



**The European Helicopter Safety Team**  
*Climbing Together New Safety Summits*

**Rega Symposium 2010**  
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# 1. SETTING THE SCENE

## 2. METHODOLOGY

## 3. INTERIM RESULTS

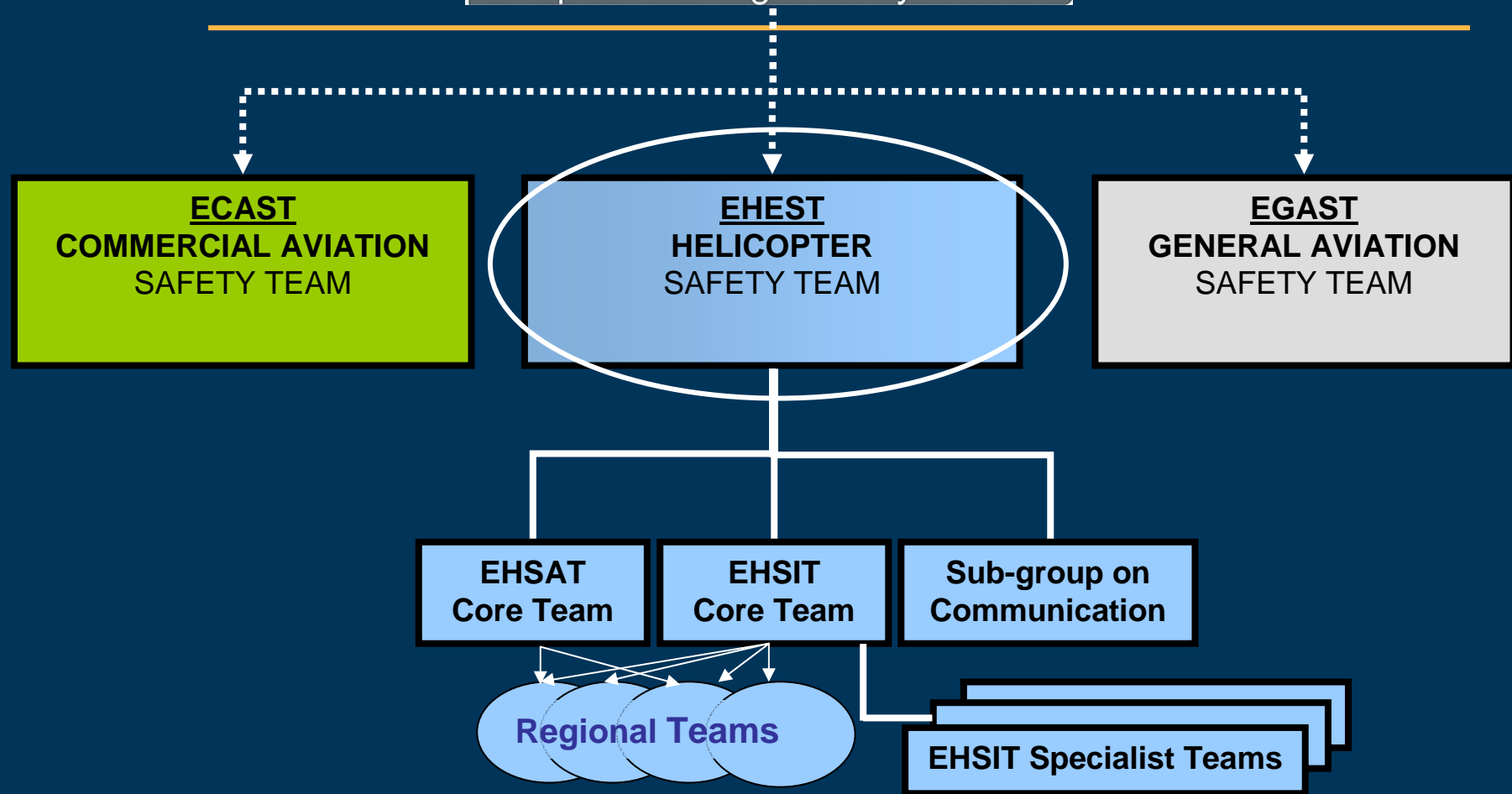
## 4. CONCLUDING REMARKS



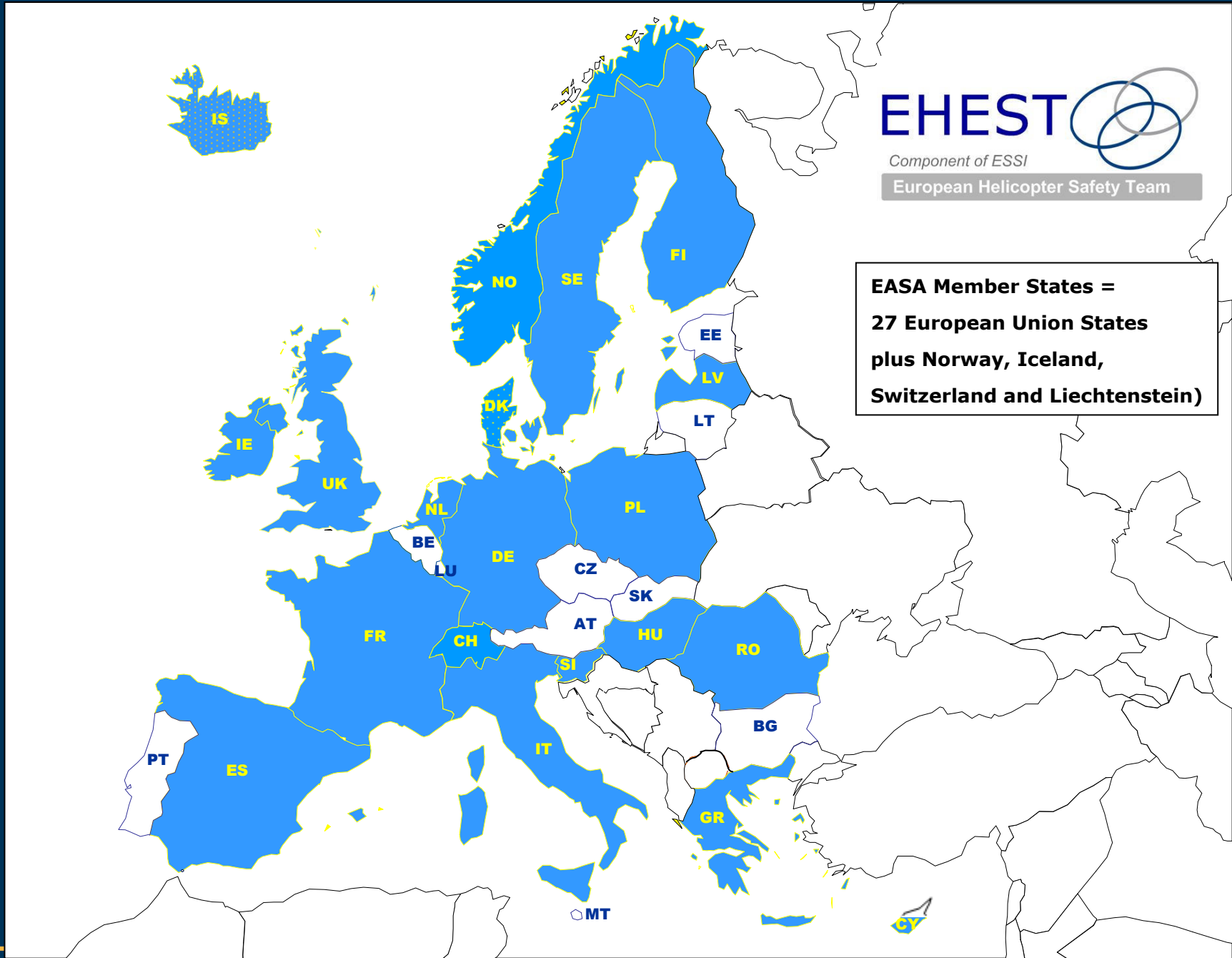
Photo Vasco Morao



EHEST is the helicopter component of ESSI  
and the European branch of IHST



<http://www.easa.europa.eu/essi/ehestEN.html>



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## 1. SETTING THE SCENE

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Photo Eurocopter

# Methodology

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- Analysis of helicopter accidents using the JHSAT method
- Added HFACS by Wiegmann and Shappell to better understand the circumstances in which pilot errors occur, and to analyse Human Factors in general

# Scope of analysis

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- Data driven approach
  - ✦ Accidents (definition ICAO Annex 13)
  - ✦ Date of occurrence year 2000 - 2005
  - ✦ State of occurrence located in EASA Member States
  - ✦ Where a final report from AIB is available
- Preliminary results presented Portugal – Oct. 08
  - ✦ 186 accidents
- Interim results presented IHSS, Canada – Sep. 09
  - ✦ 303 accidents
  - ✦ Estimated to be some 75% of the published reports
  - ✦ Published on the EHEST website
- Final report 2000-2005 planned mid 2010



