result of pending competition with other schools for assignments from the Swedish Authority for higher vocational education, under which all domestic, government-financed basic flight training should be assembled to receive government subsidies for pilot training. This development may have exaggerated some of the employees' perception of reduction in resources, but it is a fact that LUSA has undergone extensive cost cuts during the last five years, of which the replacement of full time flight instructors for part time instructors is an important consequence.

It is a human and organizational characteristic to try to avoid the negative consequences of time pressure, and instructors may be tempted to finetune in order to carry out briefings or flight sessions. This does not necessarily mean that checklist items or logbook inputs, for instance, are deliberately omitted, but minor adjustments or modifications can occur. This may cause "drift to failure" (Dekker, 2011) or "normalization of deviance" (Vaughan, 1996), but a deviation may also be a justified development to increased efficiency. Too much thoroughness may lead to failure, just as too high efficiency, the importance is in finding out what goes well (Hollnagel, 2009).

Planning is another system property of concern in the organization. An interesting observation is that no proposals (0) for improvement of the planning process was spontaneously mentioned during the interviews (and the question was never asked), but a large number (23) of proposals emerged in the free-text proposals and comments. The large numbers of comments about time pressure and proposals for planning improvements may indicate a relation between the two.

The planning department has to balance management's demand for training production and the available resources for the production. In addition, it has to solve upcoming consequences of flight sessions that have been cancelled for different reasons, long-term and short-term, which may cause an overload in the planning department. Mistakes can easily have consequences for the time available and the quality of flight training, briefings and debriefings, which may reduce flight safety. The statement "Planning of lessons and flight sessions are always done in consideration of flight safety" (30) received low response values in both surveys. This may indicate insufficient resources and a need for improvement of the planning process.

Learning and standardization:
The theme "Learning" has received an extensive attention during interviews and in free-text comments. Although it is not exactly with the same intention as Reason states (to learn from accidents and incidents) (Reason, 1997), 77 % of the proposals and comments were related to the contents and execution of the flight training, and are considered in this report as part of the attitudes to safety matters and thereby the safety culture. The conclusion is that pilot students and instructors are sources for proposals for improvements, later evaluation will show if the proposals are realizable or not. Encourgement of further proposals is important.

The remaining free-text comments and comments to learning during the interviews represented demands for further training in various fields. Many good initiatives have "run out of steam". This may in the long term perspective result in decreased trust in management and thereby affecting the safety culture.

All members of the organization are carriers of the culture, but most people are affected by the behavior of the immediate superior manager or instructor and see it as a "top-down" process. The top of the hierarchy sets the standards, and by leading by example, trust is enhanced and thereby the safety culture.

The statement "LUSA flight instructor behavior is always a good example when it comes to flight safety culture." (19) received low response ratings, interestingly enough also from the management group. This is of course a serious indication, which may have different causes.

It is hardly so that the flight instructors do not show safe behavior. It is my interpretation that this reaction is a result of lack of standardization. Standardization is here referring to, for instance, how certain manouvers shall be performed, or how assessments whether the weather is flyable or not are made, as well as assessments of pilot students' performance. Standardization provides norms, that need to be communicated, applied, maintained and continuously questioned.

In the survey outcome, as well as in the interviews and free-text responses, there are several references made to different behavior of different instructors. One example is the decision to fly in icing conditions or not. Some instructors say no, others say "Let us go up and see". Students will of course observe this, which may have contributed to the low value of the statement. Another example is the student that mentioned the four different instructors in seven sessions, giving different instructions. A third is the low response values to the statement "Students' achievements are always assessed fair and equally, irrespective of which instructor that makes the assessment" (42).

Lundahl (2009) introduced the concept of a "Just training culture", meaning that all students are given the same chance, which seems as an obvious goal for all training organizations. However, there are many reasons for that this goal may not be achieved, such as that the high professional pride of instructors, working part time as Air Traffic Controllers, may come in conflict with their double roles as instructors <u>and</u> assessors. The wish to see professional behavior may unintentionally override the role as a neutral instructor, which could vary from instructor to instructor and consequently harm a just training culture. Another factor with impact on the student's perfomance is the instructor's personal approach to the student. A negative approach with numerous complaints and few encouragements may seriously hamper the student's performance (Lundahl (2009).

These factors may also be present at LUSA, using part-time active airline pilots, operating heavy aircraft types, as flight instructors. For presently unclear reasons, the survey response rates concerning the relations between pilot students and flight instructors during a flight session

have declined from Survey 1 to Survey 2.

The fact that flight instructors from the University of Tromsö took part of the training production at the time of the incidents may have contributed to a perception of low standardization.

Landing techniques were discussed in some of the interview groups with reference to the propstrike incidents. Some of those interviewed believed that there is not enough time dedicated to discuss landing techniques and related risks. Instruction until the runway threshold is very good, but from there until the wheels are on the ground is not of the same standard, there is a perception of lack of standardization. No immediate explanation of the propstrikes was found, but there are reasons to believe that lack of instruction and standardization of landing techniques may have contributed.

One flight instructor expressed a need for the instructors to handle various situations with more flexibility, which is interesting from several viewpoints. Personal initiatives and context induced measures are always encouraged, but there is again the risk that students receive different instructions from different instructors, which means that standardization suffers. Under certain conditions, as outlined below, the balance between rules and regulations on one hand and flexibility on the other may be changed for the benefit of the instructor's space for handling various situations.

Is increased standardization then the only way to improve safety, with the related increase of rules and regulations? René Amalberti (2001) claims that the higher the probability is for fatal accidents in risk-exposed activities, the higher the need for rules and regulations, while activities with a high safety level and low probability the need is less. More rules may in fact increase the risk for accidents due to higher complexity. In the first category of activities, Amalberti refers to bungy jumping, private flying and mountain climbing, in the latter commercial western scheduled flight operations and European railroads.

Altough fatal accidents do occur in flight training they are few, and LUSA's operations must be considered safe with no serious accidents since its formation in 1998. More rules and regulations will not automatically improve safety, and it is also easy to incorrectly believe that just more disciplined adherence to them may be the solution.

Learning is a natural and essential part of a safety culture, and it is important to take advantage of the opportunities for learning that accidents and incidents offer. According to research, safety courses and training are necessary, but not sufficient prerequisites to improve the safety culture. Dialogue and discussions in seminars and at informal occasions must exist to achieve effect (Guldenmund, 2010, p. 1035). The number of comments and proposals in the interviews and free-text responses (see Tab. 1. and 2.) indicates that there is a demand for more opportunities for discussions in this respect.

The reporting system:

Reporting, one of the main factors in a safety culture (Reason, 1997, p. 195-196), helps us to find gaps between established technical or procedure standards on one hand, and the actual equipment status and how things are done in real life on the other. It also provides opportunities to take action on discovered differences. This is true as long as the reports lead to relevant actions and not end up as a dust collector on a bookshelf. It is not uncommon in other organizations that employees refrain from reporting with the motive "it does not help, nothing happens", which is a serious signal, but no such comments have been made by LUSA employees.

Reporting was addressed by several statements in the survey, but did not generate many comments during interviews and free-text comments. The reason for this is probably that most employees at LUSA know the system and how to report. However, some of the survey outcomes and the comments are important and should be brought to attention.

The pilot students at LUSA are aware of the reporting system, but are not really aware of what happens with the report once it is submitted. This could be a barrier to reporting, since employees in general want to know who will read the report, whether there is a risk for personal negative consequences and if there are actions taken as a result of the report. Information and feedback to the members of the organization on submitted reports are essential to create confidence in the system and motivation to continue reporting (Reason, 1997, p. 197).

The physical presentations of feedback on reports (6) receive very low response rates, the lowest interestingly from the management group itself, the ultimate unit responsible for such presentations. There are good opportunities to create high standard presentations, not only to give feedback on reports, but to address flight safety-related events in general.

According to the interviews, feedback on NCOR:s has improved the last few years, but there are several comments about that the NCOR process is not always completed with the "full circle". Actions are carried out, but the evaluation of whether the action had the intended effect or not is often missing. It also happens that an NCOR is replaced by a meeting to remind about procedures and regulations when a deviation has occurred. The reason for this can be time pressure, disbelief in the reporting system or that "this is such a minor thing". In fact, the meeting may have a greater impact than the report itself if it is given proper time and attention, but the report should also be submitted to allow follow-up.

The low frequency and standard of report feedback meetings and the incomplete and sometimes replaced NCOR process may be the result of lack of knowledge or production pressure, but other reasons can not be excluded. In some organizations there may be a fear of reporting own and other's mistakes. In a just culture people will feel free to report without running the risk of negative consequences in some form. A just culture will strengthen a reporting system (Dekker, 2007).

The organization:

To ensure an effective operation of an organization, or even prevent it from collapsing, the interaction and flow of information between the units of the organization and between the units and the environment must be maintained. The split physical location of the departments hampers these opportunities, both the in-depth and the speed, with which the information is exchanged. Sub-cultures with different norms and attitudes may easily emerge as a result of restricted communication, which may be associated with increased risks.

The opportunities for meetings and time to work together on safety matters have decreased considerably as a result of production pressure, eventually also resulting in low standardization. However improved in Survey 2, the statement about frequent discussions about risks (16) receives low ratings. This is confirmed by an expressed demand in interviews, proposals and general comments for more opportunities to meet. This type of communication is essential for the safety culture, and the absence of it may be an indication of deterioration.

An important part of the communication consists of written rules and regulations in manuals and similar documents. 31% of the free-text comments proposed a revision or even a replacement of the manual system. Irrelevant or not updated manuals will hamper adherence to

the regulations and will deteriorate the safety culture.

Flexibility is an important property of a safety culture in terms of its ability to withstand and continue to operate after a serious event that threatens its existance, also referred to as its "resilience". LUSA's flexibility to handle and accommodate internal and external changes have received low ratings (32, 33, 34), as well as the statements about insight and understanding about management's work with flight safety matters (21,22). The statement about information on events in the global aviation system (18) has received a very low response rate, also reflected in the free-text answers.

Resilience can be improved through, among others, in-depth and frequent discussions about risks and safety and monitoring internal and external events. With access to information and insight in and understanding of the processes in the organization, the members can participate in the safety work. Observing and learning from what works well also enhances resilience, and the individual actors' "stories" about own successful and less successful events are also important contributors (Hollnagel, 2011). During the inteviews the introduction of MPL (Multi-crew Pilot License) was mentioned, and the successful assignment as "Yrkeshögskola" is another example. The low failure rate at LUSA is also a positive property, that should be analyzed to learn from what works well.

It is the author's interpretation that the system properties, mentioned above, may induce gaps between procedure and practice.

5.2. Second research question: Can the results of such analysis form the basis for organizational interventions that may provide prerequisites to bridge such gaps?

General trends

Graph 56 how a positive development of attitudes to safety matters for all categories (except UiT, not measured in 2012) and attitude groups, except for Feedback and Assessment. The positive development is most likely the result of that safety culture as such has been brought into focus and discussed in the organization. Some of these discussions have been part of the interventions, but the topic has also been brought up in offices, hangars, workshops and classrooms.

An interesting observation, supporting this assumption, is that several free-text comments contain requests for factors, addressed in the surveys, such as:

- "More information about who may receive and evaluate the report, and in general what happens when a report is submitted",

- "More meetings with discussions regarding flight safety. The frequency varies quite a lot",

- "Bring in the outside world to Ljungbyhed. Create a forum for staff and students to talk aviation and flight-related events",

- "Better standardization among instructors."

These are topics that have been mentioned in the survey statements, and the respondents have been made aware of the importance of them.

The negative development of the Feedback and Assessment group does not necessarily indicate a deterioration of the attitudes, but rather the result of increased focus on these matters. Previously accepted conditions may have been brought to attention from new perspectives, such as "maybe it could be better, I have not thought about that before". The fact that also instructors agree to this is interesting, and further analysis of this result could be valuable.

The formal interventions have of course also contributed, but merely as a support to the ongoing process. Due to a heavy management workload during the intervention period, with new management and preparations of the application to the Swedish Authority for Higher Vocational Education, the four factors, recommended by Guldenmund (see Section 2.3. in this report) were not fully implemented.

Based on the survey responses it seems that there is a just culture at LUSA. However, it is well known fact that respondents in general have a tendency to give too positive responses to this type of statements, both in interviews and in surveys. It reflects a wish to have a just culture, and therefore the respondents give better rates than it deserves, it is simply an adaption to the expected, how it should be (Antonsen, 2009). The conclusion is that a just culture must be handled with care and requires a deeper analysis..

The low response value from administrators and technicians (8) is probably the result of a misunderstanding or a mistake in giving the response. Although everyone in the organization theoretically has the opportunity to affect flight safety, the administrators may not perceive that they have such opportunities, which also may have contributed to the low response value.

In the statements no. 5 and 7 ("I always…"), the interviews show that the words "always" and "threat" (5, 7) are interpreted differently by different respondents, which probably have affected the survey results. In fact, no-one have rated these statement on level 6, which means that no-one always reports when something that threatens flight safety is seen. The instructor category is lower than other categories in this respect.

