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INTRODUCTION

What is the purpose of this Advisory Circular?

This circular provides the rationale and procedure for conducting a Line Operations Safety Audit (LOSA) at an airline.

To whom does this Advisory Circular apply?

This circular is relevant for airline personnel in flight safety, flight training, and flight operations. It is also relevant for personnel in ground operations and in-flight services.

Contents of the Advisory Circular

A LOSA—introduces the LOSA process and distinguishes it from other proactive safety data programs such as FOQA and Aviation Safety Action Program (ASAP). The next section— why do a LOSA—lists the various types of data collected via a LOSA and shows how they contribute to an airline’s safety management system. Next, the personnel involved in a LOSA and their respective roles are described. The longest section—how to implement a LOSA—is a detailed step-by-step guide to the LOSA process from initial planning to the final report. The Circular concludes with The Ten Operating Characteristics that define a LOSA and ensure the integrity of the process. Under the guidance of this Circular, an airline wanting to implement a LOSA must abide by all ten characteristics.

WHAT IS LOSA

A Line Operations Safety Audit (LOSA) is a formal process that requires expert and highly trained observers to ride the jump seat during regularly scheduled flights in order to collect safety-related data on environmental conditions, operational complexity, and flight crew performance. Confidential data collection and non-jeopardy assurance for pilots are fundamental to the process.

Using a medical metaphor, a LOSA is similar to a patient’s annual physical examination. People have comprehensive check-ups in the hope of detecting serious health issues before they become consequential. A set of diagnostic measures, such as blood pressure, cholesterol, and liver function, flag potential health concerns which in turn suggest needed changes to the patient’s current lifestyle. A LOSA is built upon the same proactive notion. It provides a diagnostic snapshot of strengths and weaknesses that an airline can use to bolster the “health” of its safety margins and prevent degradation.

LOSA is distinct from but complementary to other proactive safety programs such as electronic data acquisition systems (i.e., FOQA), and voluntary reporting systems (i.e., ASAP). There are two major conceptual differences. First, FOQA and Aviation Safety action Program (ASAP) rely on outcomes to generate data. For FOQA, it is flight parameter exceedances, and for ASAP, 4

it is adverse events that crews report. By contrast, LOSA samples all activities in normal operations. In these regularly scheduled flights, there may be some reportable events, but there will also be some near-events, and importantly, a majority of well-managed, successful flights. LOSA provides a unique opportunity to study the flight management process, both successful and unsuccessful, by noting the problems crews encounter on the line and how they manage them.

The second major difference is the perspective taken by each program. With its focus on electronic data acquisition downloaded directly from the aircraft, FOQA can be said to have the “airplane perspective”. ASAP provides the “pilot perspective” by utilizing pilots’ voluntary disclosure and self-reporting of events. ASAP reports provide insight into why events occur, as seen from the crew’s perspective. By contrast, LOSA provides a “neutral,

third party perspective” in that LOSA observers record contextual and flight crew data on every phase of flight, regardless of the outcome. All three perspectives provide useful data to an airline’s safety management system.

A third, more pragmatic, difference between the programs relates to logistics. FOQA and ASAP are continuous programs, i.e., they are set up to collect data on a daily basis. A LOSA is more project-based. The full LOSA process, from advance planning and observer selection and training, to data collection, analyses and final report, can take six months. Despite these differences, data from one program can be cross-referenced and used to guide data collection in another. For example, ASAP reports may highlight a problem with departures at a particular airport. This information can be fed to the LOSA steering committee that can then target more observations out of that airport in order to understand the magnitude and specifics of the problem. As another example, a LOSA may identify a high incidence of unstable approaches, leading to a review of procedures and the specification of new approach parameters. FOQA data can track adherence to the new specifications in the interim period leading up to the next LOSA.

WHY DO A LOSA

A LOSA provides unique data about an airline’s defenses and vulnerabilities. As explained above, a LOSA does not replace other safety-data sources such as FOQA or ASAP. Instead, it complements these programs and extends the reach of an airline’s safety management system. The data collected during a LOSA can impact almost every department in an airline, as the following examples show. The data collected during a LOSA can help an airline:

Identify threats in the airline’s operating environment

Observers note events in the operational environment, e.g., adverse weather, airport conditions, ATC clearances, terrain, and traffic congestion, and how they are managed by flight crew. High-prevalence threats and/or threats with higher mismanagement rates can be prioritized for further investigation; lower mismanagement rates signify areas of strength.

