



***Genesis of a Feedback System
Based on Human Factors
for the Prevention of Accidents
in
General Aviation***

SAFETY STUDY

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Abbreviations

AFIS	Aerodrome Flight Information Service
BEA	(Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile) = French Accident Investigation Bureau
DGAC	(Direction Générale de l'Aviation Civile) = French Civil Aviation Authority
ICAO	International Civil Aviation Organisation
REC	(Recueil d'Événements Confidentiels) = Confidential Reporting System
SFACT	(Service de la Formation Aéronautique et du Contrôle Technique) = Technical Inspection and Training Service
ULM	Ultra-Light Motorised

Civil aviation can only survive if all parties involved -- both players and customers -- are convinced that all operations are undertaken in a safe environment. Such safety is often perceived as the tranquillity of mind that results from the certainty that no disaster is about to strike.

Civil aviation is commonly divided into two components:

- public air transport of passengers or freight (these activities are charged for),
- general aviation, comprising everything that is not public transport (leisure flying, training, aviation-related activities).

The purpose of this paper is to describe creation of a feedback system for improving safety in general aviation.

The study commences with a short preview of safety in general aviation, concentrating in particular on comparisons with public air transport, and argues for the setting-up of an additional feedback system. Next the derived benefits and limits of such a system are analysed. Finally, a description of practical implementation of such a system, together with some initial results, is employed to highlight the related operational problems and indicate appropriate solutions. An outline of various approaches taken in foreign countries is also provided.

The emphasis is placed on the incorporation of human factors, through two scenarii:

- Man is the main player in the sphere of aviation-related activity, he being the one who carries out the activity;
- Man, beyond the notion of aviation-related activity, takes a step back to consider his own actions and accounts for them in order to supply a feedback system.

1 THE CONTEXT

1.1 Comparisons between public air transport and general aviation

1.1.1 Some features of activities

Public air transport is an activity pursued within limits that are minutely defined by instructions, procedures and numerous regulations, and closely monitored by various authorities. Factors such as the scale of commercial and financial undertakings, responsibilities of airlines with regard to their customers, legal constraints, or the need to project an image of safety, justify the high levels of material and human assets devoted to the prevention of accidents.

General aviation includes flight training schools, aviation-related activities and recreational aviation.

Training schools: The certifications issued by administrations attest to satisfactory

technical expertise. Even though the competition between private flying schools imposes minimum training costs, safety seems to be maintained to a satisfactory level, thanks in particular to very experienced management and close supervision.

Aviation-related contractors: A manual of special activities registered with the administration specifies the methods and procedures used by contractors in undertaking their activities. The competition between companies of various sizes employing disparate equipment (microlights/ULM, helicopters etc.) is very fierce. For directors, company survival in the very short term depends essentially on commercial or financial criteria.

Recreational aviation: Users are above all trying to exercise a leisure activity at the best price. They very often belong to non-profit-making associations functioning on a volunteer basis. Management and control within the association, like administrative supervision without, is sometimes hard to detect. While training levels most often are appropriate to the exercise of private activity, role-currency is relatively unregulated.

Therefore aviation-related activities and recreational flying are often characterised by:

- regulations that are insufficiently coercive or precise,
- shortfalls at the local management or supervision levels,
- lack of control in infrastructure and the aviation environment,
- an emphasis on the lowering of costs,
- a certain "arms-length" attitude towards the authorities.

Only limited means are applied to the prevention of accidents in general aviation, particularly in the case of aviation-related activities and recreational aviation.

1.1.2 Assessing the safety level

With regard to public air transport, average activity per year in France may be appraised using certain figures: around two million departures representing 100 million passengers and 10 million flight hours. On average, accidents account for approximately ten deaths per year. Thus, the "tolerated" safety coefficient for public air transport is in the order of 10 to the power of -6, that is to say one death in one million flight hours.

The order of scale for general aviation is around two million flights per year, representing approximately one million flight hours, in the course of which accidents result for around a hundred deaths. The safety coefficient can thus be evaluated as 10 to the power of -4, that is to say, one death per ten thousand flight hours⁽¹⁾.

1.1.3 The situation regarding feedback

Feedback routes are numerous (audits by the GSAC, Airprox procedures etc.).

¹ Whether for public air transport or general aviation, estimations are based on a factor of ten only.

With regard to accidents and serious incidents, the Civil Aviation Code stipulates that all such events require an obligatory declaration, and that the technical investigations directed by the BEA shall result in publication of reports which may include recommendations. In the case of incidents, the BEA decides to what extent it should become involved.

In the realm of public air transport, technical investigations into accidents and serious incidents may become extremely involved, since organisations are highly structured, the parties involved are clearly identified, and procedures are standardised. In conformity (notably) with the orientation adopted by JAR-OPS-1⁽²⁾, public air transport undertakings have established accident-prevention and flight safety programs. Such programs include all types of information-gathering systems, notably flight analysis through the systematic processing of information gathered by onboard recorders, the appointment of flight safety officers, the issuing of flight safety bulletins, the collation of volunteer reports etc. Thus large investments are devoted to investigating incidents and minor events occurring frequently during operations.

For general aviation, the BEA publishes a monthly information bulletin detailing particularly representative accidents and serious incidents. Since the system lacks intricate structure or wide-ranging standards, investigating the root causes of such events is often impossible. For this reason, reports are generally factual. The BEA may also publish general operational reports covering several general-aviation accidents having related causes. The latter documents contain more detailed analysis and causal research than the information bulletin. Nonetheless, apart from some very rare exceptions, general aviation organisations have not set up their own systems to handle feedback regarding unaccustomed situations or minor events. Moreover, no such statutory constraint exists in this respect.

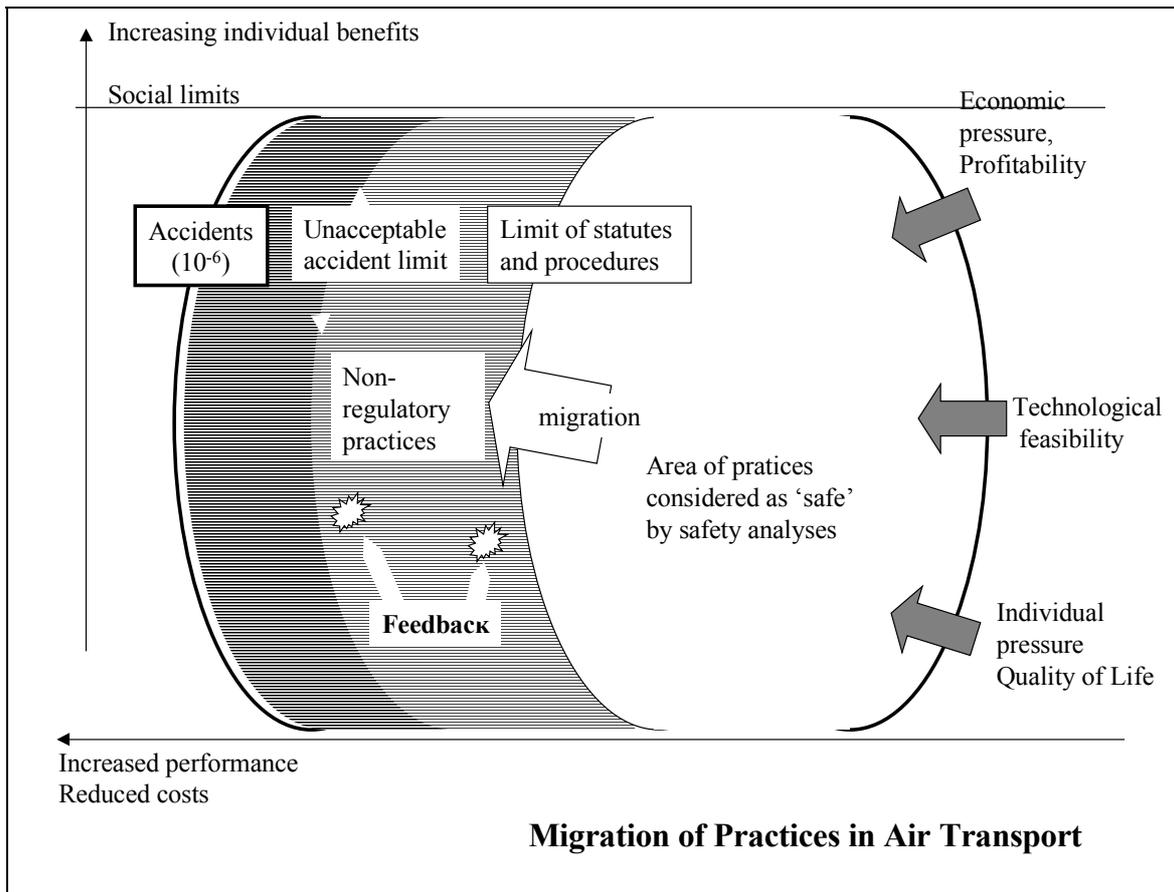
1.1.4 Event-characterisation

Thanks to the high safety levels attained in public air transport, accidents are very rare. It is therefore difficult to draw parallels between accidents, or classify them into categories. Incident-reporting produces information regarding isolated factors that might lead to accidents, but the combination of factors that could lead to a disaster is unforeseeable.