Because of its nature, flight training is riskier than scheduled commercial airline operations, which means that hazardous situations may occur more often and even be considered "normal" as a part of the training. The observer's (instructor's or student's) assessment of a flight safety-related event is affected by factors such as his or her knowledge, information and experience. Dekker labels this the "local rationality principle" (Dekker, 2006, p. 12). Consequently, what shall be reported and what shall not be reported depends on the situation and the observer. This may explain that the category flight instructors gave low response values to the statement "I always report ...". Some situations may not be perceived as a threat and will therefore not be reported.

With reference to the differences in outcome between Survey 1 and Survey 2, it is my conclusion that it is possible to modify the attitudes to safety by means of bringing the matter to discussion and carry out interventions, thereby strengthening the ability to bridge gaps between safety-related procedures and practices. How this ability to bridge will develop in the long-term perspective is still to be seen, possibly through continued interventions, yearly analyses and by monitoring the reporting system.

6. RECOMMENDATIONS

Further analysis of why the survey value of "Feedback and Assessment" has decreased from 2012 to 2013:

That both instructors and pilot students agree on this statement should be subject to further analysis.

Consider the time pressure:

Are the training goals and resources in harmony? Can the planning process be improved?

Reduce gaps between procedure and parctice:

Faced with high production demands, it is easy to deviate from rules and made decisions. Students and instructors sometimes allow deviations from the SOP:s, which easily can lead to drift to failure, but also inputs for development. On page 19-20 of this report, there is a proposed strategy for identifying and dealing with gaps between procedure and practice.

Training in internal routines.

Deficiencies in knowledge or application of internal processes have been observed. In most cases the reason seems to be a lack of knowledge about the content and design.

Further training:

Requests for this are expressed from several of the interviewed. Although today's pedagogical level is high, there is always cause for further development and review of new methods.

Adjust meeting structure:

Many calls for better meeting discipline and reinstatement of relevant meetings. Meetings are a prerequisite for formal and informal communication, and a means to avoid isolation of members.

Close the reporting circle:

Several sources noted that reporting certainly works well, but the feedback and validation of whether the action taken produced the desired results or not is often missing.

Under one roof:

The distribution of the staff to two different buildings is unfortunate. Co-location facilitates communication horizontally and vertically and increases understanding between departments.

Learn from what works well:

By habit, we have a tendency to just observe things that go wrong. Much can be learnt from what goes well through for instance success stories.

Information forum for global flight incidents and accidents:

Will contribute to general knowledge about the industry.

7. DISCUSSION

As response to the first research question, *"Can a safety culture analysis identify system properties that may induce gaps between procedure and practice?"*, the analysis has revealed several examples of such gaps, based on results from interviews and free-text responses:

- Deviations from intended training plans,

- Shorter rest time between flight sessions than intended due to delays,

- Shorter time for briefings and debriefings than intended,

- Information about schedule changes later than intended,

- Not returning the log book to the aircraft (and flying away without it),

- Not submitting an AOG note due to the production consequences thereof,

- Different assessment of students by different instructors,

- Not closing the NCOR cycle,

- Instructor meetings not held regularly as intended.

Possible reasons for these deviations are discussed in Chapter 6, "Analysis".

When it comes to assessments of changes from Survey 1 to Survey 2, the results are more reliable for the permanent categories, such as instructors, management, technicians and administrators. Positive changes have been noted during the study period, but again, the size of the population is a weakness. Former students should probably not be included in future measurements. The response rates for the two surveys is fairly good, 68% and 60% and should be considered as normal.

It should however also be noted that there may be a learning effect between the first and the second use of the survey, which may have contributed to the results, both in a negative and a positive way. Some of the statements have been explained and discussed during meetings and seminars, and the respondents may have changed opinion as a result. For subsequent measurements, this effect will be neutralized.

The design and classification of the statements to be responded to has been a challenge, and if repeated, the structure should be adjusted and some statements re-phrased, bearing in mind the drawbacks related to change of the survey over time. The interpretation of interview and free-text responses caused some difficulties. In spite of this, I think the report gives a reasonable understanding of the safety culture at LUSA, and that the research questions have been

responded to in an acceptable way.

The small population and the unstable composition of the target groups in this study reduce the reliability of the statistics from the surveys, but by combining interviews and free-text comments with the survey outcomes a fairly rich picture has been provided. The reason for including also the small groups in the survey was to get indications for designing interview questions. In hindsight, more in-depth interviews could have improved reliability.

For a longitudinal study it is a weakness that the population is changing from year to year in terms of that student groups come and go. Although not scientific, it can still be interesting to see the long-term development of the responses also from the groups that have left as a result of better introduction training, better planning, better standardization, etc. A survey each year with student-related statements could give valuable information about the outcome of such efforts.

The reason for the propstrikes was discussed during several of the interviews. Surprisingly, none of the interviewees mentioned the fact that the part-time flight instructors operates different aircraft types with different landing characteristics. This could have been a factor to consider as a contributing cause, but was not mentioned.

The number, contents and planning of the interventions during the study period can be improved. Unfortunately, and due to high workload, only a few interventions were carried out.

8. CONCLUDING REMARKS

It shall be noted that the initial purpose of this study was to describe the safety culture at LUSA. It was later also to constitute an academic project work with two research questions, related to the safety culture and the change of it over a two-year period. The re-design caused some extra work.

This study has analyzed the outer levels of the "culture onion" by means of two attitude surveys, separated in time, but also worked its way towards the core through interviews and opportunities for the respondents to provide subjective comments and proposas in writing.

Most researchers agree that a good safety culture rests on norms and values, contributing to a high safety level, shared by all members of the organization. When it comes to values, the "inner layers of the onion" (Guldenmund, 2006), i.e. what is important in life as an employee at LUSA, this analysis does not give an answer. The values can only be observed and described by anthropological methods.

However, from subtle indications during interviews and in free-text answers, it seems however that "production of high standard pilots", "a good reputation of LUSA" and "a safe and sustainable workplace at LUSA" are basic values, shared by most employees at LUSA.

I have also shown that it is possible to identify system properties that may induce gaps between procedure and practice by means of a safety culture analysis, and that the results can form the basis for organizational interventions, providing prerequisites to bridge such gaps.

The tools, developed in this process, can be used for future, continuous monitoring of the development of the safety culture at LUSA.

Guldenmund says with little encouragement: "Obviously, assessing safety climate or safety culture with the object of changing it is bothering, ambitious and time consuming, spanning a period of a lot of managers will not even see the end of" (Guldenmund, 2000, p 254).

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APPENDIX 1. ATTITUDES AND ATTITUDE GROUPS

Attitude group "Reporting"

Statements to be rated by the respondents:

1. I know how to report something that may threaten flight safety.

2. If I do not want to make a written report, I know to whom I can report orally.

3. I know what happens with my report when I have submitted it.

4. At LUSA, management presents all reports about deficiencies in flight safety, and what is done to correct them.

5. I always report when I see something that may threaten flight safety.

6. The presentations of reports on shortcomings in flight safety at LUSA and what is done to correct them, are clear and well conducted.

7. I always report about conditions that may threaten flight safety, even if I believe that it may affect another student or a colleague negatively.

Attitude group "Just Culture"

Statements to be rated by the respondents:

8. I can report flight safety related occurrencies to which I have contributed myself without risking adverse consequences for me personally.

9. At LUSA we take responsibility for flight safety related occurrencies we have contributed to ourselves through participation in the work to prevent recurrence.

10. If I have contributed to a flight safety related occurrence, my instructor/manager always listens carefully to my story about what has happened.

11. My instructor/manager respects that there are usually several perceptions of what caused a flight safety occurrence.

12. I know exactly which safety rules that apply around and inside LUSA's aircraft.

13. I always dare to speak up to my instructors/manager when I feel uncertain about their decisions and assessments related to flight safety.

14. If I caused a flight safety related occurrence, my instructor/manager always supports me.

Attitude group "Information and communication"

Statements to be rated by the respondents:

15. I am well informed about the rules, equipment and procedures concerning flight safety at the Flight School.

16. In my unit (class or department), we often discuss the risks related to flight operations at the Flight School.

17. Flight School management immediately informs about incidents and accidents in our own flight operations.

18. Flight School management regularly informs about flight safety statistics, trends and accidents in global aviation.

19. Flight School instructor behavior is always a good example when it comes to flight safety culture.

20. At LUSA, we always get appreciation and positive comments when we propose measures to improve flight safety.

Attitude group "Participation"

(The perception of participation (a mental membership of the organization, such as being listened to, knowledge about the organization's strategic matters.)

Statements to be rated by the respondents:

21. I have good knowledge about management's goals and strategies concerning LUSA as an organization.

22. I have a good understanding of the school management's flight safety work.

23. At LUSA, all employees and students have the opportunity to influence management's flight safety work.

24. My instructors/manager encourages me to speak up if I do not agree to their assessments and decisions concerning flight safety.

25. Departments within LUSA collaborates well when it comes to flight safety issues.

Attitude group "Competence and resources"

Statements to be rated by the respondents:

26. In my position and with my tasks in LUSA I have sufficient competence to monitor and improve the flight safety.

27. In my position and with my tasks in LUSA I have sufficient resources to monitor and improve the flight safety.

28. My instructors/my manager has sufficient competence to monitor and improve flight safety.

29. My instructors/my manager has sufficient resources to monitor and improve flight safety.

30. Planning of lessons and flight sessions are always done in consideration of flight safety.

31. The flight instructors at LUSA handle critical flight situations in a safe way.

Attitude group "Flexibility"

Statements to be rated by the respondents:

32. Cooperation between the departments at LUSA is characterized of flexibility and without prestige.

33. Changes in the operations and organization of LUSA that may improve flight safety are always executed quickly and without barriers of prestige and lack of flexibility.

34. LUSA adapts quickly to changes in the environment, for instance in new technology, new pedagogics and new regulations from the aviation authorities.

Attitude group "Learning"

Statements to be rated by the respondents:

35. At LUSA, we see mistakes as free opportunities for learning.

36. At LUSA, we take advantage of all opportunities to learn from incidents and accidents in the flight operations.

37. My instructors/manager clearly shows the importance of learning from incidents and accidents in flight operations.

38. My instructor/my manager encourages me to be curious about factors that may affect flight safety.

39. LUSA regularly trains to manage incidents and accidents in flight operations.

40. At LUSA, we encourage and support each other to always work with flight safety in focus.

Attitude group "Feedback and Assessment"

This part concerns the specific training situation in the aircraft, and was answered only by students and flight instructors.

Statements to be rated by the respondents:

41. I always get factual assessments by my instructor/my manager if I have contributed to a situation that threatened flight safety.

42. Students' achievements are always assessed fair and equally, irrespective of which instructor that makes the assessment.

43. There is never pressure for time during flight sessions, there is always plenty of time for, for instance, repetition of a flight manouever.

44. The intentions of the flight instructor during a flight session are always clear and understandable

45. The relationship between student and the instructor during a flight session is always open and honest.

46. There is always plenty of time for the briefing before a flight session.

47. There is always plenty of time for the debriefing after a flight session.

APPENDIX 2. RESULTS PER ATTITUDE, ATTITUDE GROUP AND CATEGORY

Each attitude group is presented with comparisons between mean values per category (”spiderweb diagrams”), and mean values and standard deviations per category and attitude (histogram).