For example, understanding the extent to which certain airports or ATC practices pose a problem for flight crews, and capturing the strategies flight crews adopt to deal with them, can lead an airline to develop special procedures or advisories to help its pilots manage the known threat.

1. Identify threats from within the airline’s operations

Observers note events arising from within the airline’s own operations and how they are managed, e.g., operational time pressure, dispatch errors, aircraft malfunction/MEL items, and problems with ground, ramp, maintenance, and cabin personnel. A high number of threats arising from dispatch or cabin might signal that these departments require attention, or that inter-group co-operation with pilots needs to be improved, or that procedures are inconsistent across departments. As above, prevalence and management rates provide cues for prioritizing action.

2. Assess the degree of transference of training to the line

Data can be provided insight on whether training concepts are learned, but not whether they are actually practiced on line.

A LOSA provides that operational information, which can be reviewed from a training perspective to understand which areas of training, if any, are not transferring successfully to the line.

3. Check the quality and usability of procedures

A LOSA provides insights about potential problems with procedures. For example, if 5% of observed crews make a callout error during descent/approach/land, there may be a problem with those crews. However, if 50% of observed crews make the same error, then the evidence suggests a problem with the callout procedure. Procedures can be ill-timed, over-long, confusing, and/or compete for the pilots’ attention with

other more important activities. A LOSA will locate problematic procedures and policies via poor adherence rates. A LOSA can also identify the extent of procedural deviations across fleets.

4. Identify design problems in the human-machine interface

A LOSA captures aircraft handling and automation errors on different fleets that can highlight systemic flaws in design, interface, or adaptation. The rate at which certain errors go undetected and become consequential can also indicate potential design vulnerabilities. An airline can feed these LOSA findings back to the aircraft manufacturers, as well as writing SOPs to circumvent the flaws.

5. Understand pilots' shortcuts and workarounds

With experience comes expertise; pilots learn ways to save time and be more efficient. These techniques are rarely seen in a line check, when performance is usually done "by the book". A LOSA provides a principled manner by which an airline can capture collective expertise from within the pilot group, and then share that information with all its pilots through formal airline communication channels.

Using LOSA, false expertise—the adoption of a shortcut or workaround that is flawed in its safety assumptions—can also be identified and remedied.

6. Assess safety margins

Threats and errors that are mismanaged can result in undesired aircraft states if sufficiently serious. Vertical and lateral deviations and unstable approaches are examples of undesired aircraft states, also known as accident and incident precursors. A LOSA provides data about the prevalence and management of these incident and accident precursors. Thus, an airline acquires data about how close it is operating to the edge of the safety envelope, without crossing the boundary into an incident or an accident.

7. Provide a baseline for organizational change

LOSA results provide baseline and outcome measurement data against which organizational interventions can be measured. Using the medical metaphor, this would be akin to the patient deciding to cut out fried foods upon learning of a high cholesterol count. The next check-up reveals, in quantifiable form, whether this strategy has been effective in reducing cholesterol or whether other actions are necessary. Similarly, a follow-up LOSA provides a new set of results which will show whether the organizational changes were effective in reducing certain threats, errors, and/or undesired states.

8. Provide a rationale for allocation of resources

Because LOSA results highlight both the strengths and weaknesses in an organization, the results provide a data-driven rationale for prioritizing and allocating scarce organizational resources toward interventions.

WHO IS INVOLVED IN A LOSA

When first exploring whether or not to conduct a LOSA, it is advisable to gather representatives from all departments that may be potentially involved, including flight operations, training, flight standards, the safety department, and the pilot group.

Departments

The flight operations and training departments typically know first-hand what is and is not working well. These departments often have specific areas that they would like the LOSA to focus on. Possibly the most important reason for their involvement is that ultimately many of the problem areas that are identified during a LOSA must be addressed by these departments. They will also be the recipients of the potential benefits derived from the LOSA. If these departments do not support LOSA, then there will be resistance to the

findings; however, if these departments are part of the process, there will be a sense of ownership, and they will be invested in the results.