Feedback systems based on minor events give information about the state of the organisation in general, the suitability of personnel for their respective tasks, or changes in the perception of hazards⁽³⁾ etc.

² Joint Aviation Requirements—Commercial Public air transportation - Aircraft. This text has been signed by representatives of the civil aviation authorities of numerous European states. It was integrated into French regulations by the decree of 12 May 1997 concerning the technical conditions for aircraft operation by airlines.

³ Rasmussen, J., 1997. Risk management in a dynamic society, a modelling problem. *Safety science* 27 (2-3),183-214.



The diagram illustrates the shift in the field of operations by air-transport players, under the effects of economic constraints, technological advances and individual human orientations toward least effort. The shifts take place routinely from an area considered as "safe", towards an area situated beyond regulations and procedures, characterised by blurred boundaries and not addressed by safety analyses. Feedback from this area allows a better understanding of the reality of the activity, and highlights events occurring closer to the unacceptable incident limit. It can be seen that the realm of operations still remains quite remote from the accident boundary.

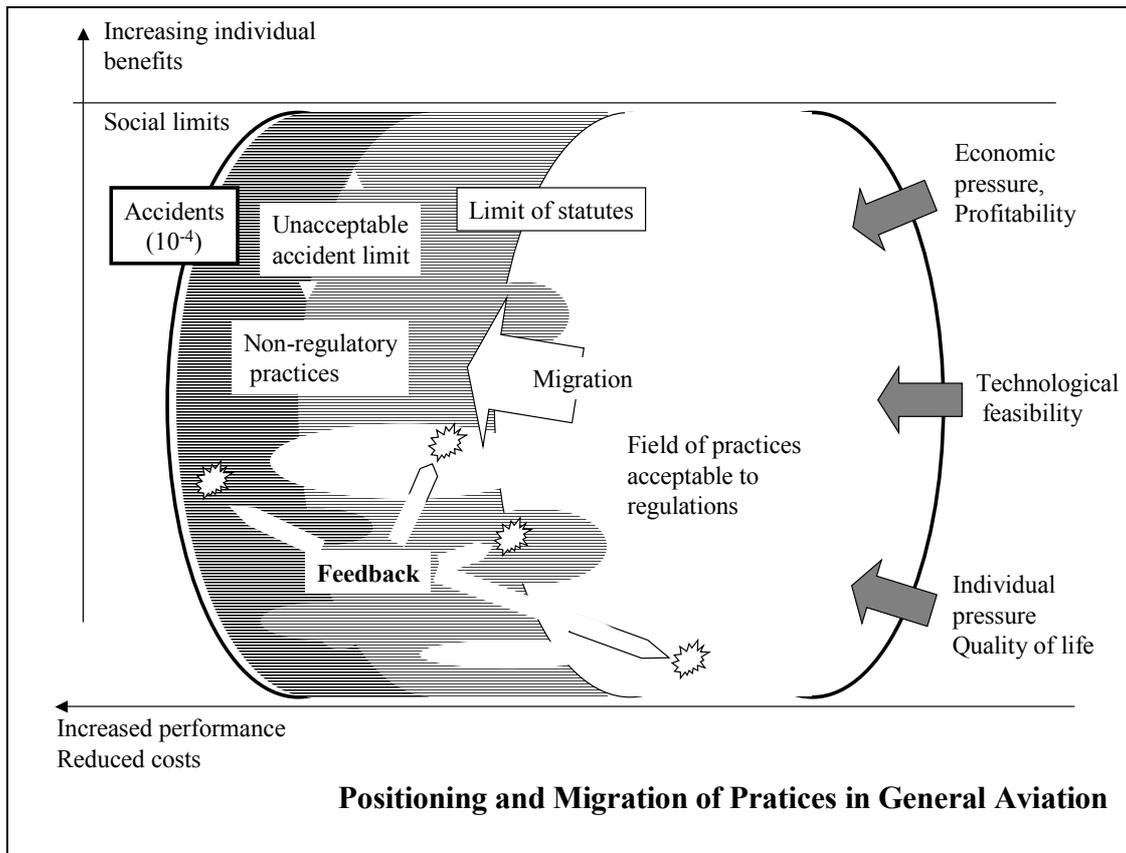
By allowing an overall view of the operation of a complex system such as public air transport, and identifying failings both in the organisation and on the part of its constituent players, feedback systems provide a means of identifying risks and making adequate corrections.

In general aviation, the safety level is lower. Most fatal accidents can be grouped according to origin, into three categories:

- a strong desire to reach one's destination in poor weather conditions,
- low-altitude flight,
- aerobatics.

The general-aviation information bulletin concerning serious accidents and incidents has been published for the past six years. Studies have been provided over the last few years. Nonetheless, the safety level appears to be stationary, with no significant change in the rate of fatal accidents. Would it have increased had the two instru-

ments (bulletins and studies) not existed?



The above diagram is derived from the preceding one. It attempts to explain the situation for general aviation.

Conditioned by constraints analogous to those of public air transport, the normal practice of activity in general aviation is in a field particularly constrained by existing regulations. Indeed, this activity is characterised by a paucity of defined procedures, the rarity of safety analyses, and the lack of statutory instruments. The latter, extremely precise on certain points, allow a wide latitude of interpretation on others and, in certain cases, a very wide degree of freedom. Cases arise where an accident occurs despite total application of regulations.

In the absence of an efficient system for the compilation of events that otherwise left no trace, unacceptable incidents generally pass unnoticed.

Therefore feedback could meaningfully address several types of events:

- incidents that exposed the persons concerned to danger,
- unaccustomed situations occurring in a blurred regulatory context, where correct response requires experience on the part of the persons involved,
- events occurring in the framework of non-regulatory practices,
- cases where the application of existing regulations is problematic.

1.1.5 The limits of current feedback

Following a public air transport disaster, the material and human means required for performing a technical investigation are set in place. Furthermore, public air transport undertakings have found the necessary resources for setting up internal feedback systems for reporting minor events. The limiting factors in this field are beyond the scope of this paper.

For accident investigations in general aviation, clues pertaining to equipment items are generally much easier to detect (breakages, glue failure, fuel contamination etc.) than those relating to human factors. For this reason, investigations often run into problems for several reasons:

- absence of flight recorders (data and/or voice),
- often uncontrolled activity leaving no traces,
- few written documents, since activity is little standardised,
- pressure exercised by the social environment (where each individual recognises himself...),
- sometimes heavy media presence,
- judicial implications influencing the reliability of testimony,
- disappearance or amnesia of first-line actors (pilots, passengers),
- frequent absence of eye witnesses,
- leisure activity in an associative environment secondary to the professional activities of the persons involved.

Given such difficulties, aspects associated with the human element are very often difficult to determine. The context is one of mistakes, incomplete knowledge, incorrect judgement etc. Yet such factors are the cause of the vast majority of general aviation accidents. Detailed explanation of such accidents would require a solution to or a workaround for the difficulties mentioned above, in order to deepen investigation in the human-factors field.