Survey scale:
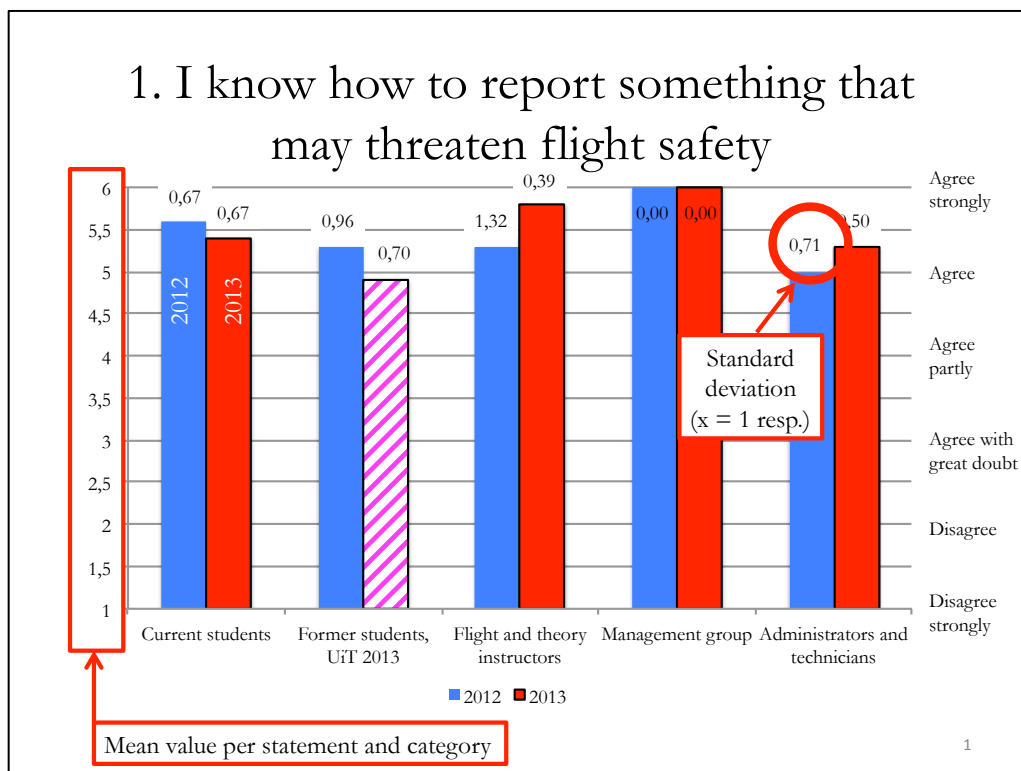
6 = Agree strongly

5 = Agree

4 = Agree partly

3 = Agree with great doubt

2 = Disagree

1 = Disagree strongly

Explanation of the histograms, sample:
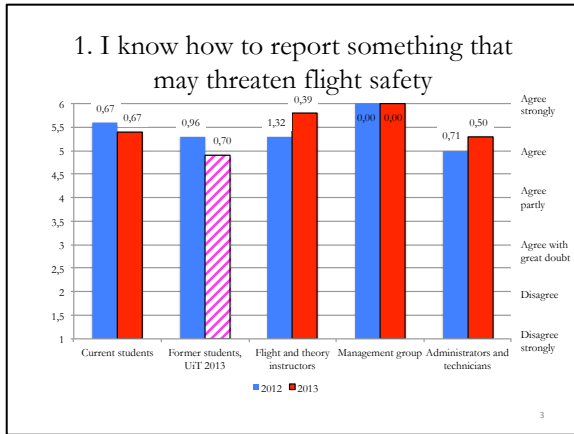
Graph 10 (1):	2012	2013
	Mv (s)	Mv (s)
LUSA students	5,6 (0,67)	5,4 (0,67)
UiT students	-	4,9 (0,70)
Flight and theory instr.	5,3 (1,32)	5,8 (0,39)
Management group	6,0 (0,00)	6,0 (0,00)
Adm. and technicians	5,0 (0,71)	5,3 (0,50)
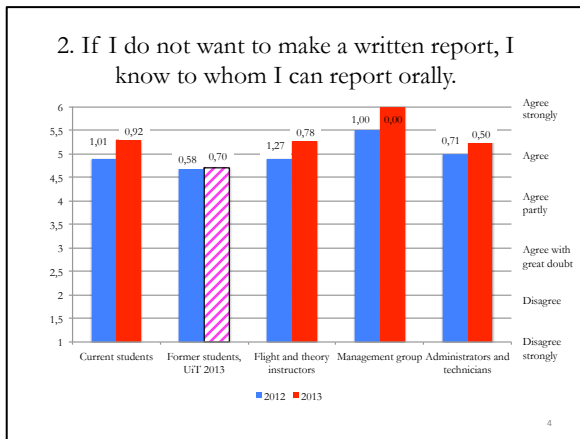
Graph 11 (2):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,9 (1,01)	5,3 (0,92)
UiT students	-	4,7 (0,70)
Flight and theory instr.	4,9 (1,27)	5,3 (0,78)
Management group	5,5 (1,00)	6,0 (0,00)
Adm. and technicians	5,0 (0,71)	5,3 (0,50)
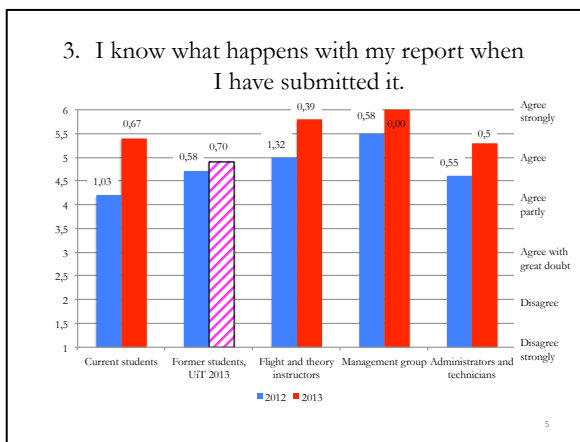
Graph 12 (3):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,2 (1,03)	5,4 (0,67)
UiT students	-	4,9 (0,70)
Flight and theory instr.	5,0 (1,32)	5,8 (0,39)
Management group	5,5 (0,58)	6,0 (0,00)
Adm. and technicians	4,6 (0,55)	5,3 (0,50)
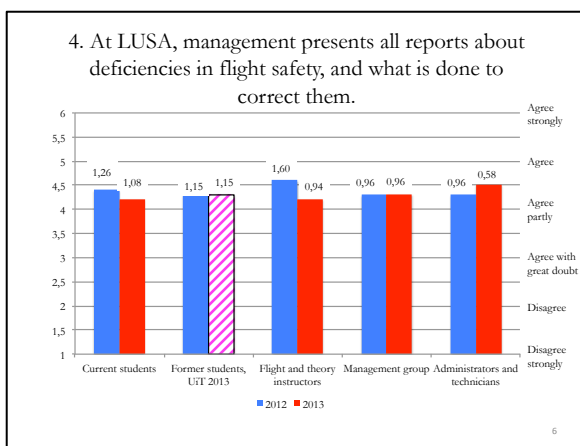
Graph 13 (4):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,4 (1,26)	4,2 (1,08)
UiT students	-	4,3 (1,15)
Flight and theory instr.	4,6 (1,60)	4,2 (0,94)
Management group	4,3 (0,96)	4,3 (0,96)
Adm. and technicians	4,3 (0,96)	4,5 (0,58)

Graph 14 (5):	2012	2013
	Mv (s)	Mv (s)
LUSA students	5,0 (1,00)	5,4 (0,88)
UiT students	-	5,1 (0,83)
Flight and theory instr.	4,3 (1,73)	5,3 (0,87)
Management group	5,5 (,58)	5,8 (0,50)
Adm. and technicians	3,6 (1,52)	5,3 (0,50)
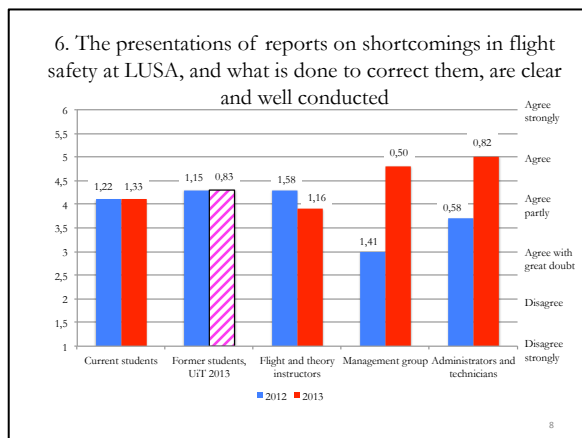
Graph 15 (6):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,1 (1,22)	4,1 (1,33)
UiT students	-	4,3 (0,83)
Flight and theory instr.	4,3 (1,58)	3,9 (1,16)
Management group	3,0 (1,41)	4,8 (0,50)
Adm. and technicians	3,7 (0,58)	5,0 (0,82)
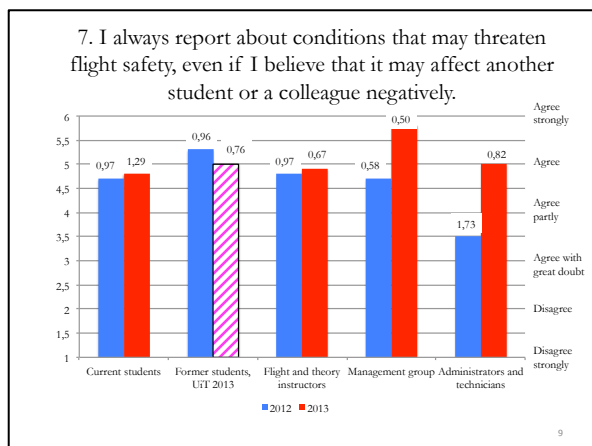
Graph 16 (7):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,7 (0,97)	4,8 (1,29)
UiT students	-	5,0 (0,76)
Flight and theory instr.	4,8 (0,97)	4,9 (0,67)
Management group	4,7 (0,58)	5,8 (0,50)
Adm. and technicians	3,5 (1,73)	5,0 (0,82)
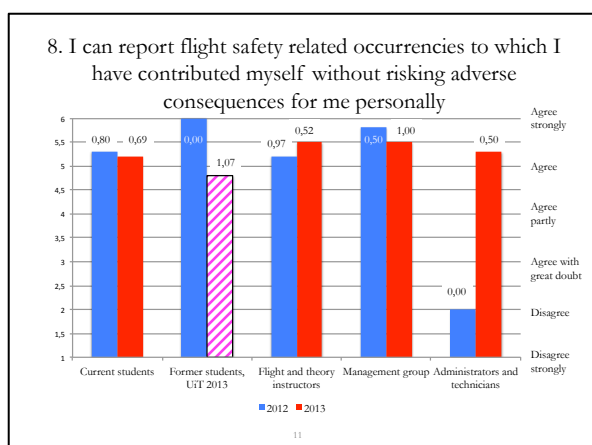
Graph 17 (8):	2012	2013
	Mv (s)	Mv (s)
LUSA students	5,3 (0,80)	5,2 (0,69)
UiT students	-	4,8 (1,07)
Flight and theory instr.	5,2 (0,97)	5,5 (0,52)
Management group	5,8 (0,50)	5,5 (1,00)
Adm. and technicians	2,0 (0,00)	5,3 (0,50)

9. At LUSA we take responsibility for flight safety related occurrences we have contributed to ourselves through participation in the work to prevent recurrence.
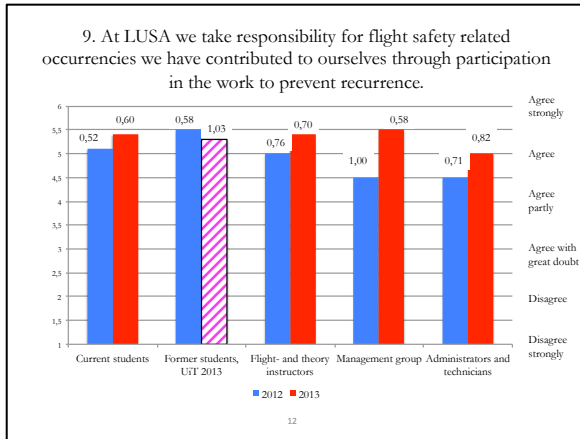
Graph 18 (9):	2012 Mv (s)	2013 Mv (s)
LUSA students	5,1 (0,52)	5,4 (0,60)
UiT students	-	5,3 (1,03)
Flight- and theory instr	5,0 (0,76)	5,4 (0,70)
Management group	4,5 (1,00)	5,5 (0,58)
Adm. and technicians	4,5 (0,71)	5,0 (0,82)

10. If I have contributed to a flight safety related occurrence, my instructor/manager always listens carefully to my story about what has happened.
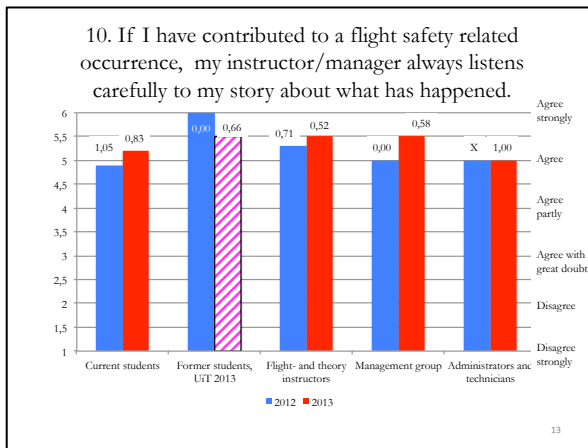
Graph 19 (10):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,9 (1,05)	5,2 (0,83)
UiT students	-	5,5 (0,66)
Flight- and theory instr.	5,3 (0,71)	5,5 (0,52)
Management group	5,0 (0,00)	5,5 (0,58)
Adm. and technicians	5,0 (0,00)	5,0 (1,00)

11. My instructor/manager respects that there are usually several perceptions of what caused a flight safety occurrence.
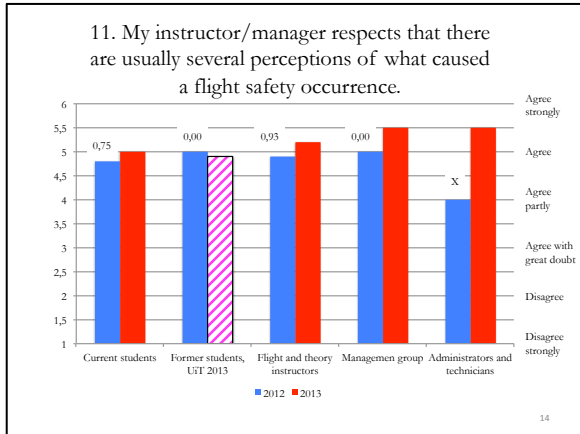
Graph 20 (11):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,8 (0,75)	5,0 (0,52)
UiT students	-	4,9 (0,77)
Flight and theory instr.	4,9 (0,93)	5,2 (0,60)
Management group	5,0 (0,00)	5,5 (0,58)
Adm. and technicians	4,0 (0,00)	5,5 (0,58)