Pilots' Association or Group

The importance of having the pilots involved with and supporting the LOSA can not be overstated. If the line pilots are convinced that their association or pilot group supports LOSA, they will be more willing to accept the presence of observers on their flight decks. Additionally, if pilots believe this process is beneficial to them and to safety, they will be forthcoming and candid with their views and safety concerns. On the other hand, if the pilots view LOSA as a management tool to “spy on their cockpits” and they respond with “angel” performance rather than typical performance, then the results will not be fruitful.

Hence, where airlines have a formal pilots' association, leaders of the association must be involved in the LOSA process from the beginning. If no formal pilots' association exists, pilot representatives must be included. The pilots' association or group can also help disseminate the results of the LOSA and inform the pilots as to the company's plans as a result of the LOSA.

LOSA Coordinator & Steering Committee

Because buy-in and support is crucial, consideration should be given to forming a LOSA steering committee drawn from the various departments and the pilots' association. The LOSA steering committee and/or the LOSA coordinator have many tasks and logistical responsibilities, including:

- Publicize the upcoming LOSA in pilot newsletters to build awareness;
- Distribute a letter to all line pilots explaining the purpose of the LOSA;
- Decide the size and focus of the LOSA
- Select the observers, organize their schedules, and set up observer training;
- Organize a secure site for collection of the observation forms and subsequent data analysis.

All of these tasks are discussed in more detail in the “How to” section of this document.

Observers

LOSA observers must be carefully selected to ensure the integrity of the LOSA process. LOSA observers must be familiar with the airline's procedures and operations; they must also be respected by the line pilots. The observer team can include a small number of non-pilots as long as they can anticipate and understand flight crew tasks and their surrounding operational context; however, the majority of the team should be active or recently retired pilots from the airline.

In airlines that operate more than one fleet, observers should be scheduled to observe across fleets other than their own. This adds value to the process in that the observer looks more at the “big picture” rather than the fine detail. For similar reasons, experience has shown that using a small percentage of external observers drawn from pilots with LOSA experience at other airlines adds value in the form of a “control group” for observations. External observers—typically 10–20% of the total observer team—will normally attend the airline LOSA training and will need to familiarize themselves with airline procedures. They are particularly useful in picking up systemic and organizational threats to which airline staff are often “blind” due to familiarity.

A LOSA observer must be like a “fly on the wall”, able to occupy the cockpit jump-seat and capture data without being obtrusive or interfering with the crew's performance. This involves creating an environment where the crew almost does not realize they are being observed. LOSA observers will observe errors and undesired aircraft states as part of their observations; however, they should only interrupt and take an active role if they receive the safety of the flight to be seriously and immediately endangered. A helpful rule of thumb is to ask observers to think of themselves as a guest riding in the jump seat of another airline. This seems to help distance the observer from the flight crew while still being able to politely point out safety concerns if they come about.

LOSA observers should be scheduled in the status of “passenger”, “supernumerary” or “observer” only, i.e. they should not be scheduled as a member of the legal operating crew. This assists both the crew and the observer to understand that LOSA observers are data collectors only, not evaluators there to critique crews. Observers do not have any responsibility for the operation.

Line Pilots

A LOSA cannot succeed without the full and candid co-operation of the line pilots, and there can be no co-operation without trust. Line pilots must be informed in advance about the purpose and planned implementation of a LOSA.

They should receive a letter co-signed by credible representatives of both management and the pilot organization that assures them of the confidential and non-jeopardy status of LOSA data. The letter should also include a disclaimer giving all pilots the choice of declining a jumpseat observer at their discretion.

Only by building in these guarantees and safeguards will the line pilots feel sufficiently comfortable to act normally in the cockpit in the presence of a LOSA observer. A final assurance should be an in-house publication of a summary of LOSA results along with an outline of initial actions and proposed changes.

Data Analyst and Report Writer

The data analyst should have knowledge of the airline’s flight operations as well as database management and data analysis skills. However, an airline might choose a third party analyst if expertise is not available in-house, or if line pilots have expressed reservations about the integrity of the LOSA implementation or objectivity of the final report.

The data analyst and report writer work together to prepare a report of the findings to be presented to management and pilots.