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## **1. SETTING THE SCENE**

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## **3. INTERIM RESULTS**

**General Data**

**SPS and HFACS Analysis**

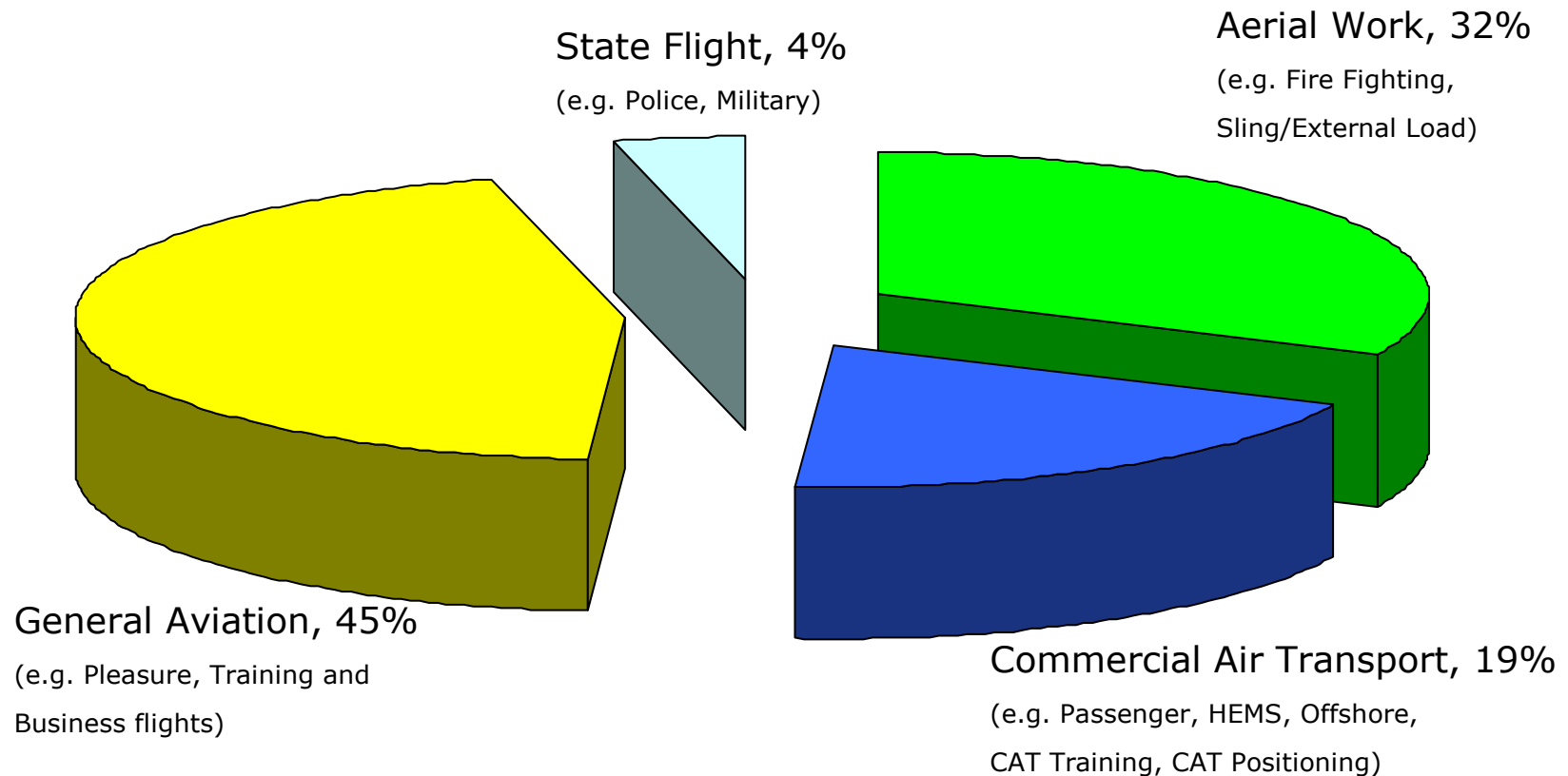
