THE EUROPEAN HELICOPTER SAFETY TEAM (EHEST): 2008/2009 ACHIEVEMENTS

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Abstract

This paper presents the analysis of a sub-set of 186 helicopter accidents that occurred between 2000 and 2005 in Europe. This analysis was performed by the European Helicopter Safety Analysis Team (EHSAT) of the European Helicopter Safety Team (EHEST). The EHEST aims to reduce the rate of helicopter accidents by 80% by 2016, an ambitious objective stated by the International Helicopter Safety Team (IHST) of which EHEST is the European component. In order to achieve this objective, the European strategy and action plans will be developed by the European Helicopter Safety Implementation Team (EHSIT) which was launched in February 2009.

1. EHEST: THE EUROPEAN COMPONENT OF THE INTERNATIONAL HELICOPTER SAFETY TEAM (IHST)

The IHST was established after the first International Helicopter Safety Symposium (IHSS) held in Montreal in September 2005. The IHST is a combined government and industry effort to reduce the helicopter accident rates (both civil accidents and noncombat military mishaps) by 80% within 10 years worldwide. See http://www.ihst.org/.

The IHST is led by representatives of the American Helicopter Society (AHS), Helicopter Association International (HAI), the Federal Aviation Administration (FAA), Transport Canada (TCCA), the European Aviation Safety Agency (EASA), together with several industry partners, and is a truly international initiative.

The IHST process has two types of working groups: a Safety Analysis Team and a Safety Implementation Team. The former analyses helicopter accidents and produces suggestions for safety improvement called intervention recommendations. The latter revisits these intervention recommendations, produces safety enhancement action plans, and monitors action plan implementation and progress towards the objectives. Action plans may address both the regulators and the industry.

The EHSAT is the analysis team of the EHEST and is the European equivalent of the US Joint Helicopter Safety Analysis Team (JHSAT), and the EHSIT is the implementation team of the EHEST and the European equivalent of the US Joint Helicopter Safety Implementation Team (JHSIT).

2. EHEST: THE HELICOPTER COMPONENT OF THE EUROPEAN STRATEGIC SAFETY INITIATIVE (ESSI)

The EHEST is also the helicopter component of the ESSI. The two other ESSI teams are the European Commercial Aviation Safety Team (ECAST) and the European General Aviation Safety Team (EGAST). See http://www.easa.europa.eu/essi/.

The EHEST brings together helicopter manufacturers, operators, regulators, helicopter and pilot associations, research organisations, accident investigators, general aviation and a few military operators from across Europe [Ref 1-3].

The EHEST counts more than fifty participating organisations, of which around thirty are actively involved in analysis activities.
The EHSAT work consists of analysing accident investigation reports. To tackle the variety of languages used across Europe and in the accident reports and to optimise the use of resources, EHSAT regional teams have been formed in France, Germany, United Kingdom, Italy, Spain, Switzerland, Norway, Sweden, Finland, Ireland and Hungary. In addition, the Netherlands, Iceland, Denmark, Greece, Poland, Romania, Latvia and Slovenia participate in EHEST. So far the countries covered by the regional teams account for more than 90% of the helicopters registered in Europe.

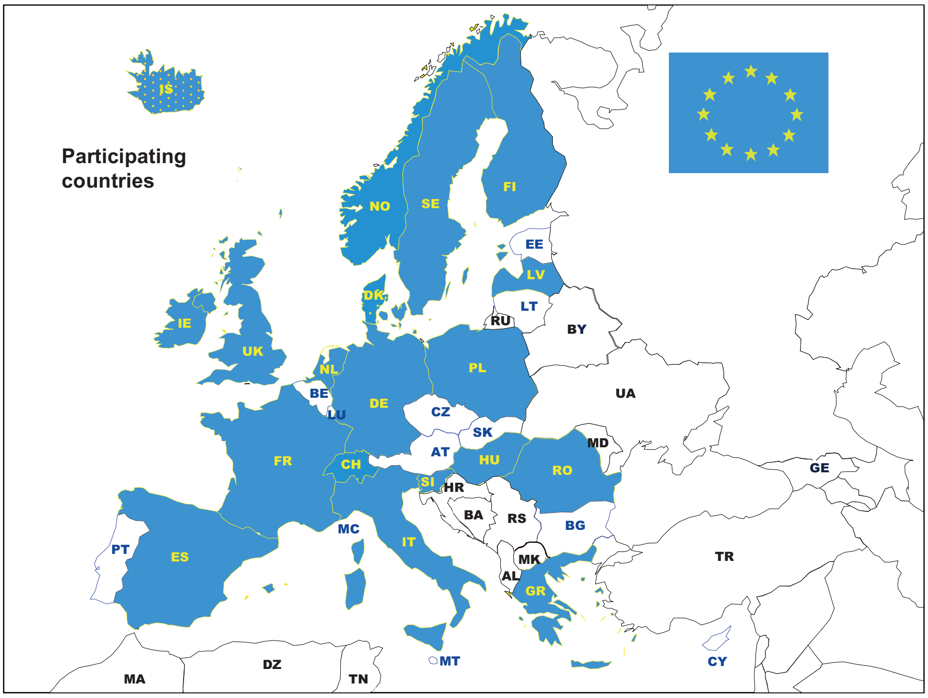

Figure 1 - EHEST participating countries

Analysing an accident requires a diverse and balanced set of competences. The composition of the analysis teams should therefore ideally reflect these competences by bringing together representatives from the national aviation authority, accident investigation board, civil operators, helicopter equipment manufacturers or type certificate holders, pilot associations, the general aviation community and, optionally, military organisations.
In addition, a central EHSAT Core Team, bringing together regional team leaders, performs standardisation, quality control, data aggregation and analysis functions.

3. METHODOLOGY

The EHSAT analysis scope is initially limited to reviewing accidents (definition ICAO Annex 13) that:
- were reported by the accident investigation boards,
- occurred in the 2000-2005 timeframe in EASA Member States[1],
- have a final investigation report available.