WHEN TO CONDUCT A LOSA

There are several factors to consider when scheduling a LOSA. Given all the personnel involved, a LOSA should be scheduled to fit with other operational priorities. For example, is there a particular time in the year when more observers will be available? Is there a better time for the Scheduling department to roster these people? Also, is there a particular time that is more interesting from a safety or operational perspective? Some examples: bad-weather season, peak traffic season, after the introduction of an operational change such as new aircraft, altered routes, or a merger.

A LOSA must not be implemented immediately after a major incident or accident. The airline will be in a heightened state of awareness at this time, and pilots will be overly sensitive to observation; hence, the chances of getting normal data will be diminished. At a minimum, airlines should wait at least six months after a major safety event before scheduling a LOSA.

HOW TO IMPLEMENT A LOSA

This section presents a step by step guide to implementing a LOSA. Broadly speaking, there are steps associated with getting good-quality data from observers (Data Collection), and steps associated with ensuring that accurate and meaningful data are given to management and line pilots (Data Analysis & Feedback). An airline can conduct its own LOSA by observing the following steps.

DATA COLLECTION

1. Form a LOSA steering committee and appoint a LOSA coordinator

2. Gather information and LOSA resources from other airlines and industry groups

Before conducting a LOSA for the first time, the committee and coordinator should seek out information from other airlines that have already conducted a LOSA. Other airlines may be able to share observer selection and training techniques, observation forms, scheduling tips, and other logistical aids.

3. Publicize LOSA within the airline and send a letter to the line pilots

A first task is advance publicity via company publications to build line pilot awareness and acceptance of the upcoming LOSA. Next, the coordinator organizes and distributes a letter to all pilots explaining the purpose of the LOSA.

This letter specifies the purpose of the audit, the fact that all observations are of a non-jeopardy nature, and that all data will be kept strictly confidential. The letter is signed by the highest level of management within flight operations, with the endorsement of other relevant personnel such as chief pilots and pilots' representatives.

The letter of announcement should precede the line audit by at least one month, with a follow-up alert one week before starting observations. LOSA observers should have copies of the signed letter to show crewmembers in case questions arise.

4. Decide the focus of the LOSA

The LOSA steering committee decides the focus of LOSA. One option is to sample broadly across the entire operation—this would be an effective strategy for a first LOSA. Alternately, the LOSA steering committee can focus on problems that have been identified by other data sources, such as FOQA and ASAP. This approach would schedule LOSA observations on particular routes, in certain regions, or into particular airports that have been identified as problematic.

The committee can also focus a LOSA on a new fleet or other recent organizational changes.

5. Decide the number of observations

Most airlines will find it cost effective to conduct a LOSA on a sample of their operation—the question is how big a sample?

As a general guideline for a full LOSA, match the number of observations per fleet to the relative number of departures per day. For example, if 30% of departures occur on Fleet A, then approximately 30% of the LOSA observations should occur on Fleet A. Within each fleet, try to sample as many different crews as possible, and as a rule, conduct 50 or more observations per fleet. Below that number, there is the risk of not accurately capturing a representative sample.

Modify the guideline slightly when focusing on a particular operation or region.

For example, to sample international flights into a particular sub-continent, then regardless of what percentage they constitute of the airline's daily departures, still schedule at least 50 observations to ensure a good sample.

6. Create an observation form

The observation form should be based on a conceptual framework that captures multiple aspects of normal operations, including the operating environment and flight crew performance. It should provide categories and codes to streamline observations and save the observer's time, but it should also require a written description of the flight that captures the full context. See appendix (A) sample LOSA observation form.

7. Select observers

The observer team should have representatives from flight operations, training, safety, and the pilots' association. Some airlines employ a selection procedure whereby management and the pilots' association each put forth a list of acceptable observers, and then those who appear on both lists are selected.

The number of observers needed depends on the size of the audit and the observers' workload. There is substantial work involved in completing an observation form and providing a detail-rich narrative for each flight; therefore, the recommended number of observations is 10-15 per observer, depending on routes and schedules. Hence, a LOSA that plans 150 domestic observations requires at least 10 observers, while a 300-observation LOSA that includes international flights requires 20-25 observers.