Although investigators want to detail the context in which the accident occurred, many factors exist to limit their investigative field, and thus the utility of their findings towards improving safety.

1.2 The requirement for an additional feedback system for general aviation

General aviation can be distinguished by:

- safety levels that are around one hundred times lower than those found in public air transport,
- an accident prevention system that could be perfected (since it is almost always the same accidents that occur),
- difficulty of in-depth accident investigations, thus the problem of limited findings,
- a lack of statutory obligations to analyse minor incidents in the cause of safety.

For this reason it was decided to set up a feedback system for reporting minor events, particular situations or unusual circumstances.

Certain exploratory studies were undertaken by ONERA and DGAC (SFACT). The law voted in 1999 regarding accident investigations⁽⁴⁾ facilitated the creation of such a system within the investigative set-up. Thus, in coordination with the SFACT, general-aviation user groups and professional bodies, it was decided to create a Confidential Reporting System (REC) within the BEA (French Accident Investigation Bureau).

The features of the REC will be described in Chapter 3. At this point, a simple overview of the system shows that:

- such a system requires mutual confidence between the specialists responsible for running it and aviation users⁽⁵⁾,
- the system functions on the basis of the free will of parties submitting reports,
- the system must guarantee confidentiality and anonymity for parties involved in events.

2 - OBJECTIVES AND LIMITS OF THE REC

2.1 Objectives

Since safety levels in general aviation are evaluated at 10 to the power of -4, very often the same accident-causes produce the same effects. It is, however, difficult to deepen the technical investigative process, therefore the ability to use information to prevent other accidents is limited.

From another angle, many harmless events occur during aviation activity. A brief examination shows that the origins of these events are the same as those of accidents. The idea is therefore to collect information about such events, for formatting, then employ this as feedback, redirected either back to users, or to organisations (administrations, manufacturers etc.).

The events experienced by reporting parties are of two types:

- situations perceived as anomalous -- generally incidents or events which could have compromised safety;
- situations perceived as "normal" but out of the ordinary, or special or rarely encountered, which might represent a difficulty for another user or which need to be passed on for the information of the organisations.

⁴ Law No. 99-243 of 29 March 1999 concerning technical investigation of accidents and incidents in civil aviation, Book VII of the Civil Aviation Code.

⁵ In the remainder of the text, the term "user" means "a person acting in the general aviation framework". It might be a pilot, instructor, controller, mechanic, ground service personnel etc.

2.1.1 Incidents

An "incident" differs in particular from an "accident" by its effects, although the origins are similar. An incident is caused by a reduced series of factors not involving serious consequences.

If the incident is of a technical nature or associated directly with the environment, the person will generally disclose in all cases, since:

- his own involvement in it is limited,
- the occurrence is undoubted,
- the fault is reproducible or is still visible.

This kind of event can be taken into consideration without delay.

Example: Pilot abandoned takeoff due to appearance of low-voltage warning. Informed air-field control authority immediately, and also the aircraft maintenance workshop.

Other example: Pilot abandoned takeoff after seeing dog on runway.

In many cases, the technical part of the incident is reported, but the state of mind of the first-line actor coping with it too often goes unnoticed: how was the anomaly detected? Which mental processes drove the actor in his decision? What were the consequences of the event regarding continuance of the flight? etc. This "second aspect" of the incident represents a more interesting source of feedback.

Example: An experienced pilot closed at speed on a controlled airfield just as the radio frequency was very busy. The pilot could not obtain prior authority to join the runway circuit, but he saw that this manoeuvre would not impede other traffic. At the start of the downwind leg, he managed to contact the controller and stated that he was "a few seconds from the circuit". He continued his flight as authorised, to touchdown.

At the time of his arrival, the pilot had three options:

- reduce his speed,
- extend the flight path and fly a longer downwind leg,
- join the circuit directly, and "negotiate" with the controller.

Faced with this special situation, the pilot relied on experience to reach his decision.

We could imagine the same situation occurring with a student pilot on a solo navigation flight. Unable - at the time - to determine the first two solutions, this pilot joins the runway circuit, much preoccupied with the fact he is failing to meet a statutory requirement. This additional stress may reduce his awareness and even compromise a safe landing.

An accident-prevention measure could be derived from the situation as occurring with the experienced pilot. This could serve as a concrete case study presented to the overall pilot community, indicating a method for evaluating the difficulties and hazards associated with each of the three solutions. Instructors could use the case study as a starting point for useful discussions with their students before solo flights.

Finally, an incident may consist solely of an error of understanding, mishandling etc. It generally goes unobserved, at the best becoming a conversation-piece in the "squadron bar" between users with little feel for safety. This is the kind of event of interest to the REC approach. Here again, the investigation of this kind of incident avoids some of the problems mentioned in the previous chapter. The first-line witness, or involved party, can speak freely about what happened since (in particular) there are no social, public or judicial implications etc.

Example: A pilot was coming to the end of a glider flight lasting two-and-a-half hours. On final approach to the alternative runway reserved for gliders, he had difficulty controlling his speed and glide path. He had descended to about three hundred feet before he realised that he had operated the landing gear instead of the speed brake lever. Pilot locked the landing gear then used the speed brakes to control the approach and touch down safely. Before this flight, the pilot had only flown a few circuits on this type, on which the air-brake and landing-gear controls were not configured as on the other aircraft used at the pilot's home gliding club.

This type of confusion has led to several accidents involving serious injuries.

The investigation and publication of information concerning incidents is of particular importance in improving safety. In fact the difference between an incident and an accident might depend solely on the presence of a simple aggravating factor. This factor might be a lack of knowledge, a lack of skill, an accident-forming circumstance, defective protection etc.

One of the objectives of REC is to provide users with incident narratives highlighting the full range of causes and designed to stimulate thinking into each factor potentially contributing to the accident.

2.1.2.Unusual situations

Having coped with an unusual situation, an actor may be inspired by dual intent:

- Actor considers that his experience may be useful to others. His narrative, once formatted, is circulated to all users.

Example: In visual flight, the loss of visual references is the source of many fatal accidents. Normally, nothing is known about possible gaps in the pilot's training, his/her habits etc. However, a good number of pilots have lost their visual references, then recovered them, at the risk of a severe fright... They probably drew interesting conclusions after their experience, but never went on to talk about it: no one ever benefited from their experience.

- Actor decides to inform the authorities as to the reality of the event. Details are therefore sent to the organisations in question.

Example: during an instrument flight, a pilot started his approach toward the destination airfield, which was not controlled. During closing of radio communications with the controller, the latter asked the pilot to switch off his transponder. The pilot considered that this instruction did not comply with the regulations and that it could have had serious repercussions on the remainder of the flight. He decided to inform the civil aviation authorities of the practice.

2.2 Limits

The systematic processing of event narratives is beset with difficulties, bias and potential pitfalls⁽⁶⁾. These are allowed for in the system design.

2.2.1 Risks of spurious results

Unaccustomed situations and minor incidents are very numerous during aviation activity. Reports are submitted according to the desires of the actors involved, and no investigative acts are undertaken on the reported events. Therefore, the quantity and quality of narratives collated by the REC would never perfectly represent the reality of what had actually occurred.

It would therefore be illusory to want to establish credible statistics (epidemiological studies) from the REC database. On the contrary, many events are of interest for safety if they are studied and analysed one by one (clinical studies). Furthermore, it is accepted that even figures based on indisputable facts (for example, accidents) must be interpreted carefully.

Additionally, events reported under REC cannot of themselves constitute an argument for the modification or drafting of statutory instruments. On the other hand they may be used to explain or illustrate the application of such legislation.