The methodology was basically inherited from the JHSAT in the US, which itself adapted the process to helicopters from the methodology originally developed in the late nineties by the Commercial Aviation Safety Team (CAST) for the analysis of fixed wing commercial air transport accidents. See http://www.cast-safety.org/. The analysis methodology features five steps:

1. Collect General Information
Several variables are collected for classification and analysis purposes such as occurrence date, state of occurrence, aircraft registration, helicopter make and model, operation type, aircraft damage, injury level, number of fatalities, phase of flight, meteorological conditions, and flight crew experience. To code this kind

[1] The EASA Member States are the 27 EU Member States plus Norway, Switzerland, Iceland and Liechtenstein.

of information, EHSAT has introduced the ICAO ADREP 2000 taxonomy for standardisation purposes and to allow exchange of information using ECCAIRS[2].

2. Describe and Analyse the Accident
The analysis aims at identifying all factors that played a role in the accident. The underlying assumption is that accidents are the result of a chain of events that could have been prevented by altering or eliminating one or more of the "links" in the chain. The method requires identifying *what* happened and *why* in a chronological order, using factual evidence from the report and expert judgement when information is missing.

3. Assign standardised codes to the factors
Free text descriptions are coded using two standardised codes: Standard Problem Statements (SPS) inherited from the US JHSAT method and the Human Factors Analysis and Classification System **(**HFACS) codes introduced by EHSAT to more comprehensively address Human Factors (HFs), an important target for achieving the IHST overall objective of 80% accident rate reduction.

The **Standard Problem Statements** (SPS) taxonomy has over 400 codes in 14 different areas, and has a three level hierarchical structure. Level 1 categories are: Ground duties; Safety Management; Maintenance; Infrastructure; Pilot Judgement and actions; Communications; Pilot situation awareness; Part/system failure; Mission Risk; Post-crash survival; Data issues; Ground personnel; Regulatory; and Aircraft Design. A single factor identified in the accident can be coded using more than one SPS. Figure 2 presents an example of three level SPS coding:

Analysis /Why/Contributing factors	SPS nr.	level 1	level 2	level 3
The commander inadvertently entered IMC and probably became spatially disoriented	701005	Pilot situation awareness	Visibility/Weather	Inadvertent entry into IMC

Figure 2 - Example of a three level Standard Problem Statement coding

The **Human Factors Analysis and Classification System (HFACS)** was developed by Shappell and Wiegmann [Ref. 4] using Professor Reason's concept of latent and active failures [Ref. 5]. The HFACS model describes human error at four levels: unsafe acts (e.g. of flight crew, maintainers, air traffic controllers, etc.), preconditions for unsafe acts, unsafe supervision, and organisational influences. See Figure 3.

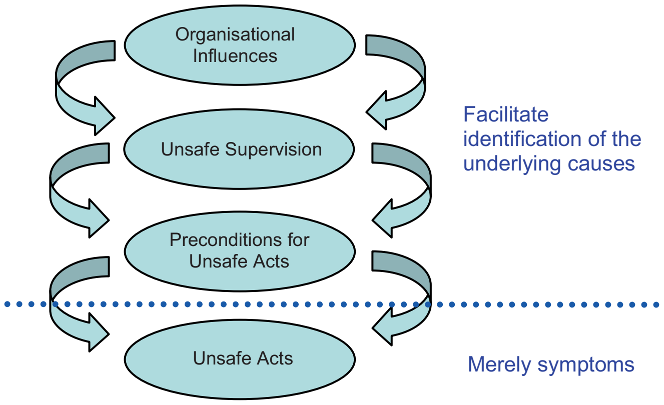

Figure 3 - HFACS model structure

2 ECCAIRS stands for European Coordination Centre for Accident and Incident Reporting Systems. The ECCAIRS Reporting System features a series of IT applications allowing organisations to create, maintain and deploy a repository of accident and incident reports. ECCAIRS is used by many National Aviation Authorities (NAAs) and Accident Investigation Boards (AIBs) in Europe, but also worldwide.

HFACS contains over 170 codes covering these four levels. Figure 4 presents an example of four level HFACS coding:

Analysis /Why/Contributing factors	HFACS nr.	level 1	level 2	level 3
The commander inadvertently entered IMC and probably became spatially disoriented	5305100	Preconditions - Condition of Individuals	Perceptual Factors	Spactial Disorientation 3 Incapacitating
	5001040	Unsafe Acts - Errors	Skill-based Errors	Overcontrol/Under control
	5501030	Supervision	Inadequate Supervision	Local Training Issue / Programs
	5603020	Organizational Influences	Organizational Process	Program and Policy Risk Assessment

Figure 4 - Example of a four level HFACS coding

Additionally, the EHSAT also introduced the special extension of HFACS for Maintenance HFs (HFACS ME).

4. Produce and categorise Intervention Recommendations
The next analysis step consists of identifying Intervention Recommendations for all the factors identified in the previous steps. Intervention Recommendations are aimed at preventing factors, directly or more remotely involved, from reoccurring. One or several Intervention Recommendations can be formulated for each SPS or HFACS. Intervention Recommendations are freely generated and formatted in free text, using the diverse expertise of the analysis team. Intervention Recommendations are then categorised at two levels. Figure 5 presents two examples of Intervention Recommendations.

Intervention recommendation		
(free text)	IR Category level 1	IR Category level 2
All periodic base check flying tests carried out by the Operator should include the pilot's capability to fly by sole reference to flight instruments	Training_Instructional	Flying and Aircraft Management Skills
Regulations should address the hazards of flight in a Degraded Visual Environment (DVE)	Regulatory	General

Figure 5 - Examples of Intervention Recommendations

5. Score Standard Problem Statements and Intervention Recommendations
To assist the EHSIT and ultimately the industry and authorities to determine the best course of action, SPS and HFACS codes are scored on Validity and Importance and Intervention Recommendations are scored on Ability and Usage. *Validity* assesses the level, quality and credibility of information available in the report. *Importance* is the measure of the identified factor importance in the event's chain of causal factors. *Ability* is the measure of how well an Intervention Recommendation can mitigate an event or contributing factor assuming it performed exactly as intended, and *Usage* is the measure of the confidence that the intervention will be used and will perform as expected.