8. Train observers

LOSA observers must be educated about the purpose and rationale of LOSA, and trained in the use of the observation form. LOSA observer training typically takes two to three days. To assist in the design of the training, members of the steering committee may want to attend LOSA observer training at another airline first. Observers should practice with scripted scenarios or videos until they are confident they can use the observation form correctly. At this point, they can be dispatched to the line; however, it is recommended that observers be brought back in after one or two flights, to discuss their observations, correct any misperceptions, and coach them on areas that require clarification. Appendix C provides more detail on the objectives and content of observer training.

9. Schedule observations

Plan no more than two observations per observer per day to allow sufficient time to complete the observation form and write a rich narrative. Schedule observers across fleets regardless of their type rating to encourage a more general, cross fleet perspective of flight crew performance. Build some flexibility into the schedule to allow for the unexpected. Finally, do not let the observations continue indefinitely—schedule all observations within a 1-3 month period if possible, else the impact of LOSA will be lost.

10. Decide on a data repository

The LOSA coordinator organizes a secure site for the data and oversees the receipt of the observation forms. The coordinator must be able to protect the identity of the observers and the observed to ensure complete confidentiality and non-jeopardy conditions. Under no circumstances should it be possible to connect individuals with particular observations.

The observations can be kept in-house if data management and analysis expertise is available, and if data security can be assured. Alternately, the data can be sent to a trusted third party who will assume responsibility for data collection, cleaning, and analysis. The decision will depend on airline resources and pilot trust issues.

1 There have been several LOSA conferences in different regions of the world. At these events, airline representatives learn about Threat and Error Management, they hear from other airlines who have implemented a LOSA, and they attend an overview of LOSA observer training using the TEM model.

11. Provide logistical support

Give the observers the name of a contact person, most likely the LOSA coordinator, who can be reached if there are any problems with scheduling or data collection.

DATA ANALYSIS & FEEDBACK

12. Verify the data

Convene a meeting of “local experts”—airline personnel familiar with the operation of each fleet (possibly fleet managers or member of the steering committee, but not any of the observers). The group’s task is to review and verify the observations against current manuals, policies, and procedures. For example, an observer might log a procedural error for failure to make an approach callout when in fact there is no written procedure in the airline’s flight operations manual.

The data verification group would delete this particular ‘error’ from the database. This step is a data integrity check in that it ensures that events are correctly recorded in line with each fleet’s procedures and policies. It also builds ownership in the results and dispels any later criticism that the coding was not an accurate representation of the airline’s operations.

13. Analyze data

LOSA data reveal strengths and vulnerabilities in an airline’s operations. The data analyst should investigate the prevalence and management of different events and errors. Although certain types of comparisons will seem obvious, many analyses can and should be based upon hunches and theories derived from local knowledge of operations. If the analyst knows how fleets and operations are managed, comparisons that reflect this structure can be made. If the analyst knows the kinds of information that might be useful to training, safety, or to

domestic or international flight operations, results can be tailored to these particular aspects of the operation. Feedback from various airline stakeholders is critical during this stage of preparing the report. The analyst should not hesitate to distribute early drafts to key people within the airline familiar with LOSA to cross-verify the results. This not only helps validate derived trends, but it gives other airline personnel ownership of the report.

Patterns will emerge as the data are analyzed. Certain errors occur more frequently than others, certain airports or events emerge as more problematic than others, certain SOPs are routinely ignored or modified, and certain maneuvers pose greater difficulty for adherence than others. These events and practices form the basis of suggested targets for enhancement.

14. Prepare report

The last stage of a LOSA is a written report that presents the overall findings of the audit. With a large database like the one generated from a LOSA, it is easy to fall into the trap of trying to present everything. The report must be concise and present only the most significant trends from the data.

Along with the results, the report should provide an initial list of targets for enhancement. Targets need to be action-focused and data-driven. Some example targets that might emerge from a LOSA include:

- a) Reduce the number of unstabilized approaches
- b) Streamline pre-departure checklists
- c) Reduce SOP cross-verification errors
- d) Understand automation errors on the new fleet
- e) Investigate conditions at airports X and Y
- f) Improve management of adverse weather threats
- g) Investigate high rate of MEL items on the ZZ fleet
- h) Reduce dispatch errors at the hub
- i) Develop an international flight operations guide
- j) Develop a module on intentional non-compliance errors for Captain
- k) Upgrade training

15. Brief management

The LOSA report should be presented to management in operations, training, standards, safety, and possibly other departments depending on the results. For example, representatives from ramp, maintenance, dispatch and cabin may want to hear how their work is perceived from the pilots' perspective, particularly if it is problematic. A briefing to the pilots' association is also recommended.