12. I know exactly which safety rules that apply around and inside LUSA's aircraft
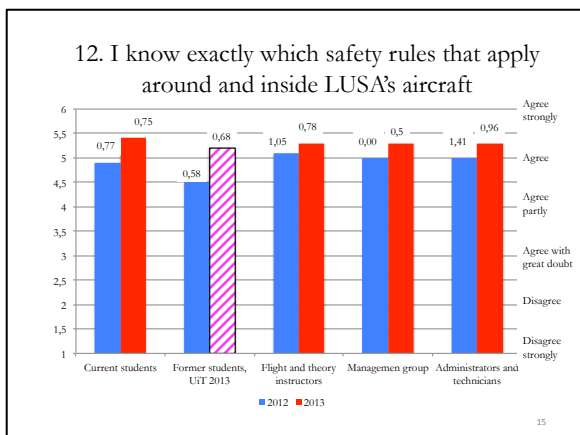
Graph 21 (12):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,9 (0,77)	5,4 (0,75)
UiT students	-	5,2 (0,68)
Flight and theory instr.	5,1 (1,05)	5,3 (0,78)
Management group	5,0 (0,00)	5,3 (0,50)
Adm. and technicians	5,0 (1,41)	5,3 (0,96)

13. I always dare to speak up to my instructors/manager when I feel uncertain about their decisions and assessments related to flight safety.
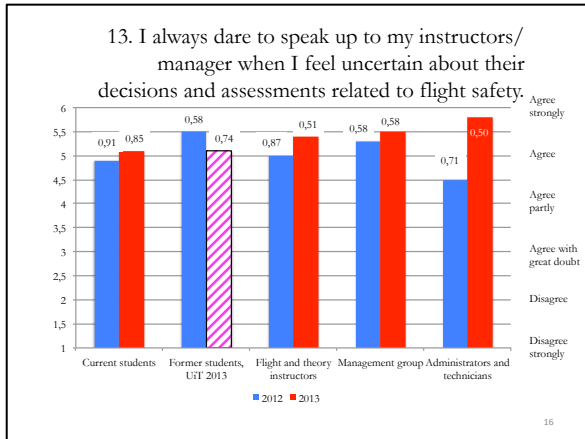
Graph 22 (13):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,9 (0,91)	5,1 (0,85)
UiT students	-	5,1 (0,74)
Flight and theory instr.	5,0 (0,87)	5,4 (0,51)
Management group	5,3 (0,58)	5,5 (0,58)
Adm. and technicians	4,5 (0,71)	5,8 (0,50)

14. If I caused a flight safety related occurrence, my instructor/manager always supports me
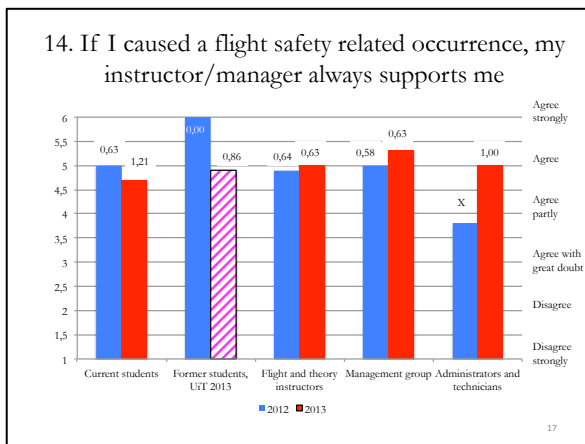
Graph 23 (14):	2012	2013
	Mv (s)	Mv (s)
LUSA students	5,0 (0,63)	4,7 (1,21)
UiT students	-	4,9 (0,86)
Flight and theory instr.	4,9 (0,64)	5,0 (0,63)
Management group	5,0 (0,58)	5,3 (0,63)
Adm. and technicians	3,8 (0,00)	5,0 (1,00)

15. I am well informed about the rules, equipment and procedures concerning flight safety at LUSA
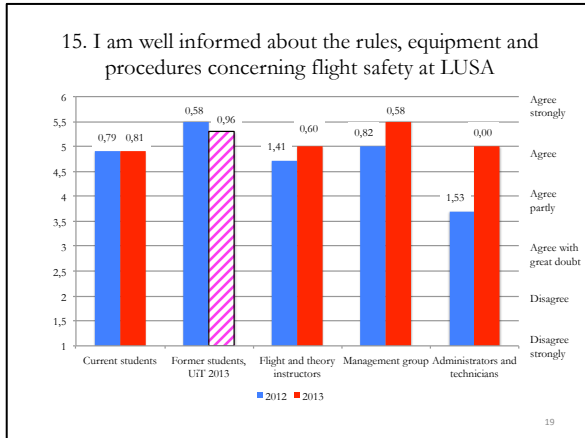
Graph 24 (15):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,9 (0,79)	4,9 (0,81)
UiT students	-	5,3 (0,96)
Flight and theory instr.	4,7 (1,41)	5,0 (0,60)
Management group	5,0 (0,82)	5,5 (0,58)
Adm. and technicians	3,7 (1,53)	5,0 (0,00)

16. In my unit (class or department), we often discuss the risks related to flight operations at LUSA
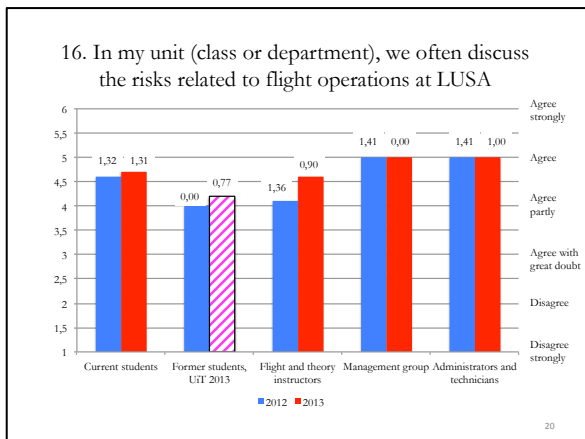
Graph 25 (16):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,6 (1,32)	4,7 (1,31)
UiT students	-	4,2(0,77)
Flight and theory instr.	4,1 (1,36)	4,6 (0,90)
Management group	5,0 (1,41)	5,0 (0,00)
Adm. and technicians	5,0 (1,41)	5,0 (1,00)

17. LUSA's management immediately informs about incidents and accidents in our own flight operations
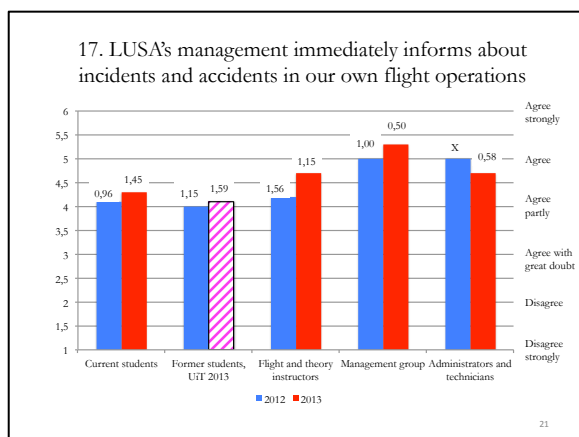
Graph 26 (17):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,1 (0,96)	4,3 (1,45)
UiT students	-	4,1 (1,59)
Flight and theory instr.	4,2 (1,56)	4,7 (1,15)
Management group	5,0 (1,00)	5,3 (0,50)
Adm. and technicians	5,0 (0,00)	4,7 (0,58)

18. LUSA's management regularly informs about flight safety statistics, trends and accidents in global aviation.
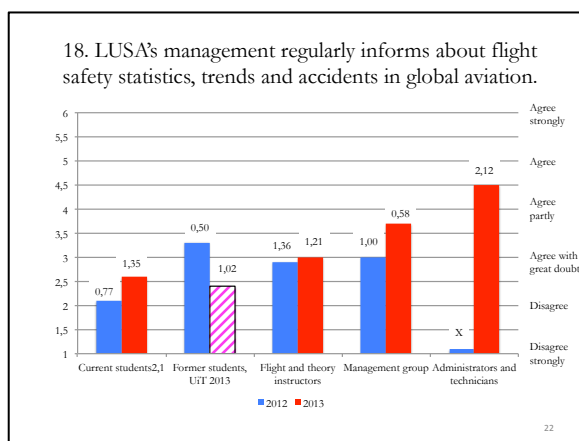
Graph 27 (18):	2012	2013
	Mv (s)	Mv (s)
LUSA students	2,1 (0,77)	2,6 (1,35)
UiT students	-	2,4 (1,02)
Flight and theory instr.	2,9 (1,36)	3,0 (1,21)
Management group	3,0 (1,00)	3,7 (0,58)
Adm. and technicians	1,1 (0,00)	4,5 (2,12)

19. LUSA's instructors always lead by example when it comes to flight safety culture
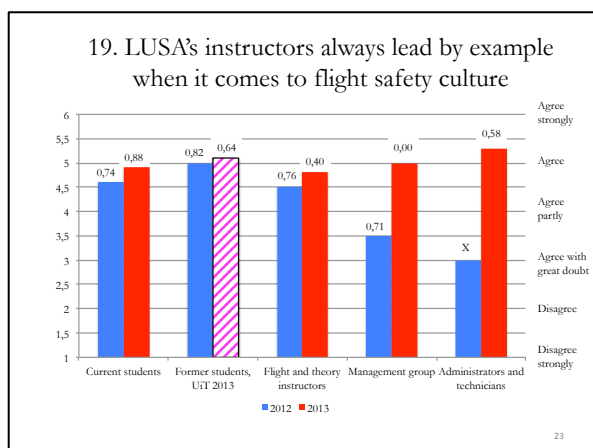
Graph 28 (19):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,6 (0,74)	4,9 (0,88)
UiT students	-	5,1 (0,64)
Flight and theory instr.	4,5 (0,76)	4,8 (0,40)
Management group	3,5 (0,71)	5,0 (0,00)
Adm. and technicians	3,0 (0,00)	5,3 (0,58)

20. At LUSA we always get appreciation and positive comments when we propose measures to improve flight safety.
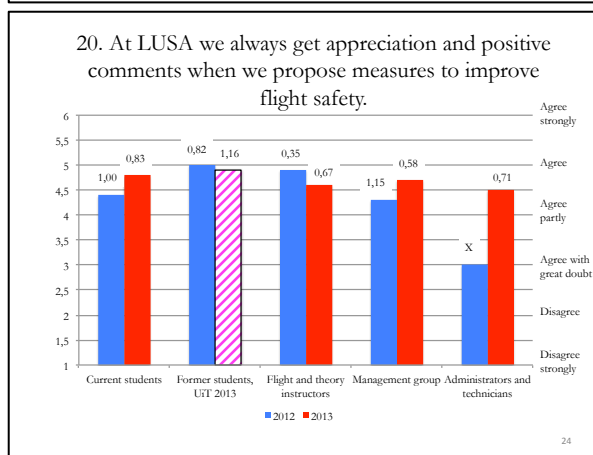
Graph 29 (20):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,4 (1,00)	4,8 (0,83)
UiT students	-	4,9 (1,16)
Flight and theory instr.	4,9 (0,35)	4,6 (0,67)
Management group	4,3 (1,15)	4,7 (0,58)
Adm. and technicians	3,0 (0,00)	4,5 (0,71)

21. I have good knowledge about management's goals and strategies concerning the LUSA as an organization

Graph 30 (21):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,0 (1,10)	4,4 (1,21)
UiT students	-	3,9 (0,86)
Flight and theory instr.	4,0 (1,22)	4,2 (1,03)
Management group	4,5 (1,29)	5,5 (0,58)
Adm. and technicians	4,3 (0,96)	5,0 (0,00)

22. I have a good understanding of LUSA's management's flight safety work.
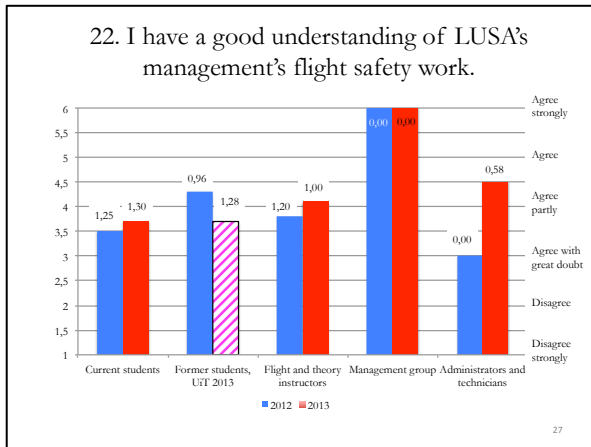
Graph 31 (22):	2012 Mv (s)	2013 Mv (s)
LUSA students	3,5 (1,25)	3,7 (1,30)
UiT students	-	3,7 (1,28)
Flight and theory instr.	3,8 (1,20)	4,1 (1,00)
Management group	6,0 (0,00)	6,0 (0,00)
Adm. and technicians	3,0 (0,00)	4,5 (0,58)