2.2.2 Bias in the treatment and understanding of information

One question which frequently arises is whether the description of the facts, and the safety message received by a user after feedback, correspond to the situation experienced by the author of the report. Several types of bias could be mentioned:

- Did the author fully understand all the facts and circumstances that made up "his" event? Was his perception distorted by preconceived ideas? And certainly, the desire to submit a report testifies to a personal approach whose sole purpose is to defend one's own convictions ...
- Does the design of the form have any influence on the way the event is described? A system of check boxes or a large number of headings to fill out presupposes the a-priori definition of every type of event, and may disconcert certain authors. On the other hand, a blank page may discourage certain others ...
- Does the narrative received by the REC specialist risk being interpreted involuntarily and analysed according to his own convictions? And perhaps insertion of the narrative in a database will be conditioned by the necessary "simplification" of the fields to fill out ...
- And certainly, the way in which the database is employed, the selection of which events are "important" or "representative", or drafting of the text conveying the feedback depends on the specialist's own idea of what constitutes "safety" ...

⁶ Amalberti, R., Barriquault, C., 1999. Fondements et limites du retour d'expérience. Annales des Ponts.

- In view of the above considerations, surely a REC itself runs the risk of addressing only known problems...
- Finally, should only aircraft pilots who have access to the system?

Several answers are proposed to such questions.

Any general-aviation actor may submit reports. Receiving several reports from several actors concerning a single event is not ruled out: even if no connection can be established between such reports, they nonetheless offer different points of view that may be pertinent to safety.

The report form was designed with very few systematic categories. The author is free to describe the event in just a few lines only, or over several pages. He may add a diagram if necessary. REC is above all interested in the human-factors aspects. Codifying these by means of a large number of categories or check-boxes might disconcert the author of the report, and would still not necessarily reflect the reality of what had occurred. If a problem of a technical nature is mentioned, information such as fault-detection steps, corrective actions, the decisions taken by the person involved, the consequences for continuation of the flight etc. are judged to be a determining factor for REC, together with any information relating to possible dysfunctions at the organisational level and pertinent to the problematic situation.

Upon receipt of the report, a telephone call is systematically made to the author of the report. The aim is to validate the narrative, collect additional information, and verify that the safety message understood by the REC specialist effectively corresponds to that intended by the author.

Practically the entire text submitted by the author is kept in the REC database. The only items systematically excluded would be identification data of no use in understanding the event. If there is sufficient room, this same text is reproduced in the feedback bulletin or sent to organisations.

Since they undertake general aviation activities themselves, REC specialists have a good knowledge of the environment. They undergo training on accident prevention and the difficulties associated with interpreting information received.

2.2.3 Difficulties in measuring system efficacy

Efficacy in the domain of accident prevention is practically impossible to measure. A large improvement in safety levels would only have quantifiable effects after several years, whereas a slight improvement would require several decades to be measurable. Moreover, particularly in the latter case, such measurement would be disrupted by a large number of economic, social or cultural parameters...

Nevertheless, even a slight improvement could translate into fewer deaths and injuries. This pleads in favour of creating an additional safety system.

2.3 Assessment

Both the objectives and the limits of the system are clearly established. Assessment of the objectives indicates that there would be greater risk in doing nothing than in attempting to create the system in question. Nonetheless, such a system would need to be employed with caution, and by exploring the projected field as thoroughly as possible.

3 - INTERNATIONAL FRAMEWORK

3.1 Incentives for the creation of volunteer report compilation systems

The ICAO General Assembly of October 1997 adopted resolutions (32-15 and 31-10) concerning voluntary reporting systems.

In the light of these two resolutions, the Accident Investigation and Prevention Group (AIG, Montreal, 14 to 24 September 1999) examined proposals to amend the existing Chapter 7 of Annex 13 to the Chicago Convention regarding civil-aviation accidents and incidents: voluntary incident reporting systems are non-punitive and guarantee the protection of information sources.

European Directive 94/56/CE dated 21 November 1994, establishing the fundamental principles governing accident investigations and incidents in civil aviation, indicates that activities devolving to the permanent body⁷ may be extended to the collection and analysis of information relative to flight safety. The permanent body must be functionally independent of any party whose interests might conflict with its mission.

The corresponding texts are detailed in Appendix 2.

3.2 Operating principle of foreign systems

Certain of the benefits to be drawn in the accident-prevention field, and consistent with ICAO recommendations, several states have set up systems identical to that presented here, with comparable statutory mechanisms.

The operating principle is based on voluntary action and confidence, and guaranteed confidentiality and anonymity. Depending on the legislation in force, the author is generally protected from any penalties. In all cases, the report is addressed to the compilation system by secure means, most often by post. A telephone call might be made to the author. The personnel running the system do not keep any nominative information, and the database information do not allow identification of any individual.

Currently, five systems are operating throughout the world. Several states not employing such systems are currently considering acquiring one.

⁷ In France, the permanent body is the BEA.

Since 1990, the International Confidential Reporting Systems (ICUs) has met periodically to encourage the creation of such systems and to stimulate co-operation.

3.3 Examples of foreign systems

A few systems are presented for illustrative purposes.

United States: ASRS

Since 1975, the Aviation Safety Reporting System has been managed by NASA with financing from the Federal Aviation Administration (FAA). Open to all actors in the aviation community (general aviation and public air transport), ASRS has to date received more than three hundred thousand reports. The monthly bulletin, "Callback", is published with eighty-five thousand copies.

United Kingdom: CHIRP

An independent organisation financed by the CAA, the Confidential Human Factors Incident Reporting Programme (CHIRP) was created in 1982 for aerospace-industry employees. It is today usable by crews, controllers and maintenance-facility personnel. The organisation publishes a magazine called "Feedback". Recently created for the general-aviation sector, "G.A. Feedback" provides quarterly feedback in this area.

Australia: CAIR

The Confidential Aviation Incident Reporting system has received around three hundred reports per year for the past eleven years. This organisation is managed by the Bureau of Air Safety and Investigations (BASI), Australia's permanent accident investigation body.

Canada and New Zealand have also set up similar feedback systems.

3.4 Case study: EUCARE System

Designed in the Nineties, EUCARE (European Confidential Aviation Safety Reporting Network) was designed as a minor-event compilation network open to all parties engaged in civil aviation in the European states, whether in public air transport or general aviation. Conditions for confidentiality and anonymity were to have been met. The Technical University of Berlin was put in charge of producing the system. Unfortunately, the project ceased on 30 June 1999 due to the level of criticism and mistrust it aroused on the part of administrations and user organisations, particularly in Germany.

4 - PRACTICAL IMPLEMENTATION OF CONFIDENTIAL REPORTING SYSTEM

Such a system is designed to:

- collect information on incidents, odd situations etc.,
- allow analysis and formatting of relevant information,
- provide feedback to the entire aviation community.

The second stage is the preserve of REC specialists, whose actions are conditioned by the precautions mentioned earlier, notably as regards interpretative bias. However, in the feedback process, the second stage cannot exist unless the first stage is functional and able to feed the system with events.

While the prevention of accidents implies incorporation of human factors in order to investigate events occurring in the course of aviation activity, the voluntary submittal of minor-event reports calls upon the human element in a different manner. The aim is to create a climate of confidence, and dissipate a current suspicion with regard to organisations based in Paris. The crux of the matter is how to adapt an information-gathering system to the particular actor in the aviation community.

4.1 Initial phase: information-gathering

The objective of the initial phase -- collating reliable information -- depends solely on the free will of actors from the aviation community. Functioning of this initial phase brings to light a certain number of questions. The answers provided for these questions constitute the main features of REC. They are mainly designed to dispel an author's reticence to declare an event.

4.1.1 Declaration procedures

The number of existing organisations; the types of forms to use; identifying the receiving parties; incident-reporting procedures ...: such factors cause a certain amount of confusion in the minds of users. In many cases, the latter are unaware of the very existence of the organisation, or do not have the proper forms etc. In short, most events encountered are processed by no organisation at all, and are therefore lost.

For minor events, REC is seen as a unique system, known to all and for use by all. A telephone number is provided for users wishing to know more about the workings of the system. An informative leaflet is available, including a form; this can be filled out, folded and mailed back at the prepaid-postage rate.

If the user needs to know about an event imposing an obligatory declaration to another organisation, the specialist will channel the user's approach along the proper lines.