**Intervention Recommendations**

## **4. CONCLUDING REMARKS**

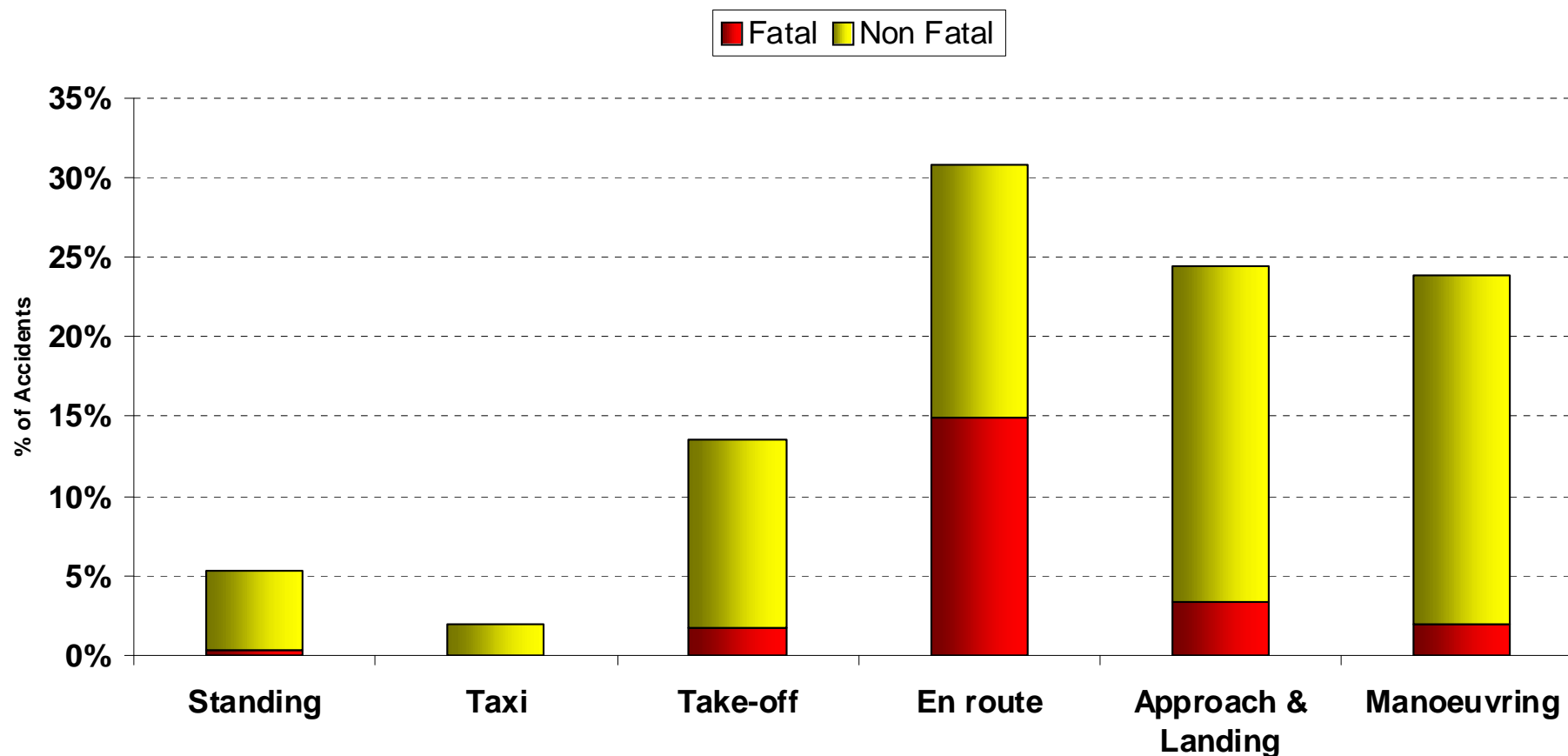


Photo AgustaWestland

## Accident Distribution over Type of Operation EHSAT Dataset



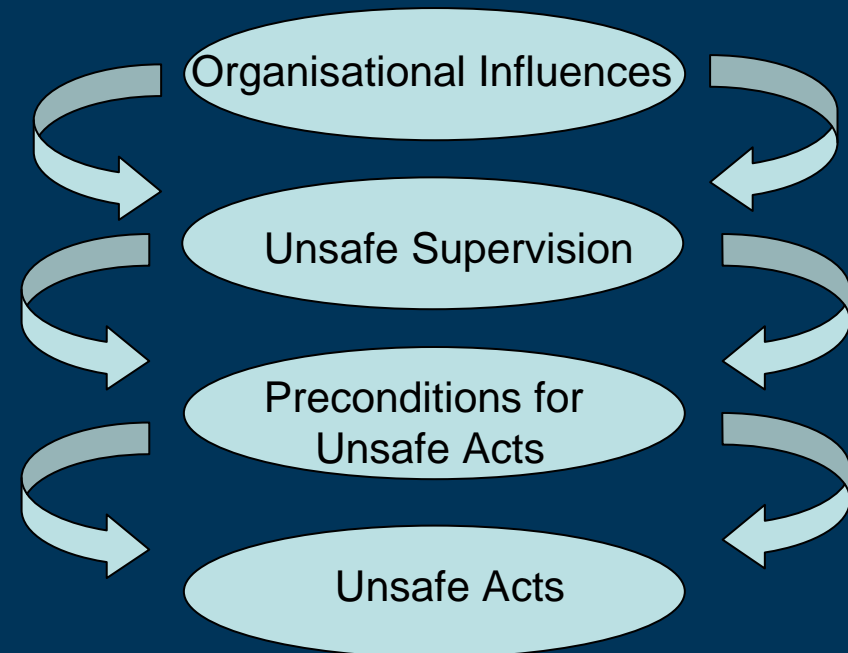
## Accident Distribution over Phase of Flight EHSAT Dataset