6. Handover to the EHSIT
Accident analyses produced by the EHSAT are passed on to the implementation team, the EHSIT. As well as this analysis, economic and other considerations are introduced in the EHSIT process to determine the best course of action and to develop suitable safety enhancement action plans.

4. PRELIMINARY EHSAT RESULTS

The analyses performed up to 30 Sep 2008, formed the basis of a preliminary analysis, and incorporated data from 186 accidents. This represents approximately 58% of the accident reports and 25% of the total number of helicopter accidents in the 2000-2005 timeframe. These preliminary results were presented at the EHEST Conference [Ref 6], the 2nd EASA Rotorcraft Seminar [Ref 7] and in AHS 65 [Ref 8], and published in the preliminary EHSAT report available on the EHEST website [Ref 9]. Data based on a further 11 months of analysis (to 20 Aug 2009) will be released at ERF 2009 and IHSS 2009 [Ref 10].

4.1. General data

Of the accidents analysed so far, a total of 72 accidents (39%) involve General Aviation operations. Interestingly, a relatively large proportion of analysed accidents came from the Commercial Air Transport sector. This is most probably the result of good availability of accident reports for this type of operation. See Figure 6.

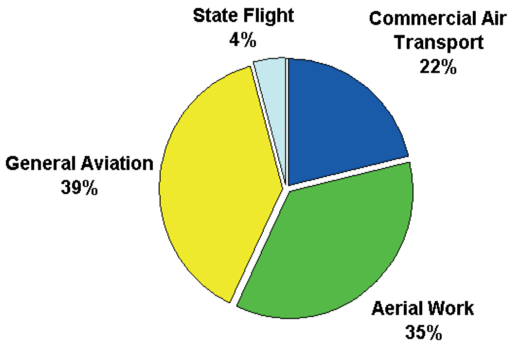

Figure 6 - Number of accidents per type of operation in the analysed dataset

Most accidents, 34%, occurred during the en route phase of flight, see Figure 7. In general, during the en route phase more time is spent at speed and therefore the energy available is higher. Additionally it has to be considered that for helicopters the en route phase is conducted very often at low height above ground level thus exposing the helicopter to wire strike, inadvertent entry into Instrument Meteorological Conditions (IMC) and Controlled Flight Into Terrain (CFIT). These threats are not applicable to the same extent to the en route phase of the fix wing. The preliminary results distribution over phases of flight for helicopters shown in Figure 7 thus differs from the distribution for fixed wing aircraft in commercial air transport operations as published for instance in the EASA Annual Safety Review [Ref. 11], where the share of Approach & Landing accidents is the highest.

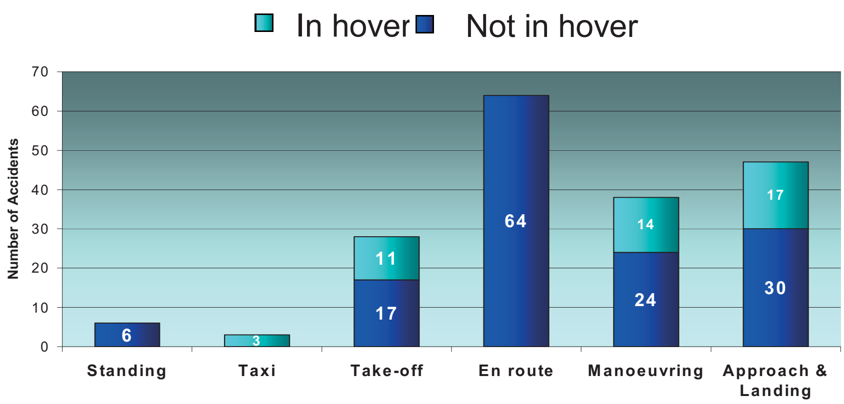

Figure 7 - Distribution of accidents over the phase of flight

Data was gathered on the pilot-in-command flight experience for 83% of the accidents in the data set. In most accidents the pilot had limited flight experience; in 33% of the accidents the pilot had less than 1000 hours total helicopter experience, see Figure 8.

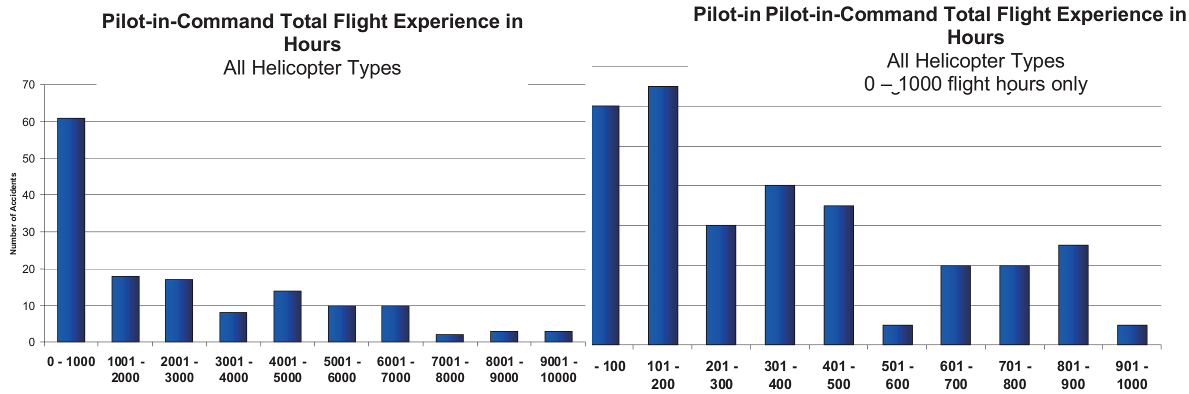

Figure 8 - Pilot-in-command Flight Experience on all Helicopter types (data from 155 accidents)

In 26% of the accidents, the pilot had less than 100 hours experience on the helicopter type involved in the accident, see Figure 9.