4.1.2 Statutory constraints regarding declaration of events

In general aviation, there is a very limited statutory obligation to declare an incident. Since there is generally no trace, it is highly likely that rigid arrangements to force actors to report would have any effect; quite the opposite, such an approach could result in distrust on the part of users, leading to total silence regarding the existence of the said incidents. In short, the effect would be contrary to that sought. Even when an obligation to report does exist, the process is not generally applied, either due to ignorance of the regulations, or unavailability of the proper forms, or confusion as to the particular recipients etc.

REC operates on the basis of user free will. The users become involved not in order to satisfy a statutory constraint, but because they are convinced that their approach may contribute to improved safety.

4.1.3 Deciding on what is worthwhile

Many proficient pilots, instructors, mechanics etc. consider that the events they experience are not exceptional, forming part of standard aviation activity, and therefore that there is no point in relating them. For a novice actor, the same events may be exceptional, even putting him/her in a bad position, increasing his workload or leading to an accident. Additionally, accidents also occur with experienced users, often because they were unaware of how to react to an unexpected situation.

Reporting parties are assured that their reports will be taken into account. They can be used in three possible ways to support feedback:

- publication in the bulletin, for circulation to all users,
- transmission to various organisations (administrations, manufacturers etc.),
- included in a corresponding "event group", for the purposes of general safety analyses.

4.1.4 The dilemma of publicising one's errors

Most events of interest to REC are those associated with a human failing. The process is about mistakes: handling errors, lack of understanding, errors of judgement etc. A user may have doubts about associating his name to such types of failings. The reasons are multiple:

- generally, an individual experiences difficulties in simply recognising his/her mistakes, since he either tries to justify them by criticism, or is ashamed of them (the mistake devalues the image that the individual has of himself);
- in some cases individuals dread evaluations or value judgements made by others, especially if the value judgement risks being amplified and distorted by rumour without the victim's knowing (the mistake devalues the image that the individual displays to members of his entourage).

To alleviate users' fears, REC specialists offer two strong commitments:

Confidentiality of received information

Under no pretext shall information enabling identification of parties be divulged to any person whatsoever. The REC does not retain any copies of documents, nor any lists or numbers. After processing, the nominative report is returned to sender. Only the sender retains any proof that he/she effectively declared an event.

Deidentification of information kept or used by the REC

Only those mentions necessary for understanding the event are kept. The language used is as close as possible to the author's text. The following elements are removed:

- author's name, address and telephone number, the precise date and especially the day of the month (the year, month, time and any "weekend / holiday" context are kept),
- the exact place of occurrence (features having a bearing on the event are preserved),
- the aircraft registration or tail number,
- the aircraft type (in certain cases, aircraft characteristics having a bearing on the event are kept, notably if there is a possibility that human-factors are involved).

Example: A pilot experienced difficulty in stabilising his aircraft on final approach to XX airfield, which could have compromised a safe landing. It is obvious that the aircraft type, the precise date and the airfield name cannot be applicable across the board for preventing accidents. On the other hand, the wind force and direction, the airfield layout and the presence of obstacles upwind of the flight path, the season, the time of day, details about pilot fatigue, sun position etc. are all factors that can be encountered in a multitude of situations, and which must be kept in the database.

The statutory and legal dispositions concerning these two undertakings have been carefully studied. It should also be pointed out that the reported events have generated no known consequences.

4.1.5 Proving what has been reported

The user is anxious not to become embroiled in a trying and troublesome procedure demanding a great deal of time and effort.

If there is no obligation to declare an event, there is no reason to throw doubt on the author's report. The system is based on mutual confidence. Since no justification is requested, no additional documents need to be provided.

4.1.6 The need for perfect understanding

The user submitting a report must have the absolute certainty that his initiative will be taken into account and understood by the recipient. This is why the REC specialist

systematically will telephone the author after receiving his report. The purpose of the call is to:

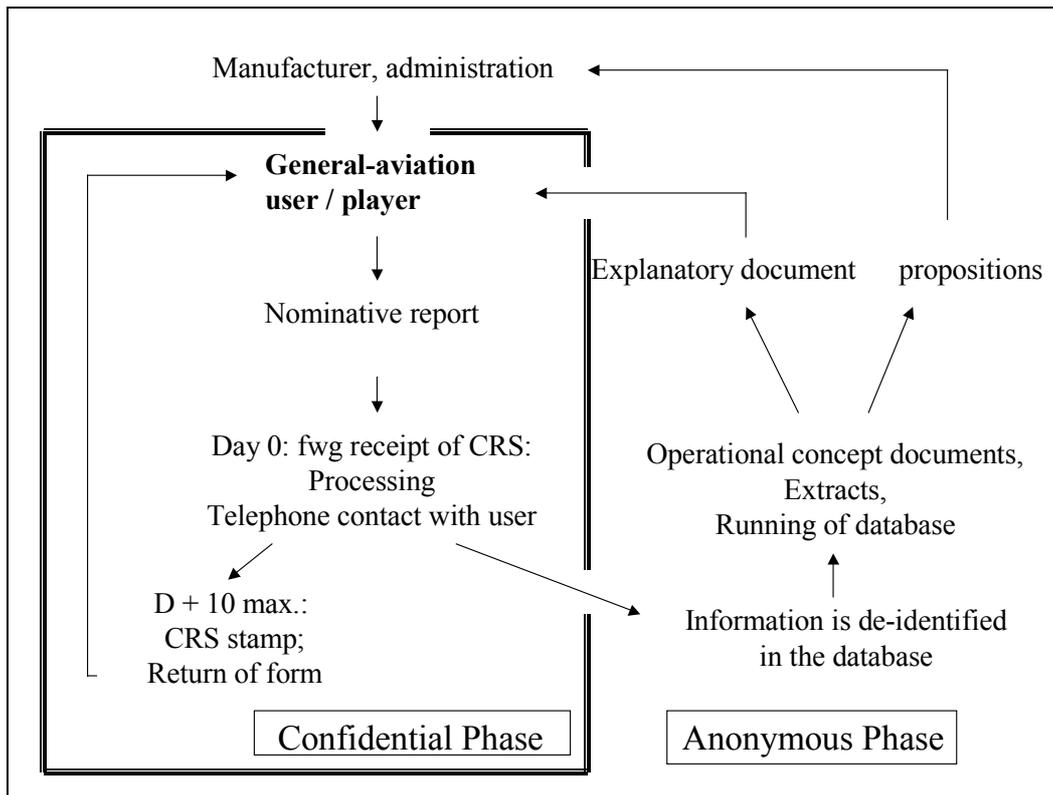
- Ensure that the author actually exists and that the submittal is not an anonymous letter (a system that relied on anonymous letters would have no credibility),
- collect any additional information,
- ascertain that the safety message that the author wanted to convey is properly understood,
- consider what use should be made of the report,
- finally, if the report does not lie within the field of interest of REC, to point the author towards the appropriate party. This, for example, would be the case when an accident declaration is sent by mistake to the REC. In no case does the specialist act in place of the author.

4.1.7 Potential penalties

The user fears being on the receiving edge of administrative or disciplinary penalties should infringement of regulations be brought to light. Article L 722.2 of the Civil Aviation Code protects a person submitting a report in good faith. Lawmakers have foreseen the loopholes that may be left uncovered by such protection. The complete text of the related article, with some commentary, is reproduced in the appendix.

4.2 Second phase: processing forms and feeding the database

As stated in paragraph 4.1.4., reporting parties are guaranteed confidentiality and anonymity. Forms are nominative and they are treated confidentially. The information kept in the database is de-identified or rendered anonymous.



Block diagram of REC operation, showing the confidential phase (applying mainly to processing of forms) and the anonymous phase (essentially concerning usage of kept information)

4.2.1 Confidential phase

During this phase (two weeks maximum), only the user and a REC specialist are in the know as to the details of the event.

4.2.1.1 Sending the report

An aviation-community actor experiences an incident, or particular situation, and considers that his experience could be of benefit to a large number of individuals. He gets a report form directly from his home organisation, or requests one by phoning⁸ the REC, which will mail one straight away.

Once the form has been filled out, it can be folded to form a pre-paid envelope, and posted at no cost (see specimen in Appendix 3).