23. At LUSA, all employees and students have the opportunity to influence management's flight safety work.
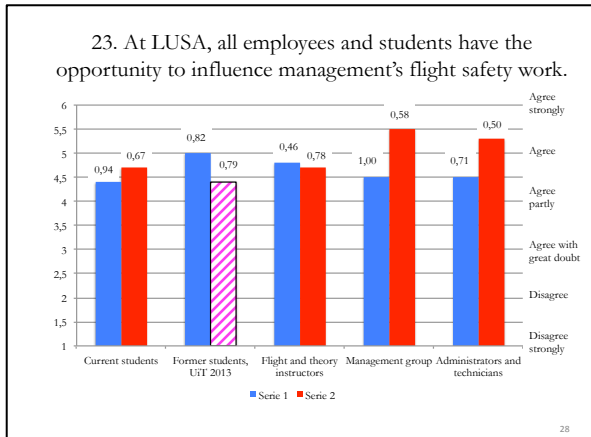
Graph 32 (23):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,4 (0,94)	4,7 (0,67)
UiT students	-	4,4 (0,79)
Flight and theory instr.	4,8 (0,46)	4,7 (0,78)
Management group	4,5 (1,00)	5,5 (0,58)
Adm. and technicians	4,5 (0,71)	5,3 (0,50)

24. My instructors/manager encourages me to speak up if I do not agree to their assessments and decisions concerning flight safety
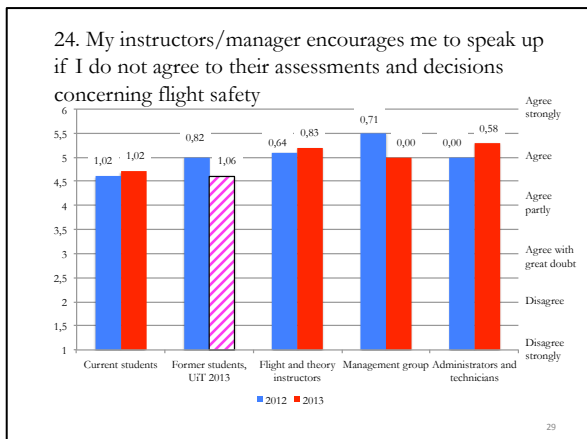
Graph 33 (24):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,6 (1,02)	4,7 (1,02)
UiT students	-	4,6 (1,06)
Flight and theory instr.	5,1 (0,64)	5,2 (0,83)
Management group	5,5 (0,71)	5,0 (0,00)
Adm. and technicians	5,0 (0,00)	5,3 (0,58)
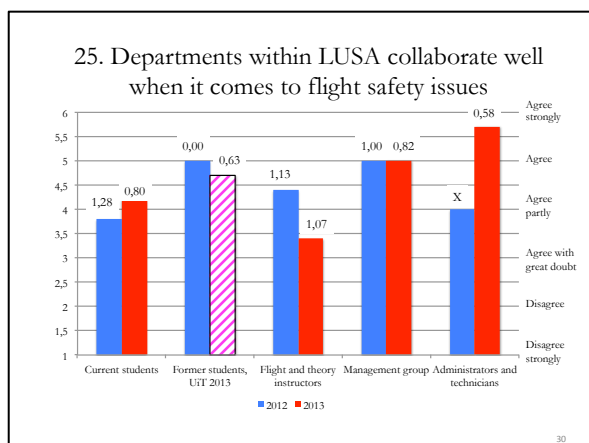
Graph 34 (25):

	2012 Mv (s)	2013 Mv (s)
LUSA students	3,8 (1,28)	4,2 (0,80)
UiT students	-	4,7 (0,63)
Flight and theory instr.	4,4 (1,13)	3,4 (1,07)
Management group	5,0 (1,00)	5,0 (0,82)
Adm. and technicians	4,0 (0,00)	5,7 (0,58)
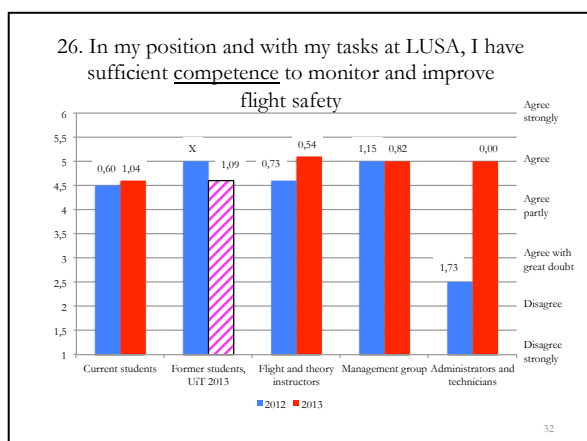
Graph 35 (26):

	2012 Mv (s)	2013 Mv (s)
LUSA students	4,5 (0,60)	4,6 (1,04)
UiT students	-	4,6 (1,09)
Flight and theory instr.	4,6 (0,73)	5,1 (0,54)
Management group	5,0 (1,15)	5,0 (0,82)
Adm. and technicians	2,5 (1,73)	5,0 (0,00)
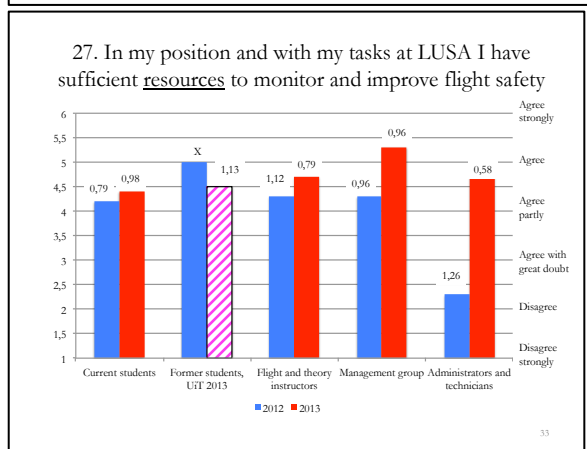
Graph 36 (27):

	2012 Mv (s)	2013 Mv (s)
LUSA students	4,2 (0,79)	4,4 (0,98)
UiT students	-	4,5 (1,13)
Flight and theory instr.	4,3 (1,12)	4,7 (0,79)
Management group	4,3 (0,96)	5,3 (0,96)
Adm. and technicians	2,3 (1,26)	4,7 (0,58)
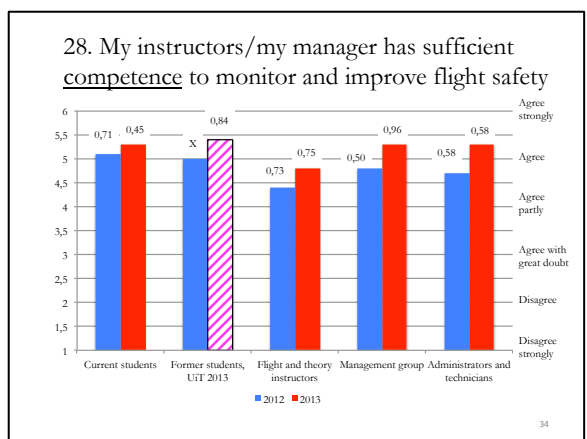
Graph 37 (28):

	2012 Mv (s)	2013 Mv (s)
LUSA students	5,1 (0,71)	5,3 (0,45)
UiT students	-	5,4 (0,84)
Flight and theory instr.	4,4 (0,73)	4,8 (0,75)
Management group	4,8 (0,50)	5,3 (0,96)
Adm. and technicians	4,7 (0,58)	5,3 (0,58)

29. My instructors/my manager has sufficient <u>resources</u> to monitor and improve flight safety.
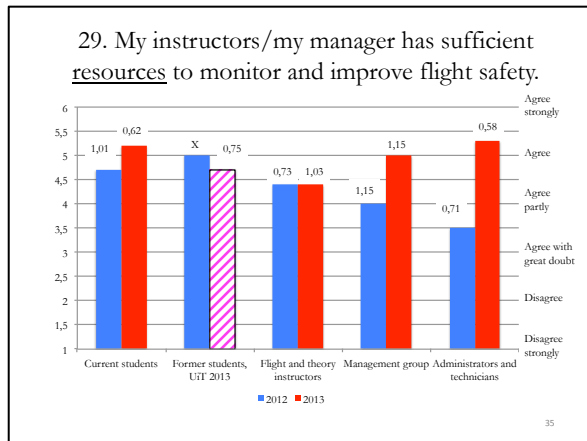
Graph 38 (29):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,7 (1,01)	5,2 (0,62)
UiT students	-	4,7 (0,75)
Flight and theory instr.	4,4 (0,73)	4,4 (1,03)
Management group	4,0 (1,15)	5,0 (1,15)
Adm. and technicians	3,5 (0,71)	5,3 (0,58)

30. Planning of lessons and flight sessions are always done in consideration of flight safety
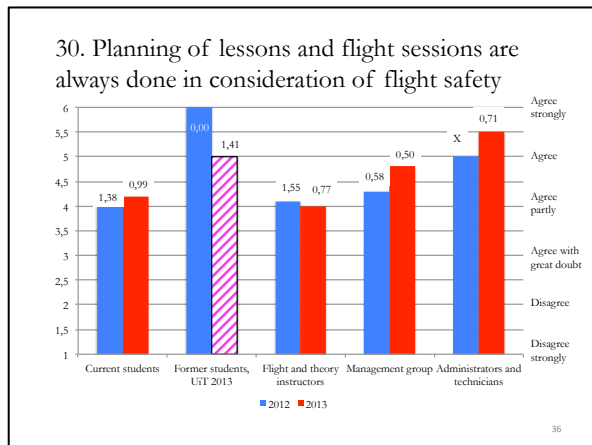
Graph 39 (30):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,0 (1,38)	4,2 (0,99)
UiT students	-	5,0 (1,41)
Flight and theory instr.	4,1 (1,55)	4,0 (0,77)
Management group	4,3 (0,58)	4,8 (0,50)
Adm. and technicians	5,0 (0,00)	5,5 (0,71)

31. The flight instructors at LUSA handle critical flight situations in a safe way
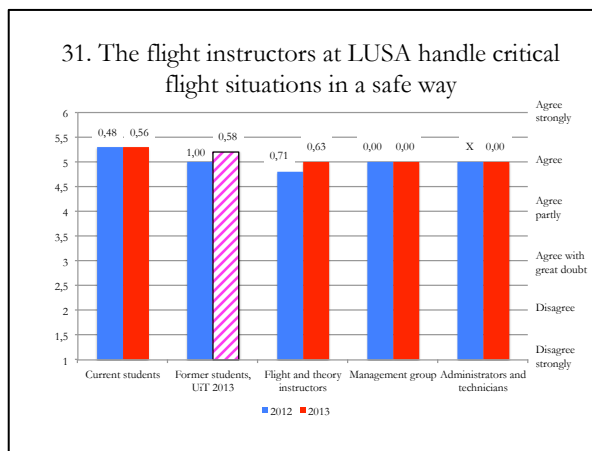
Graph 40 (31):	2012 Mv (s)	2013 Mv (s)
LUSA students	5,3 (0,48)	5,3 (0,56)
UiT students	-	5,2 (0,58)
Flight and theory instr.	4,8 (0,71)	5,0 (0,63)
Management group	5,0 (0,00)	5,0 (0,00)
Adm. and technicians	5,0 (0,00)	5,0 (0,00

32. Cooperation between the departments at LUSA is characterized of flexibility and without prestige
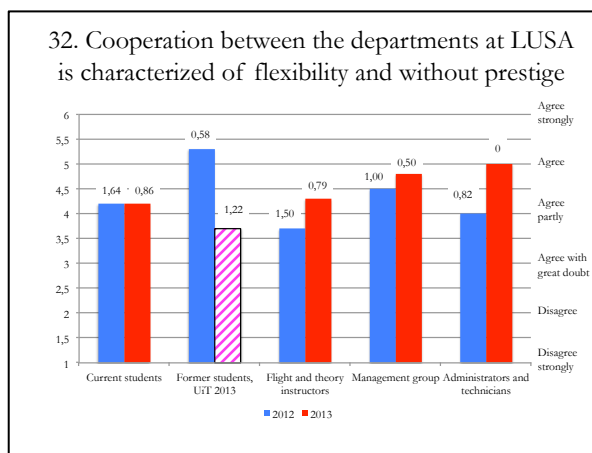
Graph 41 (32):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,2 (1,64)	4,2 (0,86)
UiT students	-	3,7 (1,22)
Flight and theory instr.	3,7 (1,50)	4,3 (0,79)
Management group	4,5 (1,00)	4,8 (0,50)
Adm. and technicians	4,0 (0,82)	5,0 (0,00)

33. Changes in the operations and organization of LUSA that may improve flight safety are always executed quickly and without barriers of prestige and lack of flexibility
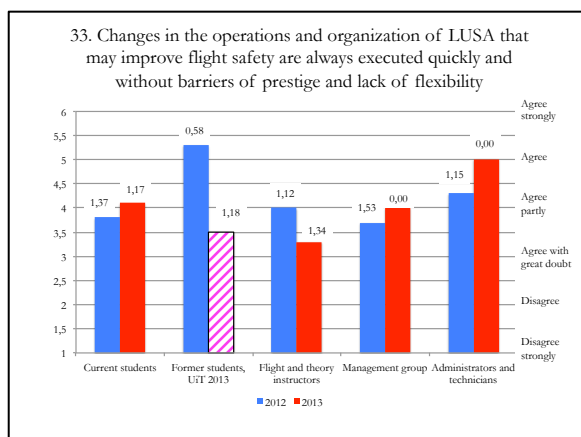
Graph 42 (33):	2012	2013
	Mv (s)	Mv (s)
LUSA students	3,8 (1,37)	4,1 (1,17)
UiT students	-	3,5 (1,18)
Flight and theory instr.	4,0 (1,12)	3,3 (1,34)
Management group	3,7 (1,53)	4,0 (0,00)
Adm. and technicians	4,3 (1,15)	5,0 (0,00)