Once the various departments are briefed on the report, they will likely want to investigate the data more deeply themselves. The data should be available in aggregated form for them to review. Some flight narratives will also be of interest, hence the prerequisite insistence on de-identifying the observations.

16. Brief line pilots

Line pilots should also be informed of the significant results in the LOSA report.

To sustain the pilots' interest in the LOSA project, make an announcement at the end of the data collection phase that the LOSA observations have been completed, stating how many and on what fleets, and advise when the pilots can expect to see the results.

When the report is ready, the highlights should be presented to the pilots, either as one LOSA debriefing event or spread over time in the airline newsletter or other safety periodical. Pilots will want to know what changes will be undertaken as a result of the LOSA.

17. Monitor safety change process

Historically, organizational safety changes within airlines have been driven by accident/incident investigation and intuition. Today, airlines must deal proactively with accident and incident precursors. To be successful, the safety change process must be data-driven. Measurement of daily operations is fundamental, because unless an organization

uses systematic measurement, the perspective it has on the strengths and weaknesses of its operations is largely based on anecdote and opinion.

A LOSA provides specific and quantified results. To take full advantage of this specificity, the targets for enhancement that arise from the data analysis should go through a formal safety change process to produce improvement. A formal safety change process provides a principled approach to target limited resources and helps the airline avoid “turf” issues, by clearly defining and prioritizing the issues that impact flight operations. The basic steps of a safety change process are:

- a) Measurement (with LOSA) to obtain the targets;
- b) Detailed analysis of targeted issues;
- c) List of potential changes for improvement;
- d) Risk analysis and prioritization of changes;
- e) Selection and funding of changes;
- f) Implementation of changes;
- g) Time for changes to stabilize;
- h) Re-measurement.

HOW TO USE LOSA DATA

A well-conducted and well-analyzed LOSA identifies strengths and vulnerabilities in an airline’s operations. It provides this information in a quantifiable form against which targets can be specified and improvements can be measured. The following example briefly illustrates the step-by-step integration of LOSA data into the safety change process.

An airline’s LOSA results indicate that 16% of observed flights involved an unstable approach. Because observations were scheduled across the operation, and the number of observations exceeded 50 per fleet, the LOSA committee is confident that the percentage is an accurate representation of operations as a whole.

Following management briefings and extensive discussion, a specific target for improvement is created to “reduce the number of unstabilized approaches by 50%, that is, reduce the number of unstable approaches from 16% to 8% or fewer of all landings.”

An action committee is formed for unstabilized approaches. They formalize the parameters and definition of an unstable approach, they review existing procedures and training, and they introduce changes in all relevant areas.

A repeat LOSA is conducted three years after the first LOSA. The data, once aggregated and analyzed, show the new rate of unstable approaches to be 12%.

The airline concludes that changes made to the operation were successful in reducing the rate of unstabilized approaches from 16% to 12%, an improvement of 25%. Upon reviewing the results of the second LOSA, the airline recommits to its original target of reducing the unstable approach rate to 8% or lower, and continues to focus efforts in this area.

Depending on the sophistication of an airline’s safety management system, and the extent to which different safety programs within the airline are premised on the same conceptual framework, data from a LOSA can be cross-referenced with data from the ASAP or FOQA programs. Each data source provides unique yet complementary evidence of the airline’s safety status. In the above example, the airline might track unstable approaches through its FOQA program using new flight parameters decided by the action committee and then implemented into procedures and training. To see if pilots are incurring problems with the new procedure, the FOQA aircraft data can be cross-referenced with ASAP reports of events resulting from unstable approaches. This way, the airline does not have to wait until the next LOSA to learn if its interventions are being successful.

LOSA data are useful in another way. LOSA presents a broad view of operations; a repeat LOSA can maintain that broad focus. For example, did the changes that were introduced after the first LOSA improve results in one area, only to cause problems in another? Checklist adherence may have improved, but did error detection—the super ordinate goal of improving checklist adherence—actually improve or is the new adherence simply cosmetic?