# Models used for identification of factors

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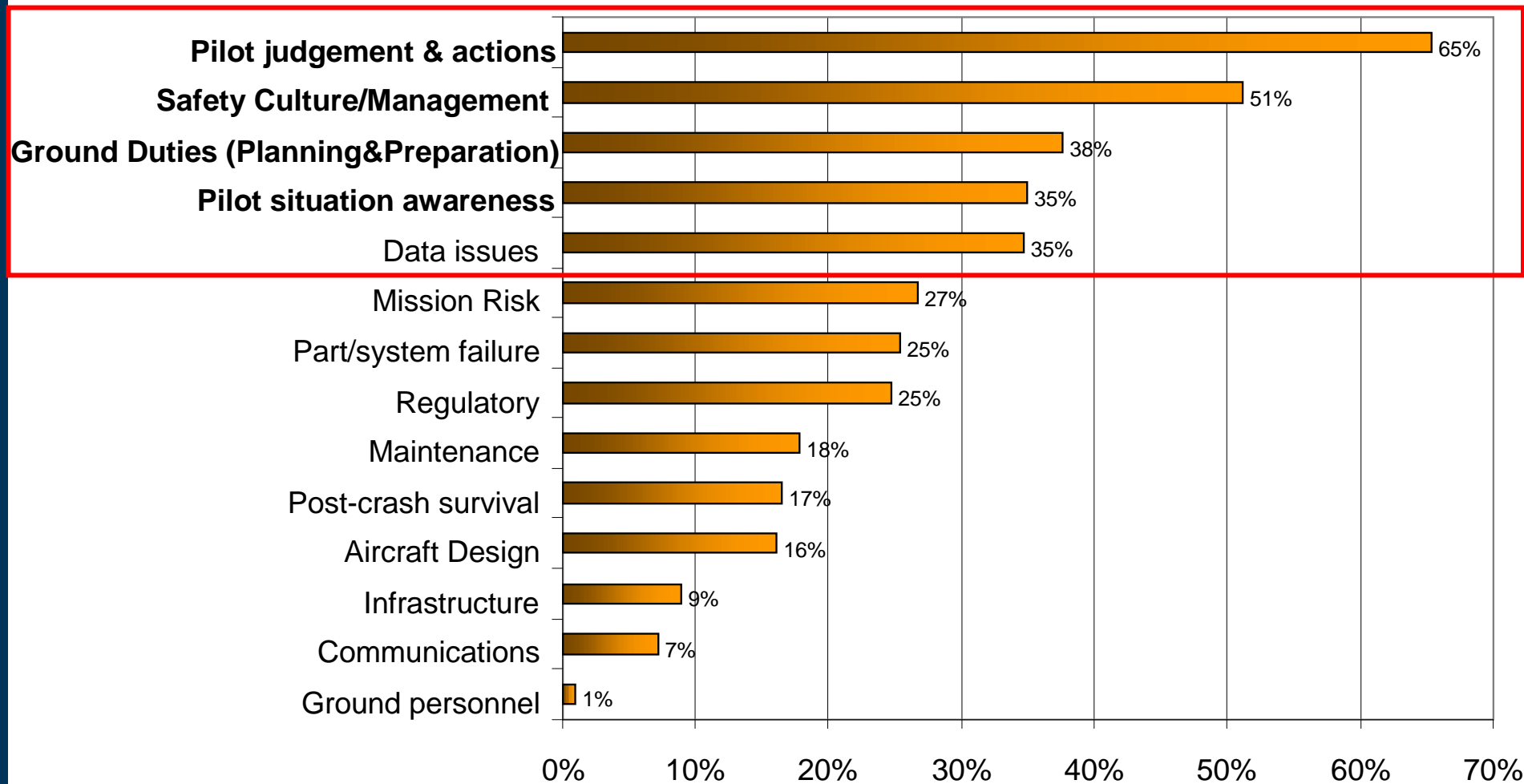
- Standard Problem Statements,
  - ✦ From the original, US team's methodology
  - ✦ 1775 factors recorded
- HFACS by Wiegmann and Shappell,
  - ✦ Added by the European team for a complementary analysis of Human Factors
  - ✦ 818 factors recorded



<http://hfacs.com/>

# SPS analysis results

**% of Accidents where SPS level 1 has been identified at least once  
EHSAT Dataset**



# An example HEMS scenario (1)

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- During a HEMS mission after the patient had been loaded the helicopter crew decided to continue the mission in deteriorating weather conditions.
- The decision to continue was taken because an ambulance was waiting to transfer the patient to hospital.
- During the take-off in poor visibility and falling snow the right front skid of the helicopter struck the surface and as a result it nosed over uncontrollably and impacted the ground.

# An example HEMS scenario (1)

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- During a HEMS mission after the patient had been loaded the helicopter crew decided to continue the mission in deteriorating weather conditions.  
**Loss of Visual Reference**
- The decision to continue was taken because an ambulance was waiting to transfer the patient to hospital.  
**Inadequate decisions**
- During the take-off in poor visibility and falling snow the right front skid of the helicopter struck the surface and as a result it nosed over uncontrollably and impacted the ground.  
**Pilot felt pressure**

# An example HEMS scenario (2)

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- The HEMS helicopter approached the operating site.
- The pilot, before landing, performed a landing site survey. The paramedic on board was requested by the pilot to check for obstacle clearance.
- The parking area adjacent to the road was initially selected as suitable landing site.
- The pilot changed his mind and decided to land on the road. But afraid of blocking the road, the pilot repositioned the helicopter again in a low hover to the parking area.
- The pilot identified traffic sign in front of the helicopter but did not notice a sign behind the helicopter. The tail rotor first hit the obstacle. The helicopter landed hard.