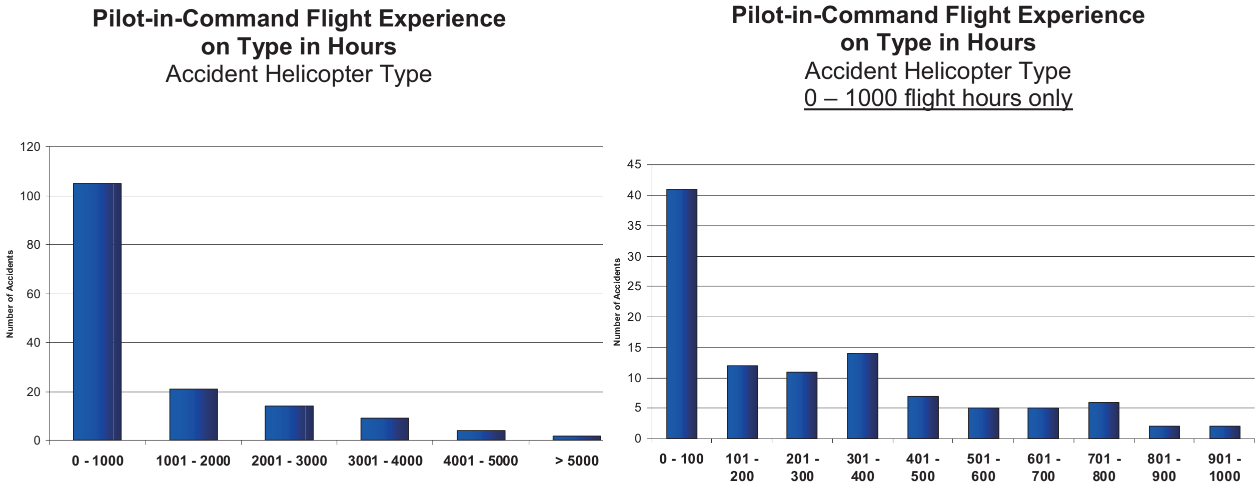

Figure 9 - Pilot-in-command Flight Experience on the Accident Helicopter Type in hours (data from 155 accidents)

It was also observed that pilot experience is not always a barrier to having an accident. In general, the proportion of less experienced pilots is higher for General Aviation accidents, see Figure 10. In 49% of the General Aviation accidents the pilot-in-command had between 0 and 100 flight hours experience on the *accident helicopter type*, compared to 14% and 9 % for Commercial Air Transport and Aerial Work operations. These statements on flight experience should however be interpreted with care, since no data is available on the overall distribution of flight experience in the helicopter community and for the different types of operation.

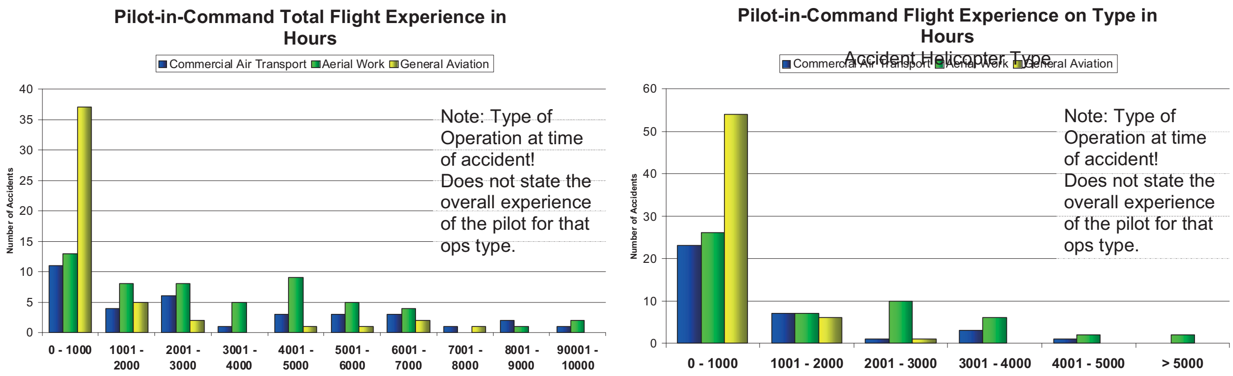

Figure 10 - Pilot experience per type of operation for all types and for the accident helicopter type

4.2. Analysis of the accident factors using Standard Problem Statements (SPS)

For the 186 accidents in the dataset, a total of 1067 SPS counts were identified.

The area that was identified the most in the dataset is Pilot Judgment & Actions. This includes factors related to pilot decision making, unsafe flight profile, procedure implementation, Crew Resource Management (CRM) and HFs such as diverted attention, perceptual judgment errors and aero medical factors.

The second most identified area is Safety Culture & Safety Management. This includes Safety Management Systems, training, pilot disregard of known safety risk, self-induced pressure and pilot experience. The third area is Pilot Situation Awareness. This covers in-flight factors such as reduced visibility and external obstacle or hazard awareness. Ground Duties, identified in 35% of the accidents, includes factors such as mission planning and aircraft pre and post flight duties. See Figure 11.