SUMMARY: THE TEN OPERATING CHARACTERISTICS OF LOSA

Ten operating characteristics define and summarize the LOSA process. Under the guidance of this Advisory Circular, a LOSA must observe all ten characteristics to ensure the

integrity of the LOSA process and the quality of the final product. These ten characteristics have been formally endorsed by ICAO, IATA, and US ALPA. The Ten Operating Characteristics are:

1. Jump-seat observations during normal flight operations

LOSA observations are limited to regularly scheduled flights. Line checks, initial line indoctrination or other training flights are off-limits due to the extra level of stress put on pilots during this type of situation. Having another observer on board adds to an already high stress level, thus providing an unrealistic picture of performance. In order for the data to be representative of normal operations, LOSA observations must be collected on regular and routine flights.

2. Joint management/pilots' association sponsorship

In order for LOSA to succeed as a viable safety project, there needs to be support not only from the management side but also from the pilots. The joint sponsorship provides a "check and balance" for the project to ensure that change, as necessary, will be made as a result of LOSA data. When considering whether to conduct a LOSA, the first question to be asked by airline management is whether the pilots' association (or pilot group representatives) endorses the project. If the answer is "No", the project must not be initiated until endorsement is obtained.

3. Voluntary crew participation

Maintaining the integrity of LOSA within an airline and the industry as whole is extremely important for long-term success. To accomplish this goal, all LOSA observations are collected with voluntary crew participation. Before conducting LOSA observations, observers must first ask the flight crew for permission to be observed. If the crew declines, the observer takes another flight with no questions asked. If an airline conducting a LOSA has an unreasonably high number of declines, this should serve as an indicator that there are critical "trust" issues to be resolved.

4. De-identified, confidential, and non-disciplinary data collection

LOSA observers are required not to record names, flight numbers, dates, or any other information that can identify a crew or individual. The purpose of LOSA is to collect safety data, not to punish pilots. Airlines cannot allow themselves to squander a unique opportunity to gain insight into their operations by having pilots fearful that a LOSA observation could be used against them for disciplinary reasons. If a LOSA observation is ever used for disciplinary reasons, the credibility of the entire safety program may be irreparably compromised.

5. Targeted observation form

The LOSA observation form is predicated on the TEM framework. At the airline's own initiative (and risk), other conceptual frameworks can be used for LOSA data collection. Whatever framework is used, it must generate meaningful data on a variety of topics, including what the crews did well, what they did poorly, and how they managed each phase of flight. A narrative written by the observer should have sufficient detail to allow others to understand the flight and all its events. The observers need to describe the environmental conditions and events surrounding the pilots' behavior so that the crews' performance can be understood in full context.

6. Trained and calibrated observers

Primarily, pilots conduct LOSA. Observation teams will typically include line pilots, instructor pilots, safety pilots, management pilots, and representatives of the pilots' safety committee. It is critical to select observers that are respected and trusted within the airline to ensure line acceptance of LOSA. After observers are selected, they are trained and calibrated in the LOSA methodology, including the use of the LOSA observation form. Observers' training in the concepts and methodology of LOSA will ensure that the observations will be conducted in the most standardized manner. (See Appendix C.)

7. Trusted data repository

In order to maintain confidentiality, airlines must have a trusted data repository. This site can be in-house, such as that used for other confidential data such as FOQA, or it can be off-site. The goal is that no individual observations will be misplaced or improperly disseminated through the airline.

8. Data verification

Data-driven programs like LOSA require quality data management procedures and consistency checks. For LOSA, these checks are done at data-verification roundtables. A roundtable consists of three or four department and pilots' association representatives who review all the raw data for possible inaccuracies.

The end product is a database that is validated for consistency and accuracy according to the airline's standards and manuals, before any statistical analysis is performed.

9. Targets for enhancement

The final product of a LOSA is the data-derived targets for enhancement based on emergent patterns in the data. It is then up to the airline to develop an action plan based on these targets, using experts from within the airline to analyze the targets and implement appropriate change strategies.

10. Feedback results to the line pilots

In order to ensure long-term success of LOSA, airlines must communicate the results back to the line pilots. Pilots will want to see not only the results of the audit, but also management's plan for improvement.