# An example HEMS scenario (2)

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- The HEMS helicopter approached the operating site.
- The pilot **Landing site selection** before landing performed a landing site survey. The paramedic on board was requested by the pilot to check for obstacle clearance.
- The parking area adjacent to the road was initially selected as suitable landing site. **Pilot decision making**
- The pilot changed his mind and decided to land on the road. **Obstacle detection** In front of the road, the pilot repositioned the helicopter again in a low hover to the parking area.
- The pilot identified **Role of people on ground** the fire engine in front of the landing area but did not notice a sign behind the helicopter. The tail rotor first hit the obstacle. The helicopter landed hard.

# Factors involved

## SPS

Pilot decision making

Self induced pressure

Failed to follow procedures

Terrain/obstacles

Inadequate oversight

Reduced visibility

Selection of inappropriate landing site

Management – Failure to enforce company SOPs

## HFACS

Decision Making - Operation

Risk assessment – Operation

Skill-based errors

Whiteout/Vision restricted

Channelised attention

Communication critical information/Planning factors

Pressing/Excessive Motivation

Organisational Culture/Values

# An example Fire Fighting scenario

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- The helicopter took off from the base to fly firemen to a forest fire.
- The helicopter arrived at the fire site. The pilot searched for a landing area to disembark the firemen.
- Finally he found an area. He saw a tree at his 3 o'clock position. He moved some meters forward and started a slow descent.
- The pilot heard a loud noise and the helicopter started yawing. The helicopter landed heavily and sustained substantial damage. The pilot and two firemen received minor injuries.

# An example Fire Fighting scenario

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- The helicopter took off from the base to bring firemen to a forest fire. **Natural landing sites**
- The helicopter arrived at the fire site. The pilot searched for a landing area to disembark the firemen. **Environmental hazards**
- Finally he found an area. He saw a tree at his 3 o'clock position and moved some meters forward and started a slow descent. **Inadequate decisions**
- The pilot heard a loud noise and the helicopter started yawing. The helicopter landed heavily and sustained substantial damage. The pilot and two firemen **Pilot felt pressure**  
**Insufficient company guidelines**

# Factors involved

## SPS

Landing procedures/Selection of remote landing site

Mission involves flying near hazards

Flight procedure training (e.g. LTE, vortex ring)

Inadequate pilot experience

Pilot intensive: low/slow flight

Failure to enforce company SOPs

Customer/Company pressure

## HFACS

Skill-based errors

Task Misprioritisation

Risk Assessment – During Operation

Excessive Motivation to succeed

Channelized attention

Crew/team composition

Organisational process

# An example General Aviation - Training scenario

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- The dual exercise was for the student to practise emergency and autorotational landings.
- The landing area selected for the exercise was muddy with a forecast wind speed of 26 kts.
- As part of the exercise the flight instructor simulated an engine failure without any prior warning.
- During the subsequent autorotation the instructor allowed the rotor RPM to drop below the minimum.
- The helicopter contacted the ground with a high sink rate and rolled over.

# An example General Aviation - Training scenario

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- The dual exercise was for the student to practise emergency and autorotational landings.

Mission planning regards terrain and weather

- The landing area selected for the exercise was muddy with a forecast wind speed of 26 kts.

Insufficient briefing of the student on the training plan

- As part of the exercise the flight instructor simulated an engine failure without any prior warning.

Student control inputs uncoordinated

- During the subsequent autorotation the instructor allowed the rotor RPM to drop below the minimum.

The flight instructor interacted too late

- The helicopter contacted the ground with a high sink rate and rolled over.