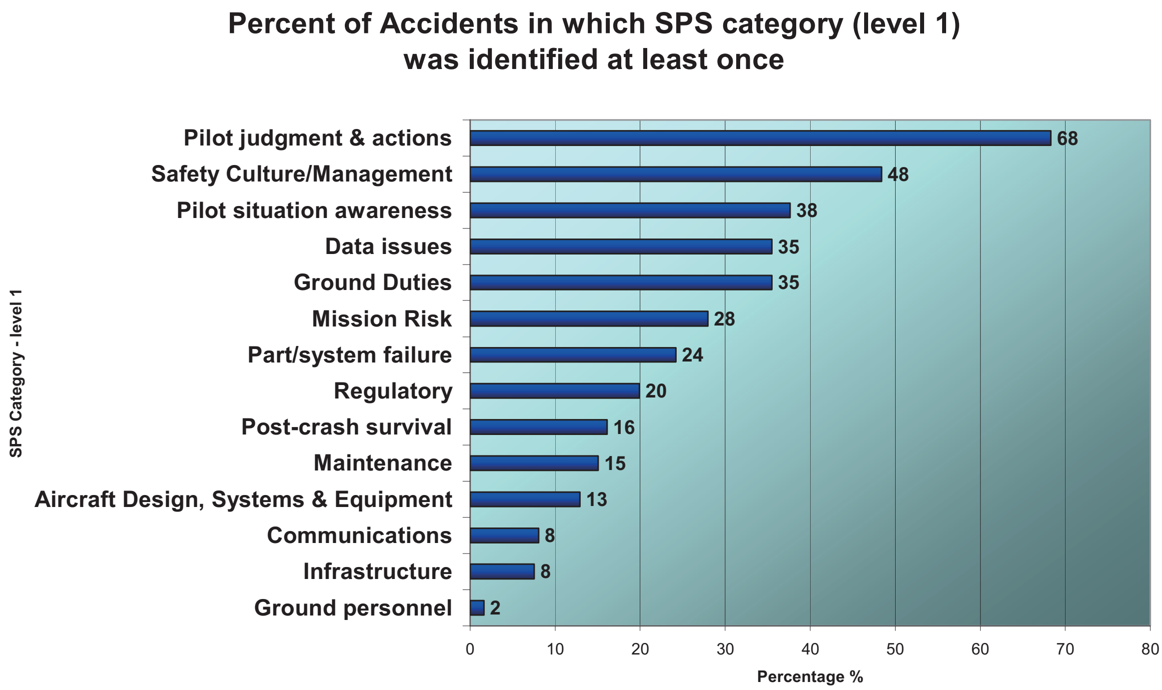

Figure 11 - Standard Problem Statement results on highest level in percentage of accidents in dataset

Data Issues is a specific area to code factors related to the lack of availability of information in the accident report. It was found by the teams that in 35% of the analysed reports there was insufficient information available to fully analyse and understand the accident. One of the reasons for insufficient information being available is the absence of a flight data recorder (FDR) capability in many helicopters, especially light helicopters[3]. Because of their particular nature, data issues will not be included in the subsequent charts.

Figure 12 provides a comparison with US data coming from the first US JHSAT report concerning 197 accidents from the year 2000 only. Correlation is quite high (0.89): the top five categories are similar for both the US and the EHSAT analysis but slightly differ in order.