34. LUSA adapts quickly to changes in the environment, for instance in new technology, new pedagogics and new regulations from the aviation authorities
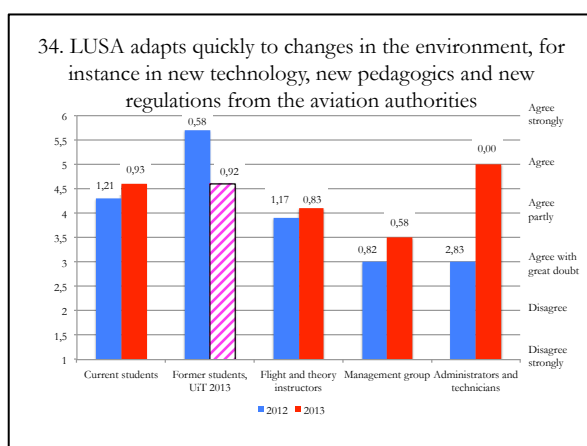
Graph 43 (34):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,3 (1,21)	4,6 (0,93)
UiT students	-	4,6 (0,92)
Flight and theory instr.	3,9 (1,17)	4,1 (0,83)
Management group	3,0 (0,82)	3,5 (0,58)
Adm. and technicians	3,0 (2,83)	5,0 (0,00)

35. At LUSA, we see mistakes as free opportunities for learning
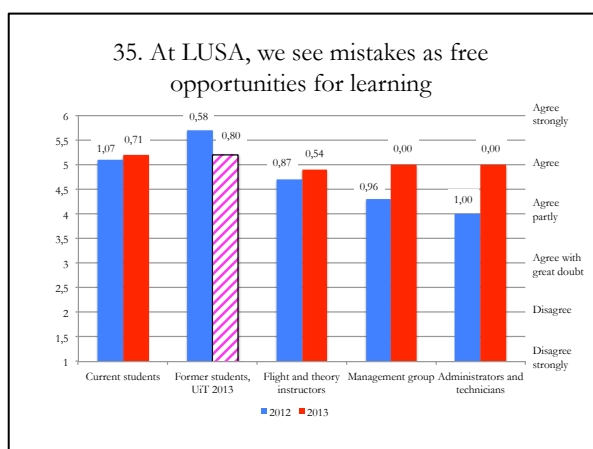
Graph 44 (35):	2012	2013
	Mv (s)	Mv (s)
LUSA students	5,1 (1,07)	5,2 (0,71)
UiT students	-	5,2 (0,80)
Flight and theory instr.	4,7 (0,84)	4,9 (0,54)
Management group	4,3 (0,96)	5,0 (0,00)
Adm. and technicians	4,0 (1,00)	5,0 (0,00)

36. At LUSA, we take advantage of all opportunities to learn from incidents and accidents in the flight operations
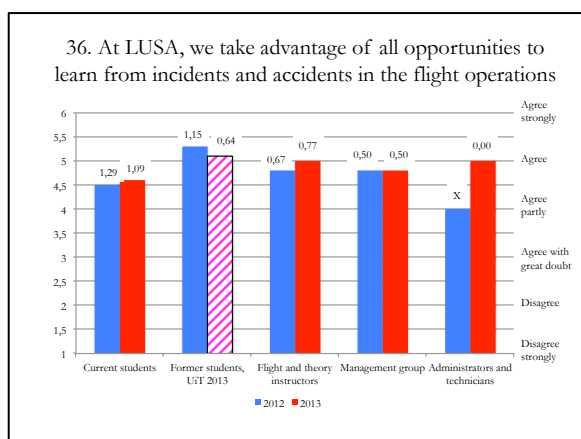
Graph 45 (36):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,5 (1,29)	4,6 (1,09)
UiT students	-	5,1 (0,64)
Flight and theory instr.	4,8 (0,67)	5,0 (0,77)
Management group	4,8 (0,50)	4,8 (0,50)
Adm. and technicians	4,0 (0,00)	5,0 (0,00)

37. My instructors/manager clearly shows the importance of learning from incidents and accidents in flight operations.
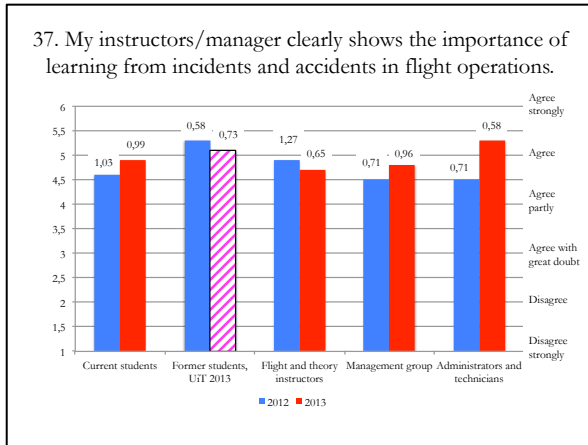
Graph 46 (37):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,6 (1,03)	4,9 (0,99)
UiT students	-	5,1 (0,73)
Flight and theory instr.	4,9 (1,27)	4,7 (0,65)
Management group	4,5 (0,71)	4,8 (0,96)
Adm. and technicians	4,5 (0,71)	5,3 (0,58)

38. My instructor/my manager encourages me to be curious about factors that may affect flight safety
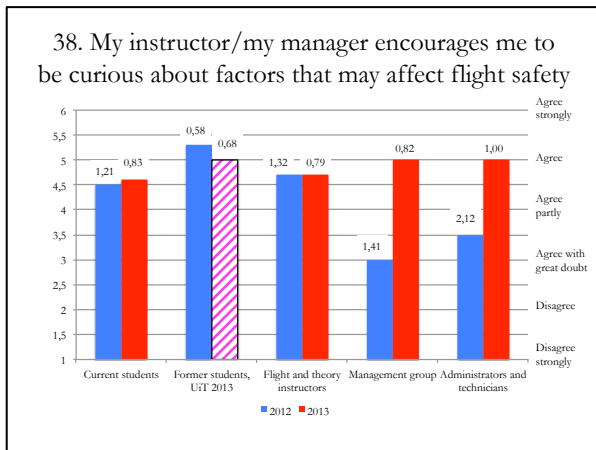
Graph 47 (38):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,5 (1,21)	4,6 (0,83)
UiT students	-	5,0 (0,68)
Flight and theory instr.	4,7 (1,32)	4,7 (0,79)
Management group	3,0 (1,41)	5,0 (0,82)
Adm. and technicians	3,5 (2,12)	5,0 (1,00)

39. LUSA regularly trains to manage incidents and accidents in flight operations
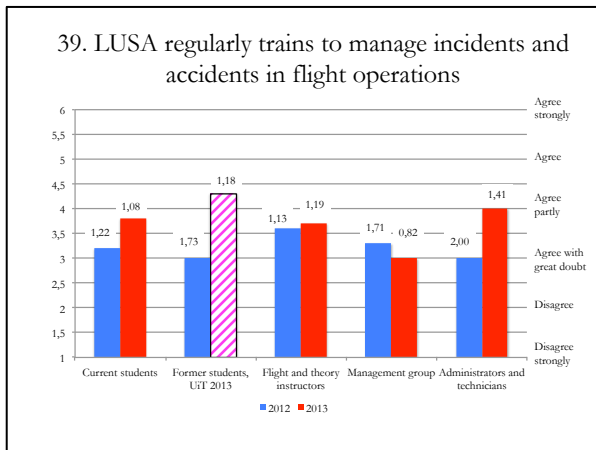
Graph 48 (39):	2012	2013
	Mv (s)	Mv (s)
LUSA students	3,2 (1,22)	3,8 (1,08)
UiT students	-	4,3 (1,18)
Flight and theory instr.	3,6 (1,13)	3,7 (1,19)
Management group	3,3 (1,71)	3,0 (0,82)
Adm. and technicians	3,0 (2,00)	4,0 (1,41)

40. At LUSA we encourage and support each other to always work with flight safety in focus
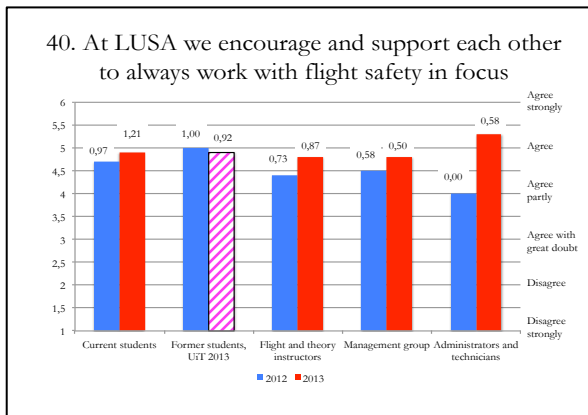
Graph 49 (40):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,7 (0,97)	4,9 (1,21)
UiT students	-	4,9 (0,92)
Flight and theory instr.	4,4 (0,73)	4,8 (0,87)
Management group	4,5 (0,58)	4,8 (0,50)
Adm. and technicians	4,0 (0,00)	5,3 (0,58)

41. I always get factual assessments by my instructor/ my manager if I have contributed to a situation that threatened flight safety
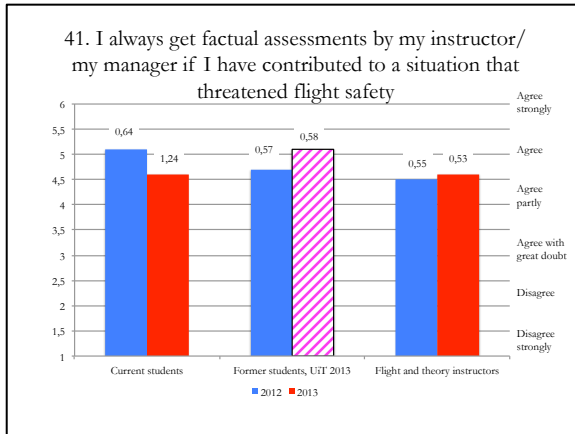
Graph 50 (41):	2012 Mv (s)	2013 Mv (s)
LUSA students	5,1 (0,64)	4,6 (1,24)
UiT students	-	5,1 (0,58)
Flight and theory instr.	4,5 (0,55)	4,6 (0,53)

42. Students' achievements are always assessed fair and equally, irrespective of which instructor that makes the assessment
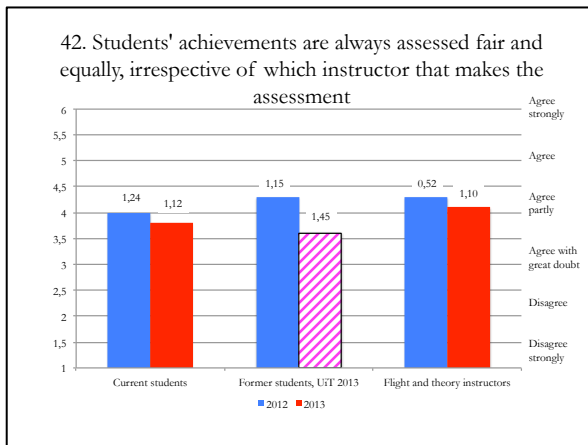
Graph 51 (42):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,0 (1,24)	3,8 (1,12)
UiT students	-	3,6 (1,45)
Flight and theory instr.	4,3 (0,52)	4,1 (1,10)

43. There is never pressure for time during flight sessions, there is always plenty of time for, for instance, repetition of a flight manouever
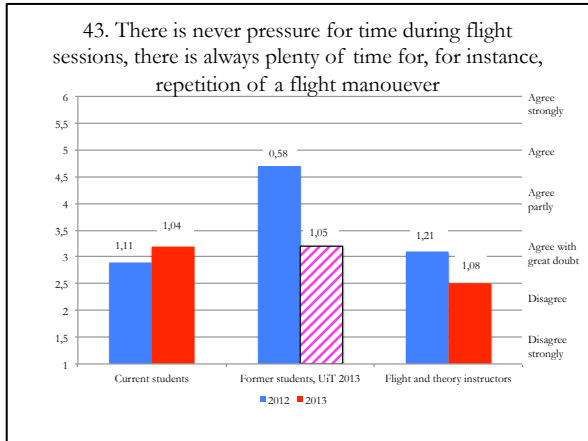
Graph 52 (43):	2012 Mv (s)	2013 Mv (s)
LUSA students	2,9 (1,11)	3,2 (1,04)
UiT students	-	3,2 (1,05)
Flight and theory instr.	3,1 (1,21)	2,5 (1,08)