# Factors involved

## SPS

Inadequate and untimely CFI action to correct student action

Pilot decision making

Perceptual judgment errors

Inadequate mission planning:  
Weather and wind

Training program management: CFI preparation and planning

Inadequate landing procedures

## HFACS

Risk assessment – Operation

Procedural error

Overcontrol/Undercontrol

Overconfidence

Necessary action – Delayed

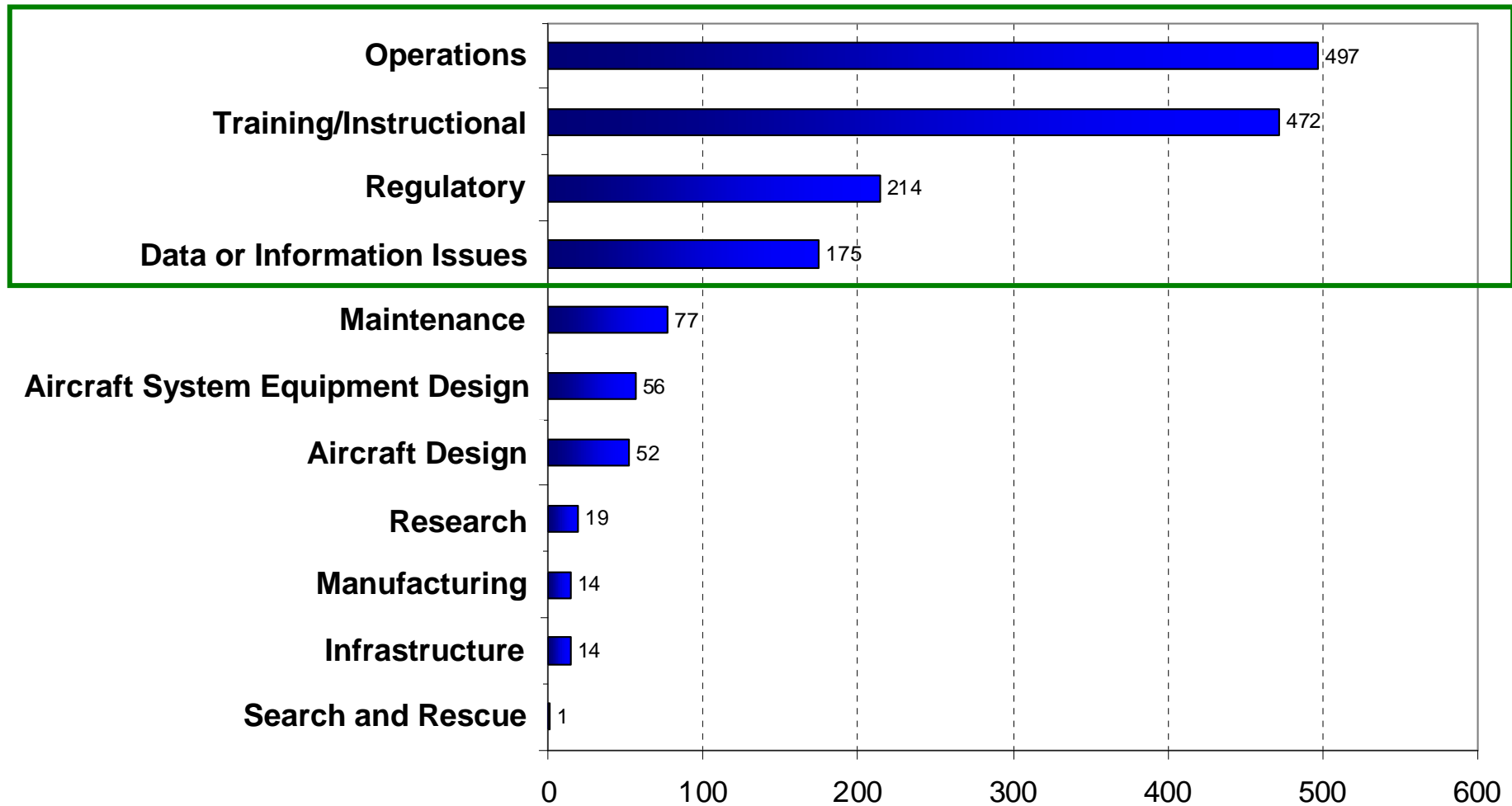
Mission briefing

Leadership/Supervision/  
Oversight inadequate

Training Program/Guidelines

# Intervention Recommendations

## Total number of Intervention Recommendations (Level 1)



# EHEST and EHSIT Sub-Teams

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- EHEST Communication Sub-Group  
Tasked to reach all European stakeholders,  
with particular focus on General Aviation
  
- EHSIT Specialist Teams  
launched in 2009 on:
  - ✦ SMS and Operations
  - ✦ Training
  - ✦ Regulation



# Specialist Team SMS/Operations

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## ➤ Consolidated recommendations:

- ✦ SMS: Encourage the use of SMS based on real safety culture including risk management and codes of practice.
- ✦ SOPs: Operators should be encouraged to establish and apply SOPs for all activities that they undertake.
- ✦ RISK ASSESSMENT/PRE-FLIGHT PREPARATION: Emphasise the importance of Risk Assessment in mission planning

# Specialist Team SMS/Operations

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- Consolidated recommendations:
  - ★ SAFETY CULTURE: Develop an engagement/communication plan to promote adherence to:
    - ➔ the core principles of basic airmanship
    - ➔ risk assessment
    - ➔ rule compliance
  
  - ★ AIRCRAFT PERFORMANCE: Reinforce familiarity with Flight Manual through awareness campaign and consider formal examination during annual flying check

# Specialist Team Training

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- Consolidated recommendations
  - ★ **INEXPERIENCED PILOTS:** Training syllabus for ab-initio pilots should cover in more detail:
    - ➔ Mission planning
    - ➔ Vortex Ring / LTE
    - ➔ Autorotation and other emergencies
    - ➔ Passenger management
  
  - ★ **DEGRADED FLIGHT CONDITIONS:** Specific training to improve decision making process for pilot before and after inadvertent entry into IMC