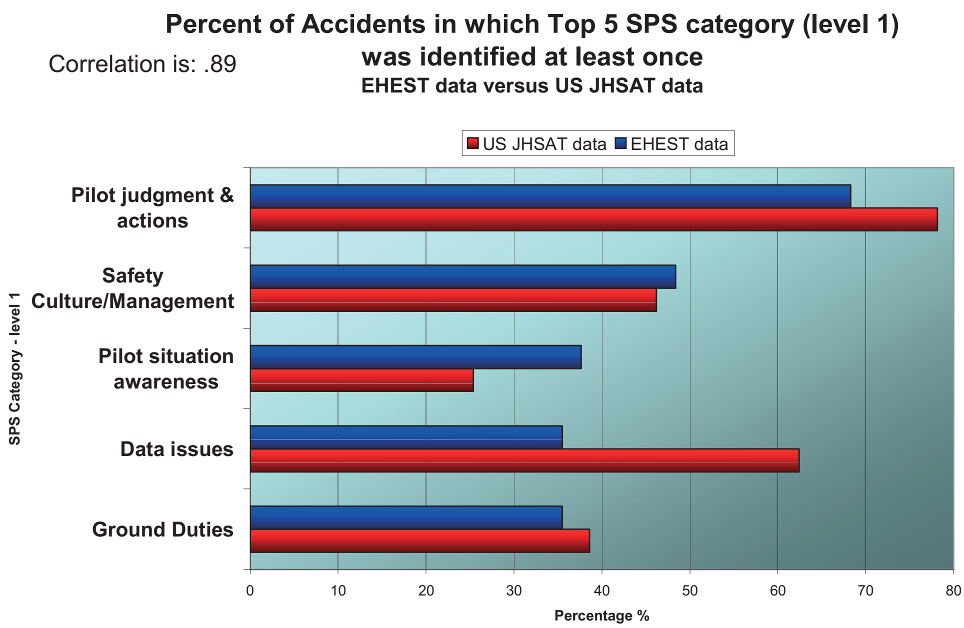

Figure 12. SPS Level 1: EHSAT results compared with US JHSAT results

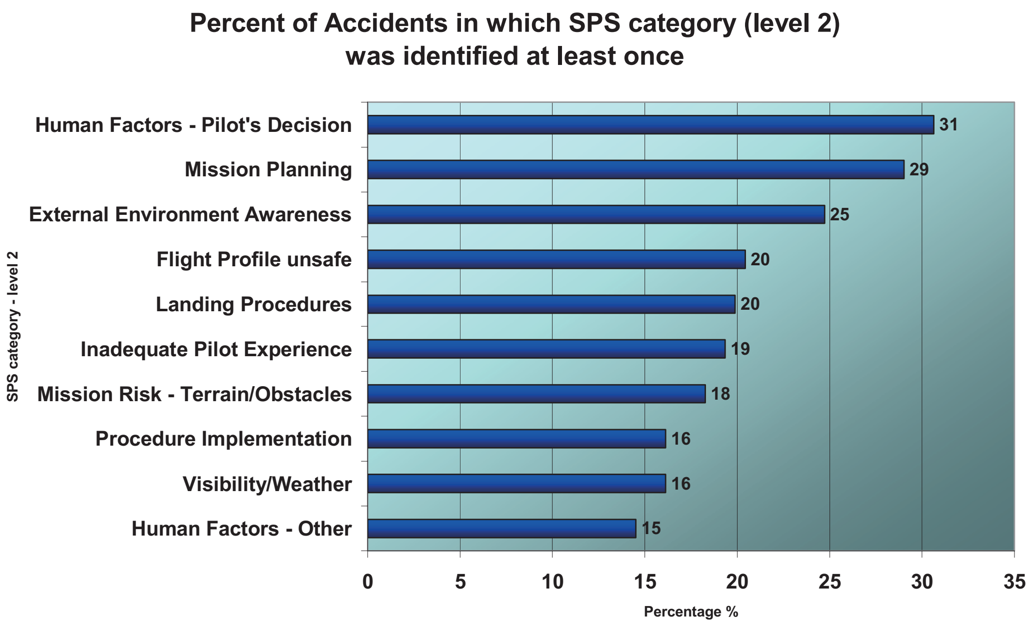

Figure 13 - Top 10 Standard Problem Statement results on 2nd level SPS in percentage of accidents

[3] It is worth noticing that EASA has launched a research project on this subject in 2008.

Level 2 SPS analysis illustrated in Figure 13 clarifies the picture and highlights pilot's decision making, mission planning and external environment awareness as the top 3 factors.

Because it was expected that most of the factors would lie in the HF domain, EHSAT adopted a second model and taxonomy for HF identification: HFACS.

4.3. Analysis of the accident factors using HFACS

For the 186 accidents in the data set a total of 445 HFACS factor counts were identified. In 76% of the accidents, at least one HFACS factor was identified. In most accidents unsafe acts or preconditions for unsafe acts were identified, see Figure 14. In fewer accidents issues related to supervision or organisational influences were captured. The possibility of identifying those factors is however very much dependent on the depth of the accident investigation performed: if the accident investigator did not look into managerial or organisational aspects related to the accident, the EHSAT analysis team could not assign factors in those areas.

Unsafe Acts

For the lowest level in the model, the unsafe acts, 84% of the identified factors concerned errors: activities that failed to achieve their intended outcome. Most errors were identified as being judgment and decision making errors, such as poorly executed procedures, improper choices, or misinterpretation of information. These errors represent conscious and goal-intended behaviour. Skill-based errors on the other hand are errors that occur with little or no conscious thought, such as inadvertent operation of switches and forgotten items in a checklist. this type of error was identified in 28% of the errors. Finally, perceptual errors are related to a degraded sensory input.
Violations, wilful disregard of rules and regulations, were identified in 16% of the unsafe acts.

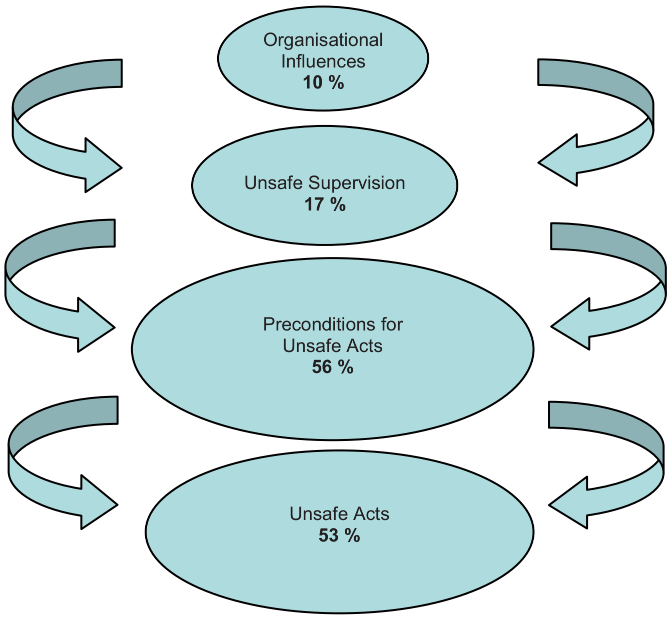

Figure 14 - Percentage of Accidents where HFACS level was identified at least once

Preconditions for Unsafe Acts

One must look deeper into preconditions of unsafe acts to identify why these took place. 60% of the identified preconditions related to the condition of the individual. These conditions include overconfidence, channelised attention, 'press-on-itis', inattention, distraction, misperception of operational condition, and excessive motivation. Personnel factors mostly concerned mission planning. Also cross-monitoring performance and mission briefing were mentioned. For the Environmental factors, restricted vision by meteorological conditions, brownout/whiteout and windblast were identified.

Unsafe Supervision

In 17% of the accidents, latent failures on middle management level were identified. Under 'Planned Inappropriate Operations' the factors of limited total and recent experience and formal risk assessment, where a supervisor does not adequately evaluate mission risks or risk assessment programs are inadequate, were identified. In addition, cases were identified under Inadequate Supervision relating to inadequate leadership/supervision or oversight and lack of policy or guidance.

Organisational Influences

In 10% of the accidents latent failures on the higher management level or organisational level were identified. Items identified under 'Organisational Process' included issues related to procedural guidelines and publications, and doctrine. Under 'Organisational Climate' organisational values/culture and organisational structure were identified.

4.4. Analysis per type of operation

Because of the differences in operational issues and their regulatory environment, an analysis was performed on the three major types of operation: Commercial Air Transport, Aerial Work and General Aviation. Three scenarios are used to illustrate the three types of operation and the top issues identified for these operations.

Let us start by considering a fictitious but representative example of a Commercial Air Transport accident: *"Once the patient was boarded the helicopter took off despite the degraded weather condition because an ambulance was waiting to bring the patient to the hospital. The helicopter hit the ground (snowed surface) with the right skid and nosed over just after take off in poor visibility due to falling and blowing snow".*

The main factors identified in this (Helicopter Emergency Medical Services - HEMS) scenario are loss of visual reference, inadequate in-flight decisions, and the fact that the pilot felt pressure to take-off and transport the patient.