4.2.1.2 Receipt and initial analysis at REC

Upon receipt, the envelope is locked in the safe of the secure premises employed by

⁸ Toll-free number 0 810 000 334; cost of a local call, open every day except Sundays and holidays, from 10:00 to 19:00. This information is reproduced on a poster circulated extensively to all aviation bodies.

the REC. The form is processed in the same premises, as quickly as possible by a REC specialist. After an initial reading, a telephone call is made to the author of the report, in order to:

- Ensure that the safety message perceived by the specialist corresponds precisely to that which the author wanted to convey,
- request any additional information required,
- consult as to what information shall be retained in the database,
- if necessary direct the author towards additional procedures.

Within two weeks of receipt by the REC, the specialist affixes a date stamp on the form and sends it back to the author.

Throughout this phase, no list, numbering system, direct or indirect nominative data or copy is made or kept from the author's report. Only the author retains proof of the information submitted to the REC, in the form of the stamp on the form, showing the date of receipt.

4.2.2 Anonymous phase: entering information in the database

The REC database is hosted on a standalone microcomputer completely remote from any internal or external telematic network, housed in the secure premises employed for REC.

The stored data do not allow any direct or indirect identification of individuals. Thus, not only are names, addresses and telephone numbers removed, but also references to aeronautical titles, aircraft registrations and the precise date and place are eliminated. If it is important to an understanding of the event, the aircraft type⁽⁹⁾ may be shown, with the author's agreement. All that is kept is useful information necessary for understanding the event and describing the situation, insofar as it can be easily banalized.

4.3 Third stage: distribution of return information

If during contact with the author or when examining the file in the database, it appears that a particular problem requires immediate correction, the de-identified information will be used to transmit an alert message to the concerned authority.

Example: operation of an ADF receiver disrupted by radio broadcasting.

Periodic database lookup is performed in order to:

- publish reports of events seen as pertinent for safety,
- produce subjects of reflection or study topics for task forces, as likely in-

⁹ More than twenty types registered or identified in France. In this case a common model is therefore employed, with specific information regarding, for example, the ergonomic aspect. Otherwise, only characteristics useful for understanding the event are retained.

puts for operational concept documents, recommendations or suggestions.

Task forces notably include certain professionals recognised for their expertise and impartiality in the field in question.

All documents obtained using the database are circulated extensively by post and/or electronic mail, and made available to the specialised press.

Additionally, file-extractions from the database may be performed for organisations if the transmitted information is used to improve safety.

4.4 Means employed

Most of the material, human and statutory means required for operation of REC are dedicated means. They are suited to the start-up phase. They will either be enriched or extended depending on how the system develops.

4.4.1 Physical assets

The BEA building at Le Bourget has an office fitted with a safe, forming a dedicated centre for day-to-day REC operations. This room also has the incoming specialised telephone line and houses the microcomputer (PC) hosting the database. These means are completely isolated from other BEA networks.

A REC operations manual has been drafted. It notably contains detailed procedures relating to the task allocations of the specialists, a summary of their responsibilities, and references of use in their activities.

4.4.2 Human assets

The specialists responsible for daily operation of the REC are selected from the pool of BEA investigators. Their activity is conditioned by the following features:

- They are not involved in any investigative activity likely to interfere with the field of action of REC.
- Like any other public servants, they are duty bound to respect confidentiality and bound to discretion. In addition to these legal responsibilities, specialists undertake personally not to reveal any information obtained in the framework of their functions. They are aware that any failing on their part in this area would ruin all confidence in the system.
- They exercise (or have exercised) general aviation activities (powered flight, gliding, instruction, aviation-related activities etc.) in an associative, private or professional context.

Other personnel may be brought in to work with REC specialists, notably in the framework of task forces engaged in studies based on de-identified information from the database.

4.4.3 Statutory provisions

The setting-up of a volunteer reporting system complies with the incentives offered to States by international forums. In France, the regulatory basis for operation of the REC is represented by the Penal Code, the Code of Penal Procedure, and the Civil Aviation Code. In addition to the area of "human factors", which is the subject of the present analysis, a detailed discussion of these texts may be found in Appendix 2. They are briefly summarised hereafter.

4.4.3.1 Texts encouraging the creation of volunteer reporting systems

Resolutions by the ICAO (International Civil Aviation Organisation) and the European Union Directive were mentioned at paragraph 3.1.

4.4.3.2 Statement concerning the independence of the organisation

Directive 94/56/CE stipulates (Art. 6) that "the permanent body must be functionally independent of any party whose interests could enter into conflict with its mission". This part of the Directive is repeated in Article L 711-2 of Decree No. 99-243 of 29 March 1999 relative to the technical investigation of civil aviation accidents and incidents.

4.4.3.3 Statement concerning obligations of confidentiality

Several legal texts impose duties of discretion and professional secrecy on REC specialists. They constitute a formal guarantee of confidentiality for authors submitting nominative reports.

The REC Operations Manual (and especially moral undertakings by Specialists) make it compulsory to observe confidentiality, process reports as quickly as possible, and avoid keeping any information enabling the direct or indirect identification of an author.

4.4.3.4 Statement concerning protection of authors

Article L 722-2 of the law of 29 March 1999 states that any person involved in the normal course of duty in an incident that he spontaneously and immediately reports to the permanent body and, where necessary, to his employer, shall not be liable to disciplinary or administrative penalties, except in a case of a deliberate or repeated breach of safety rules.

4.4.3.5 Statement concerning obligations of users

Articles R 142-2 and RS 425-1 relate to the obligation of declaring and reporting accidents and incidents.

5 - OPERATION OF THE SYSTEM

5.1 Preparation and launch of the operation

Launching an operation of this kind is especially delicate because it conditions the success of the system. It will be remembered that the latter is based on the free will of users, and on confidence.

The launch phase is directed towards organisations (administrations, user groups, federations, unions, press agencies) and toward users themselves. It is aimed at:

- informing and explaining,
- obtaining agreement,
- acquiring confidence,
- convincing parties of the usefulness of the system.

5.1.1 Exploratory work

A discussion phase was opened during the first half of 2000. Suggestions and opinions were gathered at several meetings to which user groups, federations, unions, and the SFACT were invited.

Additionally, REC design took account of:

- the operating principles of organisations that were already in operation, notably in Anglo-Saxon countries,
- the recommendations of international bodies,
- previous studies performed by ONERA on behalf of DGAC (SFACT).

During the same period, the following tasks were undertaken:

- drafting of the operations manual,
- printing of documents,
- creation of the database.

5.1.2 Actions aimed at organisations

The third quarter of 2000 was essentially set aside for informing the organisations. It was considered especially important to gain their approval, or at least convey a clear understanding of the system objectives and operating method. In effect, the features of REC appear original in a country based on Latin culture. There was the risk that organisations would display categorical opposition to the system if they learned of its

existence and operating modalities through indirect means.

Some thirty information conferences were organised at central level (Paris) and in every air traffic control region. Participants included representatives of the civil aviation authority, user federations, training schools, aviation-related contractors etc.

A press conference allowed journalists from the specialised press to be given explanations and documents.

5.1.3 Launching the operation

Between 1 October and 31 December 2000, approximately fifty information sessions were organised, both in the Paris region and the provinces. All general-aviation actors (pilots both private and professional, ground and flight instructors, mechanics, AFIS operators and air traffic controllers, meteorological officers, management & supervisory grades etc.) had attended. They received explanations and could participate in debates about safety and means of improving it. Folders containing various documents relating to REC were distributed.

The aviation press published informative articles concerning the launching of REC.

The system was operational during the launch phase, since as soon as a user had received information relevant to the REC, it was important that he could phone in, or submit a report, or receive forms etc.

5.2 First results

If the system was operational during the launch phase, user-information was still in progress. This phase ended on 31 December 2000. Since that date, the system has operated on a nominal basis.

5.2.1 Reports received

About a hundred-twenty reports were received and recorded in 2001.

A very low proportion were sent by mistake. These sometimes concerned accidents having limited repercussions. As envisaged, the author was given the address of the appropriate organisation.

No form has yet been received from an author reporting a flagrant breach of procedure, deliberate risk-taking or seeking protection solely against administrative or disciplinary measures.