44. The intentions of the flight instructor during a flight session are always clear and understandable
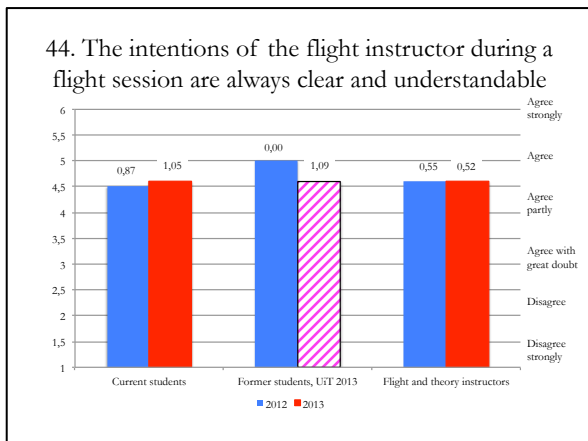
Graph 53 (44):	2012 Mv (s)	2013 Mv (s)
LUSA students	4,5 (0,87)	4,6 (1,05)
UiT students	-	4,6 (1,09)
Flight and theory instr.	4,6 (0,55)	4,6 (0,52)

45. The relationship between student and the instructor during a flight session is always open and honest
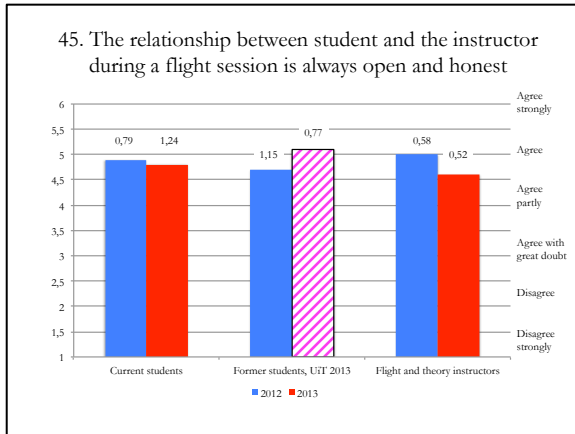
Graph 54 (45):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,9 (0,79)	4,8 (1,24)
UiT students	-	5,1 (0,77)
Flight and theory instr.	5,0 (0,58)	4,6 (0,52)

46. There is always plenty of time for the briefing before a flight session
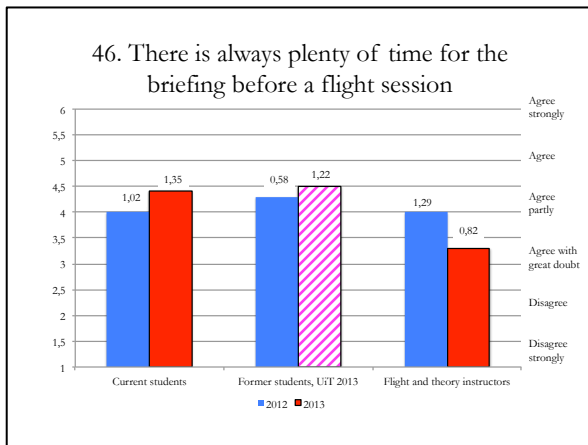
Graph 55 (46):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,0 (1,02)	4,4 (1,35)
UiT students	-	4,5 (1,22)
Flight and theory instr.	4,0 (1,29)	3,3 (0,82)

47. There is always plenty of time for the debriefing after a flight session
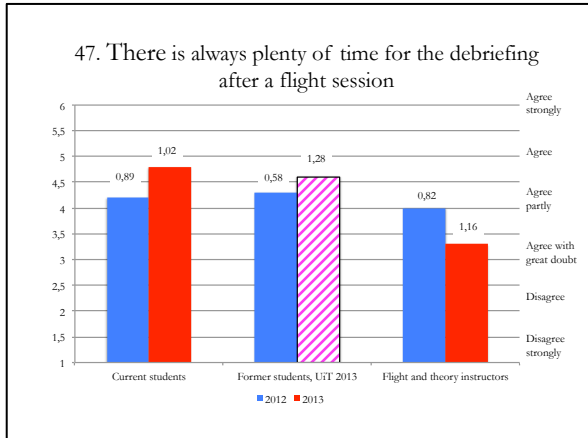
Graph 56 (47):	2012	2013
	Mv (s)	Mv (s)
LUSA students	4,2 (0,89)	4,8 (1,02)
UiT students	-	4,6 (1,28)
Flight and theory instr.	4,0 (0,82)	3,3 (1,16)

APPENDIX 3: FREE TEXT PROPOSALS AND COMMENTS

Below are the given free-text proposals and comments, given by the respondents.

3.1. Survey 1, 2012:

Current students, Proposal 1:

- Better communication between the flight training department and the theory (ground) training department. Better communication between the flight training department and the students. (C)

- Better communication between instructors, planning and students at the change of flight sessions/aircraft/session times, for instance by providing information via SMS or email if a change occurs after a certain time the day before the day with flight session, or on the same day. This would reduce the stress of planning and preparation, as well as reduce the risk of a missed session or that you do not have time to eat properly. (The latter can, in my opinion, make big impact on flight safety during long flight sessions) (C)

- Do not skip critical flight training elements because shortage of time. It is not OK to make a check ride for PPL without having flown cross wind! (L)

- Implement daily inspection refresher courses at least once per semester, including adding engine oil. (L)

- More sessions in the traffic pattern, even in the later parts of the VFR phase and not only around EK-release. (Replace some TT-nav exercise or similar) (L)

- Daily and joint debriefing of all flight sessions with all students. Everybody can bring up things that happened during the day and share their experiences. This, I think, would improve learning significantly. It could also contribute to better safety and better coordination of training, procedures, etc. (This has been the case previously during the military time, I have been told.) (M)

- Safety meetings with all students. (M)

- That you get the whole class together after a day or a week flights and tell each other what you have been doing and what you have learnt. (M)

- Bring up and discuss actual and flight incidents that happens now around Sweden (reflects flying in our environment). For instance, present an incident at a morning briefing. Then allow the students to think about it until the next day's morning briefing and make comments and thoughts. Could this have happened during our training flights, and how could it be avoided? (M)

- I would like to have a meeting maybe one day a week, possibly at the end of a day or after the morning briefing, where we go through things that we think is difficult, we have failed, done well, or tips and tricks. When talking to my class mates at our quarters in the evening, things can come up that will help tremendously in flight. For instance, when you start from a certain airport, the HSI may turn black and display a cross immediately after start. Such a thing is very important to be mentally prepared for. (M)

- We have requested to have carbon monoxide detectors in the aircraft, but it was rejected on the grounds that the existing system is of such a high safety level. However, I believe that the mental approach should be that nothing is failsafe. An installation is inexpensive and improves safety! (Org)

- Change to just have one radio frequency on for both TMA and CTR at the base, so all airborne aircraft can get a better idea of where all other aircraft are. Now some are on the CTR frequency, some on the TWR and some on the SWE-frequency during flight training in the area. It would be best if everyone were on the same frequency during all flying in the vicinity. SWE ought to be used only for navigation to other airports. (Org)

- Flexibility. Do not be so unflexibly divided between theory and flight. (Org)

- Collaboration between landside and airside is the most important improvement I saw the school has to do. Planning ahead is something everyone needs to do to carry out their flight sessions in a safe way. (Org)

- Reduced time pressure during brief and debrief, and also during flight sessions. (P)

Current students, Proposal 2:

- Clearer information from the school concerning checklists and other parts of the aircraft and simulator training. Often, each instructor has his own thinking, and you will be corrected to make it the way they want it in flight. There should be a standard that is communicated to all involved to avoid any doubt. (L)

- Review radio phraseology properly BEFORE we begin to fly! Have not received a good exercise in classrooms with instructors at all! Poor. (L)

- Increased focus by instructors on Threat and Error Management. (L)

- Have long briefing sometimes about the latest incidents and reports that are handled at the school and present the measures that are taken. (M)

- Better use of available resources. In some cases, the students can be a very good resource. (Org)

- Better monitoring on how long certain flight sessions are! At some long navigation flights (1219 for example), several felt very stressed to get back in time. You feel that the instructors, the tower and the technicians are waiting for you if you have the last session... In addition, there is a culture spread to those that have not made the flight yet that it is very important to hurry up! That is not good flight safety! (P)

- A schedule well in advance. (P)

- Better planning of the flight schedule to avoid delays that makes you stressful and affect training negatively (P)

- Monthly review of NCOR:s. Together with all classes (flying and non-flying). All new NCOR:s should be discussed and proposed actions presented. (R)

- Flight safety letters in which incidents and accidents in the organization are reported. (R)

- Encourage reporting of events even if they seem unimportant. Do this maybe once a week in connection with the briefings to be really clear about it. (R)

- Better monitoring on how long certain flight sessions are! At some long navigation flights (1219 for example), several felt very stressed to get back in time. You feel that the instructors, the tower and the technicians are waiting for you if you have the last session... In addition, there is a culture spread to those that have not made the flight yet that it is very important to hurry up! That is not good flight safety! (TP)

- A schedule well in advance. (P)

- Better planning of the flight schedule to avoid delays that makes you stressful and affect training negatively (TP)

Current students, Proposal 3:

- Better and clearer communication between students and instructors, and a wish to get the information earlier. Not only for flight safety, but in general. Often you get information too late. (C)

- Students could possibly know the aircraft better if they, for example, in one month intervals were scheduled to take part of a daily inspection together with the technicians in the morning! Half of our class have been trained in this but I think that many students at the school do not know how this is done! I have just started flying at flying club, and then you are required to do the daily inspection yourself! (L)

- OM Part B-1 2.2.7 Before Take Off. The middle section, saying that items 12-16 shall be made by heart and have no callouts, makes it easier to forget them and the result in that case

will be that you start without landing lights, pitot heat and fuel pump. (L)

- Better learning of the touchdown on landing, more detailed tips and structure in the landing. (L)

- More emphasis on threat briefing before each session, there is a TEM item for each session in the syllabus, but in my opinion, they are skipped many times. (L)

- Appoint a student to be for flight safety representative among students. (Org)

- Do not allow lack of time hamper quality and safety (P)

- Planning must be improved to allow sufficient time for preparations for a flight session. For instance, when weather changes or technical problems with the aircraft. Time shortage jeopardizes flight safety greatly. (P)

- Plan time for briefing and debriefing with instructors in connection with EK-sessions. These (especially debriefing) can sometimes be too short and summarized. (P)

- Do not start school in May/June... Then you get just a week's flight training and then there is a long break before you get back up and running again. Long breaks in flying are not good at all for regularity, and had it been a little more flexible with theory mixed with flight training it may not have been so bad as it is. (P)

- Improved planning. Promote safety with predictability. (P)

Current Students, General comments:

- Concerning question 32: Have never experienced something that I would consider a critical situation during flight, but I have full confidence in the ability of instructors to solve them, if they occur. (L)

Former students, Proposal 1:

- More AVA flight session. (L)

- To clearly highlight for all students at LUSA that it is not at all about "being the best" and instead emphasize cooperation, openness and informality. I doubt that everything that really should be reported is reported. For some students were probably the self-image as a top student more important than anything else, including flight safety. This should be addressed earlier in the training. (L)

Former students, General:

- Thanks for a fun time at LUSA and good luck with the Yrkeshögskolan). I felt in general

that I could have an open dialogue with instructors and staff and that my ideas and thoughts were listened to. (C)

- Some of the questions in the form could not be answered by a former student. The form may be adapted to the category you choose at the beginning. (O)

Flight and ground instructors, Proposal 1:

- Flight safety as a standing item for discussion at the morning briefing. (M)

- Clearer allocation of resources for each course. (Org)

- Increase the time for briefings, emergency training and meetings/ discussions about flight safety. This is an economic issue and I think the balance is good today in relation to the economic conditions, but more money would be welcome. (P)

- We often miss such facts as that the tower closes early, or requested off time is not introduced in the Wing. This leads to rapid reprogramming and stress as a result. Thus, improved procedures for the daily planning is proposed. (P)

Flight and ground instructors, Proposal 2:

- Appoint a Flight Safety Pilot and hold more flight safety related meetings. (M)

- Clearer responsibility distribution between Head of Training, Chief Flight Instructor and ??. Provides greater confidence, responsibility and "feel" for the operations and increases safety. (Org)

- The documentation for each session could be improved which would lead to less pressure of time between sessions. (Org)

- Improve the synchronization between theory schedule and flight schedule. (P)

Flight and ground instructors, Proposal 3:

- Work more with preventive safety activities, for instance seminars directed at both instructors and students. (L)

- In conjunction with EK flights always have someone who is responsible for the flight. (Org)

- Minimize hopping between the courses and activities of the individual. Belonging to and be organized to one single activity provides security, oversight and accountability. Then you can catch drifts and flag for safety deficiencies at an early stage. (P)

Flight and ground instructors, General:

- Yes, the economy again, if it would be possible to set aside more money, that would be fine. But under the present conditions I believe that it is only marginal efforts that can be made for improvements. (Org)

Survey 2, 2013:

Current students, LUSA, Proposal 1:

- A more relaxed atmosphere with each instructor, so one dares to ask "dumb" questions. (C)

- Address threats as a part of the departure briefing when we are in fact already in the aircraft. Do the same during the approach briefing. (L)

- Improved planning! Increases every possibility for preparations and thereby also flight safety. (P)