Table 1 below presents the top factors for the full set of analysed Commercial Air Transport accidents using both the SPS and the HFACS taxonomies at the lowest, i.e. most precise, coding level. The example scenario above fits many of the top issues listed in this Table.

Top issues – Commercial Air Transport	
Top issues Standard Problem Statements	**Top issues HFACS**
Pilot decision making	Brownout/whiteout
Pilot-in-Command self induced pressure	Decision-making during operation
Pilot's flight profile unsafe for conditions	Communication critical information
Reduced visibility – whiteout, brownout	Pressing
Pilot inexperienced with area and/or mission	Risk assessment – during operation
Pilot experience leads to inadequate planning regarding weather/wind	Procedural error
Selection of inappropriate landing site	Excessive motivation to succeed
Management disregard of known safety risk	Mission planning
Inadequate consideration of aircraft operational limits	Inattention
Failure to enforce company SOPs	Limited recent experience
	Procedural guidelines/publications

Table 1 - Top issues for Helicopter Commercial Air Transport operations (Excluding factors related to Data Issues)

Let us now consider a typical example of an Aerial Work accident: *"During vertical take off with external cargo from a confined landing area in the forest, the helicopter started to rotate to the left after having cleared the tree tops. The helicopter lost altitude, contacted the surrounding trees and crashed".*

The main factors in this scenario are that the helicopter was operated near Maximum Take-Off Mass, that it had to operate close to obstacles, that the task was pilot intensive, and that there was a tailwind. It all resulted in a Loss of Tail rotor Effectiveness, and the pilot forgot to release the cargo.

Table 2 below shows the top factors for the full set of analysed Aerial Work accidents, of which the above scenario is typical:

Top issues – Aerial Work	
Top issues Standard Problem Statements	**Top issues HFACS**
Mission involves flying near hazards, obstacles, wires	Risk assessment - during operation
Pilot decision making	Channelised attention
Mission requires low/slow flight	Mission planning
Low flight near wires	Decision-making during operation
Inadequate consideration of obstacles	Error due to misperception
Diverted attention, distraction	Inattention
Risk management inadequate	Misperception of Operational Condition
Inadequate response to loss of tail rotor effectiveness	Excessive motivation to succeed
Inadequate training on avoidance, recognition and recovery of vortex ting state or LTE	Fatigue – Physiological/Mental
	Windblast
	Overconfidence
	Limited total experience

Table 2 - Top issues for Helicopter Aerial Work operations
(Excluding factors related to Data Issues)

Eventually let us have a look at a typical General Aviation accident: *"The helicopter was on a Visual Flight Rules flight. En route, it entered an area of rising terrain and low cloud base. Radar tracking indicates that the helicopter slowed down, and then made a sharp turn before disappearing off the screen. The helicopter then suffered an in-flight collision with terrain directly after the loss of radar contact".*

The main factors in this case are that the pilot was inexperienced, did not obtain a weather forecast, did not file a flight plan, did not establish contact with ATC, and inadvertently entered Instrument Meteorological Conditions (IMC).

These factors are very common in General Aviation accidents. Table 3 below presents the complete picture for the analysed General Aviation accidents:

Top issues – General Aviation	
Top issues Standard Problem Statements	**Top issues HFACS**
Pilot decision making	Risk assessment - during operation
Mission planning –other	Overconfidence
Inadequate consideration of weather/wind	Vision restricted by meteorological conditions
Pilot inexperienced	Procedural error
Pilot control/handling deficiencies	Mission planning
Pilot misjudged own limitations/capabilities	Decision-making during operation
External environment awareness – Other	Overcontrol/Undercontrol
Disregard of known safety risk	Violation – Lack of discipline
Failed to recognise cues to terminate current course of action or manoeuvre	Inadvertent Operation
	Error due to misperception
	Channelised attention
	Get-Home-Itis/Get-There-Itis
	Misperception of operational condition

Table 3 - Top issues for Helicopter General Aviation operations
(Excluding factors related to Data Issues)

Even if some similarities can be observed, different patterns emerge for the three types of operations.

Another finding is that HFACS and SPS complement each other well: SPS codes are technically more adapted to helicopter operations while HFACS adds a valuable, theory-driven HF analysis system. As shown in Tables 1-3, the real benefit comes from *jointly* considering SPS and HFACS results in a single shell. When used in combination, HFACS and SPS provide a basis for richer analyses and recommendations.

4.5. Intervention recommendations

EHSAT was also requested to develop Intervention Recommendations aimed at preventing similar accident factors from reoccurring. Intervention Recommendations are formulated in free text and have been assigned to one of 11 categories. Most recommendations fall into:

- Training/Instructional,
- Flight Ops & Safety Management/Culture, and
- Regulatory/Standards/Guidelines, see Figure 15.