The great majority of reports received show an obvious interest. It would appear that the authors have a full understanding of REC aims and methods. They offer assistance without reticence, proposing safety-related ideas. Many narratives relating unaccustomed situations offer as much, if not more, relevant information regarding

safety improvements than many accident investigations.

5.2.2 Report-processing

The forms received are processed in compliance with the procedures in the Operations Manual and the personal undertakings by REC specialists. The de-identified information entering the database can be characterised by:

- absence of any information enabling direct or indirect identification of any individual,
- quasi-integral transcription of the author's narrative (elements allowing the identification of persons are removed),
- formatting into appropriate areas, descriptive information, explanatory information, deficient or effective barriers or protections, meaningful analysis as to the possible use of the event.

5.2.3 Information-return

During the first half of 2001, the last segment of the feedback loop was put in place. It established the link between the administrative side and users.

5.2.3.1 Feedback to the civil aviation authority

In two cases concerning serious events, upon completion of report-processing, information kept in the REC was immediately forwarded to the administration responsible. The events in question concerned the detection of carbon monoxide in a cabin and the use of transponder code 7000 for control organisations.

Every three months, relevant cards are extracted from the database. These are forwarded to the appropriate organisations. Events are grouped into three categories:

- "for information", if it seems relevant to inform the administration as to the precise events,
- "reported", if it seems likely that a measure ought to be considered, or that the event could be linked with others identified through other channels,
- "input requested", if the REC wishes to receive comments from the administration.

5.2.3.2 Feedback to users

A bulletin – “**REC Info**” -- constitutes the main feedback tool (see http://www.bea-fr.org/rec/publications_2002.htm). This takes the form of a double A4 page, and contains some accounts of events (five or six) considered relevant to the field of accident prevention. If it were any larger, it would probably not be read in full.

The planned yearly publishing level is ten issues. Circulation is 1200 copies, sent to

all user groups, schools, aviation-related contractors, unions, newspapers etc. It is also available on an internet site.

Narratives are very factual. The aim is not to give lessons in safety, because this might be taken poorly, seen as out of place or non-applicable. On the other hand, reader-stimulation may be generated by means of a commentary in the margin if a certain aspect appears complex upon reading the narrative.

Receiving "REC Info", and user-interest in reading it, are the best means of ensuring the lasting reputation of the system, confirming its goals and working principles, and strengthening user-confidence. The bulletin constitutes the best advertisement for the system, and generates input in the form of reports.

6 - CONCLUSION AND OUTLOOK

The characteristics of the REC correspond to the specifications proposed by international bodies. The system operates according to principles tried and tested in Anglo-Saxon countries employing related systems.

In a climate of confidence, REC allows knowledge-enrichment for every actor in the aviation community, based on the experience of a few. It can also provide information for organisations responsible for supervising activities. The REC field of action above all comprises events associated with human factors that are not often reported by other means.

6.1 A useful system for general aviation

In a few months, the system has become known and appreciated. It is operating as forecast. The reports received are of great interest due to the quality of the lessons learned. The actual number of reports is less of a problem.

REC forms one element of the feedback chain, one tool towards preventing accidents. Assessing its contribution in terms of safety improvements will be very difficult, even impossible to determine. It is nevertheless important that the system exist for general aviation. In effect, it forms a link between users and organisations, administrations and so on. This link operates not in the event of complaints or accidents, but by reporting unaccustomed situations or frequent minor events occurring in the course of aviation activity.

The system is still fragile, and must be consolidated. Once the database reaches the required size, general operational reports on related events will be considered.

6.2 Adaptability of the system to public air transport

Public air transport is characterised by features quite different from general aviation:

- a safety coefficient around a hundred times higher,
- standards, regulations, procedures,
- heavy financial resources,
- an homogeneous population consisting exclusively of professionals,
- voluntary and confidential event-compilation, often integral with airline internal feedback systems.

Given such considerations, a system for the public air transport sector would differ appreciably from the REC system. Notwithstanding, experience acquired in the general aviation sector would remain of great use.

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APPENDIX 1

GLOSSARY

Accident: Event associated with use of an aircraft, occurring between the moment a person boards with the intention of undertaking a flight, and the moment where all persons boarding for the same purpose have disembarked, and during which:

- a) a person is fatally or severely injured due to the fact of:
 - being aboard the aircraft, or
 - in direct contact with any part of the aircraft, including parts that may have become detached from it, or
 - being directly exposed to engine blast,unless the above involves injuries due to natural causes, injuries inflicted to the person by himself or others, or injuries received by a stowaway located in an area to which the passengers and crew normally have no access; or
- b) the aircraft suffers damage or a structural failure which:
 - compromises its structural resistance, performance or flight characteristics, and which:
 - would normally entail heavy repair or replacement of the damaged part,except in the case of an engine failure or fault where the damage is limited to the engine, its cowlings or accessories, or to the propellers, wingtips, antennas, tires, brakes, fairings, or small tears or skin perforations; or
- c) the aircraft has completely disappeared or is inaccessible (ICAO, Annex 13).

Serious injury: Any injury that a person experiences during an accident and which:

- a) requires hospitalisation for more than 48 hours, the said hospitalisation beginning within seven days of the date at which the injuries were received; or
- b) results in the fracture of a bone (except for simple fractures to fingers, toes or the nose); or
- c) results in lacerative injuries that are the origin of serious haemorrhage or injuries to nerves, muscles or tendons; or
- c) results in the lesion of an internal organ; or
- e) results in second- and third-degree burns or burns affecting more than 5% of the body surface; or

f) results from verified exposure to infectious matter or harmful radiation (ICAO, Annexe 13).

Danger: Any event, situation or circumstance that could lead to an accident (ICAO, do. 9422).

Deidentification (neologism): the action of deidentifying.

Deidentifying (neologism): suppressing any element of information that would allow establishing a person's identity, either directly or indirectly.

Incident: Event, other than an accident, associated with the use of an aircraft, which compromises or could compromise the safety of the operation (ICAO, Annexe 13).

Note: Serious incidents necessitate investigations in the same way as accidents.

Serious incident: Incident whose circumstances show that an accident almost occurred.

Note 1: The difference between an accident and a serious incident resides only in the result.

Note 2: Supplement "D" to Annexe 13 contains some examples of serious incidents.

Accident prevention: Measurements destined to detect and eliminate or avoid hazards (ICAO, do. 9422).

The aim of accident prevention is simply to ensure that accidents do not occur, in order to save human lives, avoid suffering, save money and increase public confidence in the safety of public air transport. The efficiency of accident prevention measures is compromised if authorities give in to the temptation of incorporating considerations of a legal or other nature, such as seeking culprits.

Safety consists in attempting to uncover and remove hazards before they can cause accidents or incidents. The recommended means are numerous: encouraging the relaying of information about accidents, from a constructive rather than a repressive viewpoint; performance of studies into safety at airports, or at manufacturer or airline sites; in short, ensuring that management systems are set up in all aeronautical organisations, whereby information received concerning observed or known hazards can be brought directly to the attention of the parties responsible.

Risk: Consequence of the acceptance of a danger (ICAO, do. 9422).

APPENDIX 2

NOTES CONCERNING STATUTORY INSTRUMENTS

1. Civil aviation documents

1.1 International Instruments

Annexe 13 of the ICAO manual defines the terms "accident", "serious incident" and "incident". Whereas an investigation is obligatory or advisable following an accident or a serious incident, it is only optional following an incident.

At its general assembly in October 1997, ICAO adopted several resolutions, of which two have a direct bearing on event-compilation systems.

In the first (32.15 -- "ICAO Plan for World Aviation Safety"), the Assembly directed the ICAO to ... "participate in activities aimed at establishing a global network for the analysis and circulation of information, while allowing for the need to adequately protect confidential information and the sources of such information. All contracting states are asked to urgently examine and, where required, adapt their laws, regulations and policies to... encourage a larger volume of volunteer-reporting of events likely to have an effect on aviation safety..."