- The school management must plan more in advance. Too often things are discovered too late, for example when we were to fly IFR night with short notice we had to rush and make shortcuts, affecting flight safety. (P)

- Identification of and respect for the time required to plan a flight when the flight schedule is made. Several times it has been stressful to plan properly for departure according to schedule. (P)

- Faster follow-up of NCOR. Establish an email system for distribution to all students when an NCOR is "solved/answered". (R)

- That the name of the person that submitted a report is not visible for everyone in NCOR. (R)

- Review the procedures for handling of NCOR:s. The process i often slow and planned action dates are seldom followed. (R)

Current students LUSA, Proposal 2

- More active communication between departments, perhaps even with greater use of students (who could possibly find it easier to discover possible lack of communication). (C)

- Now and then review what has happened and give tips on how to avoid these situations. Or a mail with what has happened and with comments from the managers on how this can be avoided. Monthly. (C)

- Sufficient time to carry out threat and error management briefing as a part of the flight briefing. (P)

- Develop more standardized training methods to be used by the instructors for teaching (L)

- The instructors often teach different procedures for the same manouver, which ultimately can become confusing. (L)

- Better planning of flight sessions. It's not OK to plan early flight sessions late the previous before. (P)

- Keep better track of the flight schedule. Students and teachers frequently have difficulties to find time for planning and rest before flight sessions. (P)

Current students LUSA, Proposal 3:

- Encourage students to submit proposals to improve flight safety. (C)

- Have more focus on "learning" and less on "test" during the sortie. (L)

- More focus on routines and procedures during an earlier stage of the education. Not until the PPL checkride came closer many of us students realized how the checklists should be used correctly. I would have appreciated if the instructors had been more strict with checklist use earlier during the program. (L)

- To actually follow-up and finish NCOR reports within reasonable time. (R)

Current students LUSA, General

- Better communication between flight and theory training. Often it seems to be a serious lack of communication between these institutions. (C)

- Always keep a good open and happy environment between both students and instructors! It will increase confidence and hopefully discussions and reports relating to flight safety. (C)

- The school is really good and you feel convinced that everything will be carried out, but management must realize that they have to catch things right away and not wait until it is too late for us students and the learning process. (L)

Current students, UiT, Proposal 1:

- We might have had a little more focus on phraseology in different airspaces. So that we can feel a little more assertive of what to say and respond in every situation. (L)

- Build a procedure trainer for SR20 (like the procedure Trainer for the Bulldog in the administration building), so you can train emergency checklists. Many, including myself, learn the procedures better when you can press the buttons, turn the knobs, pull the levers,

etc. It does not need to be electrical, but the most important thing is that the cockpit is shaped like in the aircraft and that all the buttons and controls are correctly located. (L)

- Give the students more practical training in the use of navigational instruments before solo flying. (L)

- The flight program spring 2011 for UiT 01-2011 was planned too ambitious. After Easter we did almost nothing, only 1-2 simulator periods per week. Then we changed to two activities per day for several weeks, ie flight and simulator training. This had a negative impact on the learning of new elements, which in turn could affect flight safety. There has not been time enough to allow new elements to be learnt properly. (P)

- That the instructors have sufficient time (P)

- Increased focus on reporting all types of safety-related events. (R)

Current students, UiT, Proposal 2:

- Better training in visual scanning for other traffic and use of Skywatch (the MFD and GNS430) early in the flight program. Of course, the students should not learn too much about the technology in Avidyne/GNS430 early in the flight program, but Skywatch is something that the students should know how to use to their advantage and in the best possible way, combined with visual scanning. (L)

- More focus on spin when flying in traffic circuit and overshoot/undershoot situations where someone may be tempted to "help" with the rudder if they focus on the runway. I feel it has been talked too little about this. (L)

- Better standardization among instructors (L)

- It feels strange that the planning is so different for the different classes. While some have two simulator periods per week, others have two simulator periods or flight sessions per day. (P)

- More information about who may receive and evaluate the report, and in general what happens when a report is submitted. (R)

Current students, UiT, Proposal 3:

- There has been a huge difference concerning in which lesson the students in our class have been. Those who have "made the most progress" are pushed up even more, and those who are in the rear end are left even further behind. How can it be that the same people are scheduled as the first to go to school check and skill test etc every time? This despite the fact that others have been ahead. Consequently, it should be made and set up a more

logical, fair and reasonable planning. Perhaps it should not be random who is set up for check ride and school check. It is challenging to always be set up as the last. Why is it that the TFHS students who already have PPL certificate have to do the school check, while students from the University of Tromsø with PPL from before do not have to do the school check for PPL? In our class there are two that already had the PPL, and first they were set up for the school check for PPL, but then they were just removed, and it seems that it has been forgotten? It seems somewhat strange that there should be differences between TFHS and UiT students in this respect. Should not all students have all school checks, even if they already have PPL? (L)

- I would like to see example pictures of what should be checked during pre-flight checks and pictures of what is normal or abnormal to see. Some students do bad inspections. (L)

Current students UiT, General

- At times, the schedule is very tight. I refer to an average of eight sessions a week for several weeks. It does not necessarily affect safety, but can affect the educational value for the students, as they may not get sufficient time to digest one session before they have to plan the next. (TP)

- It seems at times that it is more important for the school to have the aircraft airborne than to allow the students to learn. Furthermore, it appears that the school has made a too ambitious schedule for the flight program. Even if our class has plenty of time, the school is pushing to execute the program since there is lack of time due to a too ambitious program. (TP)

Flight and theory instructors, Proposal 1:

- I miss more regular opportunities to discuss the incidents/accidents that happen in our operations and how we shall think and deal with them. (M)

- More meetings with discussions regarding flight safety. The frequency varies quite a lot. (M)

- Reduce the number of manuals. The amount of documents, often not valid and in some cases conflicting, makes it difficult to find relevant information. (Org)

- Current and updated manuals, whose content is followed and without a lot of added side notes. (Org)

- Restructure and possibly expand the organization. Distribute the responsibilities to more employees. Many times managers appear stressed by the number of tasks, which affect the

organization negatively and also their ability to exercise leadership. Long handling times may have a negative affect on flight safety. (Org)

- A new manual system, simplified and easier to adapt to reality when needed. Clean up the information on Navigare so that information is current, relevant and structured in a pedagogical way. (Org)

- More long-term planning. (P)

- No buffer time between sessions in case of delays. Not always time for a decent lunch, often just 20 min lunch. (TP)

Flight and theory instructors, Proposal 2:

- More safety-oriented seminars/courses. (L)

- Frequent short safety meetings/standardization meetings. To provide an opportunity to discuss problems encountered in daily operations. (M)

- Recruit more "safety officers". (Org)

- Clearer structure in course management, preferably with re-establishing a course manager with more responsibility and authority than the current course administrators. (Org)

- Processes, describing how business is conducted. (Org)

- Clean up the manual systems and documents on Navigare and the server to allow an easier way to find information and know what is applicable. (Org)

Flight and theory instructors, Proposal 3:

- Provide more administrative time to flight instructors to allow more opportunities for reflection, proactive safety work and report writing. (Org)

- Get all school departments, i.e. administration and flight department, in the same building, in difference to the current organization. (Org)

- Revise procedures so that a deadline is in fact respected as a deadline. (Org)

- Some kind of a "schedule", showing where the CFI, HT, CGI and other key personnel are located from day to day a week ahead. Visible on Navigare. The schedule can be made on Friday for the following week, for example if they are on a course, are free or on site. (Org)

- Add more resources to the follow-up of reports in the NCOR system. Make sure they are quickly resolved and that the system failures detected are more quickly implemented in the manual system. (R)

Flight and theory instructors, general:

- Very open atmosphere between employees and instructors! (C)

- My opinion is that today there is a significant difference between LUSA manuals, which defines demands and creates expectations of the training content, and the operations in reality, often made possible through combat management, shortcuts and quite frequent unplanned overtime work. I propose to the extent possible a jointly produced plan for the LUSA organization, goals, strategy, core values, etc., and that we thereby create a more transparent and efficient organization. (Org)

- The scarcity of resources, especially financial, create greater risks for flight safety. This is likely to be accentuated with the lower budget level YHS slots provide. (Org)

- A manager shall be able to be absent without creating organization indecisiveness. (Org)

Management group, Proposal 1

- More meetings/dialogues with safety-focus between students and instructors. (M)

- I believe that joint briefings after EK-flights will increase the exchange of experiences between the students and the school. (M)

Management group, Proposal 2

- Training of staff concerning competence-based training and feedback. (L)

Management group, Proposal 3

- Bring in the outside world to Ljungbyhed. Create a forum for staff and students to talk aviation and flight-related events. (M)

APPENDIX 4: INTERVIEW QUESTIONS

The questions were addressed to:

FI =   Individual flight and ground instructors

ST =   Individual Student

TE =   Individual technician

MG =   Representative of LUSA Management

AD1 =   Individual Administrator 1

AD2 =   Individual Administrator 2

Group 1 =   2 ST, 2 FI, one MG

Group 2 =   1 ST, 1 FI, 1 TE, 1 MG

Reporting

1. Have you have experienced an event, when the flight safety was threatened?

If yes:

- What happened?

- Why was the safety threatened?

- What or who was the cause according to your view?

- How could the situation have been avoided?

(FI, ST, Grp 1, TE, AD1, AD2)

2. Was the incident reported?

If yes:

- In what way?

- Did the report result in any improvement actions?

- If not, why do you that no action was taken?

- Were there consequences, negative or positive, for any of the people involved (yourself, colleagues, managers, etc.)?

If no:

- Why was it not reported?

(FI, ST, Grp 1, TE, AD1, AD2)

3. Have you experienced a situation where you have contributed to an event that could threaten

the flight safety, and where you felt reluctance to report for the risk of negative consequences for yourself?

If yes, what happened?

• Why were you hesitant?

(FI, ST, Grp 1, TE, AD1, AD2)

4. What can, according to your opinion, be the cause for the low response Results from technicians and administrators for some of the statements concerning reporting?

(TE, AD1, AD2)

School flights

5. How do you define the term "flight safety culture"? What is it? How visible it, how can you see if it exists or not?

(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

6. Who or what do you think are carriers of the safety culture?

(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

7. Imagine some events when you felt that the planning of theory lessons and flight sessions worked really well, and some where it did not work so well. What happened? What was good or not good? Why was it good or not good?

(FI, ST, Grp 1, Grp 2, AD1)

8. Tell me about a situation where time pressure occurred during a flight session and contributed to that the session did not feel 100% successful. What happened? Why did you perceive it negatively? What was the cause of the pressure for time? How often do you experience such situations?

(FI, ST, Grp 1)

9. Tell us about events where time for briefings and debriefings was perceived insufficient. What happened? Which consequences did it have? Do you think the time that is assigned for briefings and debriefings is efficiently used? If not, how could it be improved?

(FI, ST, Grp 1, AD1)

10. Tell me about a situation where you as a student contributed to a situation that endangered

flight safety. What happened? Why? How did you experience the assessment you received by the instructor after the event? (ST)

11. Give an example of a situation where you as a student felt that you were assessed in different ways by different flight instructors for the same item? What happened? Did you experience this as an advantage or a problem? How often do you experience similar situations? (ST)

12. Tell me about a situation where you felt that flight instructor's intentions were unclear. What happened? How did it affect the flight session? How often do you experience similar situations? (ST)

Organization

13. Tell me about a situation where you experienced that cooperation, in general or in flight safety issues, between departments worked well. What happened? Why do you think that it worked well? Is it always so? If not, why?
(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

14. Imagine some situations where you experienced that changes in LUSA organization and working methods for the benefit of flight safety has been fast and efficient, slowly or not at all. What happened? Why did it work good or not so good?
(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

15. Give examples of situations where you experienced that LUSA was fast and efficient, slow or not at all to adapt to changes in the environment concerning technology, pedagogics or government regulations? What happened? Why?
(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

16. Do you think that decided changes are introduced quickly and efficiently? Give some examples!
(FI, Grp 1, TE, Grp 2, AD1, AD2)

17. Do you feel that prestige sometimes is an obstacle to development and change? If yes, give

some examples of such a situation. What happened?

(FI, ST, TE, Grp 2, AD1, AD2)

18. Do you have insight in what is happening in the other departments of LUSA? What do you miss in the form of such insight?

(FI, ST, TE, Grp 2, AD1, AD2)

19. What type of skills (or training) would you like to add to better monitor and improve flight safety at the Flight Scool?

(FI, TE, Grp 2, AD1, AD2)

20. Do you think that high staff turnover within one of the categories has been a problem for the school? If yes, in what way?

(FI, TE, AD1, AD2)

21. Do you think that LUSA has plans and capacity to cope with unforeseen events (aircraft out of service, illness, damaged buildings and the like)? What functions are most sensitive?

(FI, Grp 1, TE, Grp 2, AD1, AD2)

22. What can, in your opinion, be the cause of the prop strike incidents in recent years?

(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

23. Have you experienced situations that resulted in, or could have resulted in a prop strike? What happened? How often?

(FI, ST, Grp 1, Grp 2)

24. Which do you think are the school's three most important challenges to deal with right now?

(FI, ST, Grp 1, TE, Grp 2, AD1, AD2)

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