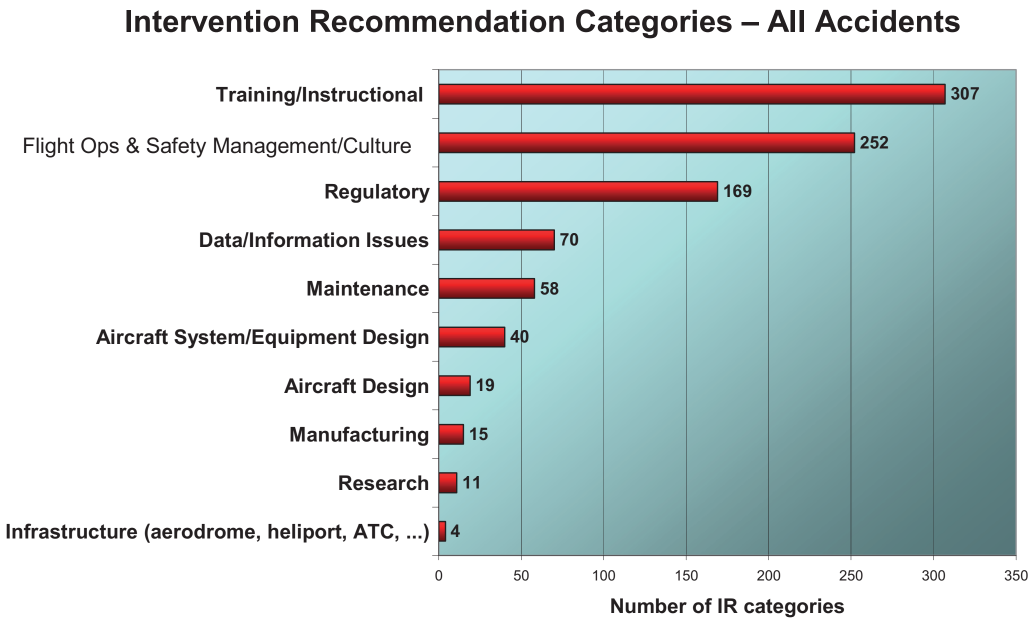

Figure 15 - Distribution of Intervention Recommendation categories for all analysed accidents

Examples of intervention recommendations are: better training for specific missions, for example mountain operations, better training for specific operating environment, such as inadvertent entry into IMC conditions, risk assessment training, promoting safety culture and introduction of Safety Management Systems, increase of obstacle awareness, requirements for flight data recording, establishment of training requirements for aerial work operational crew other than flight crew, etc.

5. WAY FORWARD

5.1 Handover of intervention recommendations to the EHSIT

Launched in Feb 2009, the EHSIT is tasked with processing the intervention recommendations produced by the EHSAT and to develop, implement and monitor safety enhancement action plans across Europe.

The following structure was adopted:

- **EHSIT Core-Team**: Composed of the Regional Team leaders plus additional key players such as the European Helicopter Association (EHA), the Core Team is in charge of defining implementation strategy, selecting priorities and activating the major European players (operators, OEMs, authorities, etc.).

- **Specialist Teams**: to address specific major subjects at pan-European level.
- **Regional EHSITs**: EHSIT will rely on the local organisation of EHSAT. Local teams are an efficient way to facilitate implementation of voluntary safety enhancements and to communicate to the local community.

Since its creation, the EHSIT has aggregated at European level the Intervention Recommendations on Training/Instructional and Flight Ops & Safety Management/Culture, and has started to aggregate the 'Regulatory' aspects.

Aggregated interventions will the be transferred to Specialists Teams who will further process this material and develop implementation strategy and actions plans using a process close to the one used by the JHSIT in the US. The added complexity within Europe is to ensure the right combination of pan-European and national implementation.

5.2. Continuation of EHSAT work

In parallel, the EHSAT continue to analyse helicopters accidents in Europe between 2000 and 2005. While the preliminary report was limited to 186 accidents analysed up to September 2008, the EHSAT database now contains (ref. 15 July 09) 334 accidents of which 288 are in the timeframe 2000-2005. The analysis of those 6 years is expected to be completed in early 2010. The Regional Teams will continue to analyse accident reports at the rate of at least one year of accidents per year to expand the database for further analysis.

5.3. Communication Sub-Group

EHEST has also launched a Communication Sub-Group. This specialised team will identify and define a process to efficiently communicate with the helicopter community, in particular small operators and General Aviation. The Communication Sub-Group will coordinate with the European General Aviation Safety Team (EGAST) and the IHST.

6. CONCLUDING REMARKS

This paper has presented results based on a preliminary dataset consisting of 186 European helicopter accidents that occurred between 2000 and 2005, and analysed by the nine regional EHSAT teams up to 15 September 2008.

Although these results are preliminary, and might change when more data becomes available, it is considered that they already provide a good indication of the type of accidents and the important factors involved.

The top 3 identified areas are: Pilot judgment & actions, Safety Culture/Management and Pilot situation awareness. These results show a high correlation of 0.89 when compared with the initial US analysis results.

Most intervention recommendations were identified in the areas of Training/Instructional, Flight Ops & Safety Management/Culture, and Regulatory/Standards/Guidelines.

Different patterns of factors were observed for Commercial Air Transport, Aerial Work and General Aviation.

The use of the HFACS taxonomy by the EHSAT provided a complementary perspective on Human Factors.

To achieve the objective of reducing the accident rate by 80% by 2016, an ambitious and comprehensive implementation scheme is key. EHSIT has been tasked with developing the necessary European strategy and action plans.

Acknowledgements

The work of the EHSAT and EHSIT regional teams is greatly acknowledged.

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Acronyms

AHS: American Helicopter Society
CAST: Commercial Aviation Safety Team
CFIT: Controlled Flight Into Terrain
EASA: European Aviation Safety Agency
ECCAIRS: European Coordination Centre for Accident and Incident Reporting Systems
EGAST: European General Aviation Safety Team
EHA: European Helicopter Association
EHEST: European Helicopter Safety Team
EHSAT: European Helicopter Safety Analysis Team
EHSIT: European Helicopter Safety Implementation Team
ESSI: European Strategic Safety Initiative
FAA: Federal Aviation Administration
FDR: Flight Data Recorder
HAI: Helicopter Association International
HEMS: Helicopter Emergency Medical Services
HFACS: Human Factors Analysis and Classification System
HFACS-ME: Human Factors Analysis and Classification System Maintenance Extension
ICAO: International Civil Aviation Organisation
IHST: International Helicopter Safety Team
IHSS: International Helicopter Safety Symposium
IMC: Instrument Meteorological Conditions
IR: Intervention Recommendation
JHSAT: Joint Helicopter Safety Analysis Team
JHSIT: Joint Helicopter Safety Implementation Team
SPS: Standard Problem Statement
TCCA: Transport Canada