The second resolution (A 31-10: Improving Accident-prevention in Civil Aviation) complements the first. In it, the Assembly ... "requests contracting states to do all in their power to urgently reinforce accident prevention measures, in particular in the domains of personnel training, upward feedback and analysis of information, and set up volunteer reporting systems, without penalties, in order to face the new flight-safety management challenges resulting from the envisaged growth and complexity of civil aviation."

In the light of these two resolutions, the Accident Investigation and Prevention Group (AIG, Montreal, 14 to 24 September 1999) examined proposals to amend the existing Chapter 7 of Annexe 13. Thus, the Meeting recommended that States establish a voluntary incident reporting system to facilitate the collection of information which cannot be collected under an obligatory system. The voluntary incident reporting system will be non-punitive and will guarantee the protection of information sources." The Meeting also specified that safety recommendations may be derived from different sources, notably safety studies.

1.2 European Instruments

Commission Directive 94/56/CE, dated 21 November 1994, establishing the fundamental principles governing accident investigations and incidents in civil aviation, stipulates in its opening article that its aim is to improve flight safety, while facilitating the diligent prosecution of technical investigations, whose sole objective is the prevention of future accidents or incidents.

To this end, technical investigations must be performed by a permanent body (Art. 6). The latter must be functionally independent, notably, with regard to the national aeronautical authorities responsible for airworthiness, certification, aviation-related operations, maintenance, issuing of licenses, air traffic control or airport operation and, in general, to any other party whose interests could enter into conflict with the mission entrusted to the organisation or the investigation body.

The activities entrusted to this body may be extended to the collection and analysis of data relating to flight safety, particularly for safety purposes, insofar as these activities do not affect the body's independence and in no manner imply any responsibility on its part in the domain of regulations, administration or standards. The organisation disposes of means allowing it to accomplish its mission on a fully independent basis vis-à-vis the above-mentioned authorities, and to this end it must receive sufficient resources.

1.3 National Instruments (France)

1.3.1 Civil Aviation Code

Law No. 99-243 of 29 March 1999, relative to the technical investigation of civil-aviation accident and incidents, as published in the Official Journal of 30 March 1999, forms Book VII of the Civil Aviation Code. It repeats the definitions employed in previous instruments, and transposes the dispositions of Directive 94/56/CE into national law.

Book VII in particular indicates (Art L 711-2) that "the investigation is performed by a specialised permanent body acting on a fully independent basis, neither receiving nor requesting instructions from any authority or organisation whose interests could enter into conflict with the entrusted mission. Article L 722-2 of the law of 29 March 1999 states that any person involved in the normal course of duty in an incident that he spontaneously and immediately reports to the permanent body and, where necessary, to his employer, shall not be liable to disciplinary or administrative penalties, except in a case of a deliberate or repeated breach of safety rules."

Article L 731-1 points out that personnel belonging to the permanent body are bound by confidentiality, subject to the conditions and sanctions mentioned in Article 226-13 of the Penal Code.

Articles R 142-2 and RS 425-1 relate to the obligations to declare and report accidents and incidents. Article R 142-3 concerns the recording of anomalies coming to light after an accident or incident.

1.3.2 Directive of 15 June 1979

This text concerns the communication of incidents relating to the airworthiness of aircraft. In the case of general aviation, it stipulates: "In the absence of a regula-

tory requirement, owners and users of private aircraft are asked to report incidents spontaneously. UEAs and AEAs are obliged to submit reports within one month. Such submittals are recommended for non-accredited bodies."

1.3.3 Order dated 24 July 1991

Specifies the conditions of use of civil aircraft in a general aviation context. It mentions only in paragraph 2.2.3 that equipment failures, including any airworthiness incident occurring during a flight in the framework of private activities... shall be reported to the civil aviation authorities.

2. Legal and administrative instruments

2.1 Problems posed by implementation of confidential event compilation systems in respect of offences involving homicide or involuntary injuries

The context involves studying the application of homicide and involuntary injury offences by jurisprudence, in the case of carelessness and recklessness:

Penal Code L 121.3. paragraph 3 states: "Where the law so allows, an offence is also deemed to have been committed in the event of recklessness, carelessness or breach of obligation regarding prudence or safety required by law or regulations, unless the author of the facts applied due care, with allowance, where necessary, for the nature of his mission or function, his level of expertise and the powers at his disposal, unless it is established that he did not apply due care in view of his level of expertise and the power and means at his disposal."

According to the law of 13 July 1983, Article 11 bis A: "Civil servants and un-cleared personnel having no public right may not be sentenced on the basis of sub-paragraph 3 of Article 121.3 of the Penal Code, for unintentional acts committed in the exercise of their function, unless it is established that they did not apply due care in the exercise of the missions entrusted to them under law."

The implementation of an event-reporting system widens the possibilities of third-party proceedings against administrations and operating bodies, particularly if the judicial side considers that processing of received information was performed with insufficient levels of caution.

The finer the method in order to prevent accidents, the wider the field of criminal liability.

Yet failure to set up such a system could create greater disadvantages still. For in effect, the system is not isolated at international level, but rather belongs to a general movement. Further, it is agreed that the system is a force in improving safety.

2.2 Problems posed by the notion of "danger to others"

This notion, which appears in the new Penal Code, may be of importance to specialists processing reports, for two reasons:

The first problem concerns REC procedures. The assumption would be that of deliberate and manifest violation of a particular obligation of caution, care and attention, presenting the risk of involving others in a very serious accident, without necessarily any damage being caused. Such a deliberate violation of regulations would not apply to the Specialists running the REC system, since they are -- it is assumed -- following orders scrupulously defined for them by the current operations manual.

The second problem may concern the text used in event reports received by the system: these may contain characterisation of "danger to others". This is an offence punishable by law (Article 223.1 of the Penal Code).

The fact of exposing others directly to immediate risk of death or injury likely to result in mutilation or permanent infirmity through obviously deliberate violation of a particular obligation of safety or care imposed by the law or regulations, is punishable by one year's imprisonment and a fine of 15,000 Euros.

2.3 Problems posed by the protected status of certain event reports

The obligation to lay information ("denunciation") is provided for all citizens in cases of crimes or homicide.

N.B.: The event encompassing the notion of "crime" would be brought to the knowledge of the administration through channels other than REC.

In the case of offences, Article 40, sub-paragraph 2 of the Code of Penal Procedure foresees that "any organised authority ... acquiring knowledge of an offence shall notify the state prosecutor's office without delay ... The obligation of professional secrecy for a civil servant is dropped should he have to testify before a court of law, whereas other professions are afforded dispensations.

The laying of information concerning the authors of an infringement is allowed in law as regards civil servants and certain categories of infringements under the Civil Aviation Code or in certain special circumstances. Article 226.19, sub-paragraph 2 of the Penal Code makes it an offence to keep nominative information concerning infringements.

N.B.: Users are clearly and regularly reminded that the REC must not receive reports relating to offences or manifest and wilful infringements of regulations (see 8.4. if the report does not come within the field of action of REC).

2.4 Obligation of discretion

Authors of reports are protected by Article 226.22 of the Penal Code, which sanctions the fact of communicating information prejudicial to a person's interests, to third parties without the authorisation of the said person.

2.5 Professional privilege

Article 226.13 of the Penal Code punishes the disclosure of information of a secret nature by any person charged by the State or a profession with keeping the said information, whether in the framework of an assignment or a temporary office. Under the regime of the old Penal Code, courts allowed the limiting of professional privilege for civil servants. The courts would probably not change their position on this point.

2.6 Requesting the lifting of anonymity in the event of penal procedures

Assumption: The judicial authority, alerted by whatever channel, wishes to establish the identity of an individual.

If the context is a simple preliminary investigation undertaken by the public prosecutor's office, there is no obligation to respond to the questions posed.

If the context is an investigation being undertaken by a judge, or a commission taking evidence, all are required to collaborate. A civil servant cannot invoke professional privilege to refuse to testify or provide a document.

N.B.: Such a demand could only be processed effectively during the period where the author's paper report is available in the event-reporting system, since afterwards the information is de-identified. It constitutes one of grounds for insisting that the processing of reports is achieved as quickly as possible (see 6.2.3.).