# Specialist Team Training

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## ➤ Consolidated recommendations

### ★ TRAINING / HUMAN FACTORS: Enhance instructor training in:

- ➔ Monitoring students
- ➔ Application of human factors principles
- ➔ Instructor intervention criteria

# Specialist Team Regulation

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- Consolidated recommendations
  - ★ EHSAT regulation related recommendations will mainly result in reviewing certain OPS and FCL contents
  - ★ Proposals for improvement will be communicated to Rulemaking using standard processes
  - ★ *WORK IN PROGRESS*

# SMS and Accreditation scheme: IS-BAO-H and the IHST SMS Toolkit

## ➤ EHEST promotes IS-BAO by IBAC

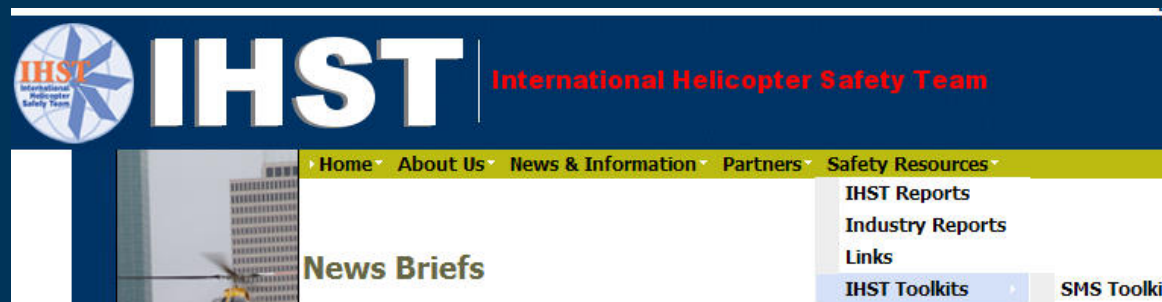
- ✦ **SMS + Accreditation scheme**
- ✦ European CEN Standard
- ✦ Helicopter version  
in development
- ✦ Europe-US coordination

<http://www.ibac.org/isbao.php>



The screenshot shows the IBAC website header with the logo and tagline: "International Business Aviation Council. The recognized forum for leveraging strengths of Members to enhance the safety, acceptance and economic contribution of business aviation globally." The navigation menu includes: News, Bulletins, IS-BAO, Aircrew Card, Safety, Security, Environment, Air Navigation. The main content area is titled "Introducing IS-BAO" and features a sidebar menu with items like "IBAC Home", "Introduction to IBAC", "General Information", "Contact IBAC", "Members", "IBAC Governance", "IBAC Update", "Annual Reports", "File Library", "Calendar of Events", and "Links". The main content area lists various resources: Overview, Benefits of IS-BAO, Ordering IS-BAO, Standards Board, IS-BAO Policies, Audit Program, Accredited Auditors, Registered Operators, Keeping Current, Workshop Schedule, Workshop Info, Applications and Fees, Newsletter, Bulletins, Journal Articles, Implementation Support, and Understanding SMS.

## ➤ And the SMS Toolkit V2 by IHST



The screenshot shows the IHST website header with the logo and tagline: "IHST International Helicopter Safety Team". The navigation menu includes: Home, About Us, News & Information, Partners, Safety Resources. The main content area is titled "News Briefs" and features a sidebar menu with items like "IHST Reports", "Industry Reports", "Links", "IHST Toolkits", and "SMS Toolkit".

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Photo Eurocopter

# Deliverables 2010-2012

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- **Safety actions towards organisations:** Operators and Operators Associations, FTOs, NAAs, ANSPs, DOAs, POAs, Part145, and Part M Organisations
- **Safety promotion material** targeting individual pilots and instructors and others
- **Best practice material** on Safety Management Systems (SMS), Standard Operating Procedures (SOPs), operational Risk Management, Safety Culture, and Training targeting in particular but not exclusively small operators
- **Rulemaking proposals** to be submitted to the competent authorities (ICAO, EASA, or NAAs) using standard rulemaking processes

# Concluding Remarks

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- Top 3 identified accident factor areas:
  - ✦ Pilot judgment & actions
  - ✦ Safety culture/management
  - ✦ Ground duties/Mission preparation
- HFACS enhances the analysis of Human Factors
- Top 3 recommendation categories:
  - ✦ Operations, SMS, and Safety Culture
  - ✦ Training
  - ✦ Regulation
- EHEST encourages intl. cooperation within IHST

# Announcement

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- **IHSS 2010 will take place in Europe**
  - Cascais, Portugal, 3-4 Oct.
  - Just before Helitech, 5-7 Oct.
- Jointly organised by IHST-US and EHEST
- Official announcement coming soon!

**EHEST**



Component of ESSI

European Helicopter Safety Team



**The challenge now is to develop, implement and monitor effective measures to meet the 80% accident rate reduction target**

*Thank you for your attention*

Questions?

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