



## **WORKING ON FIRE**

1st International Conference along with AIRTEC 2009  
3 – 4 November 2009, Exhibition Center Frankfurt aM, Germany

***Flight Safety in Fire Fighting Operations***  
**The European Helicopter Safety Team (EHEST):  
The European Initiative for improving Helicopter Safety**

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- 1. EHEST PRESENTATION**
- 2. METHODOLOGY**
- 3. ANALYSIS RESULTS**
- 4. SAFETY IMPROVEMENTS**
- 5. CONCLUDING REMARKS**

Picture Source Eurocopter

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

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## Goal:

To reduce the  
helicopter accident rate  
by 80% by 2016

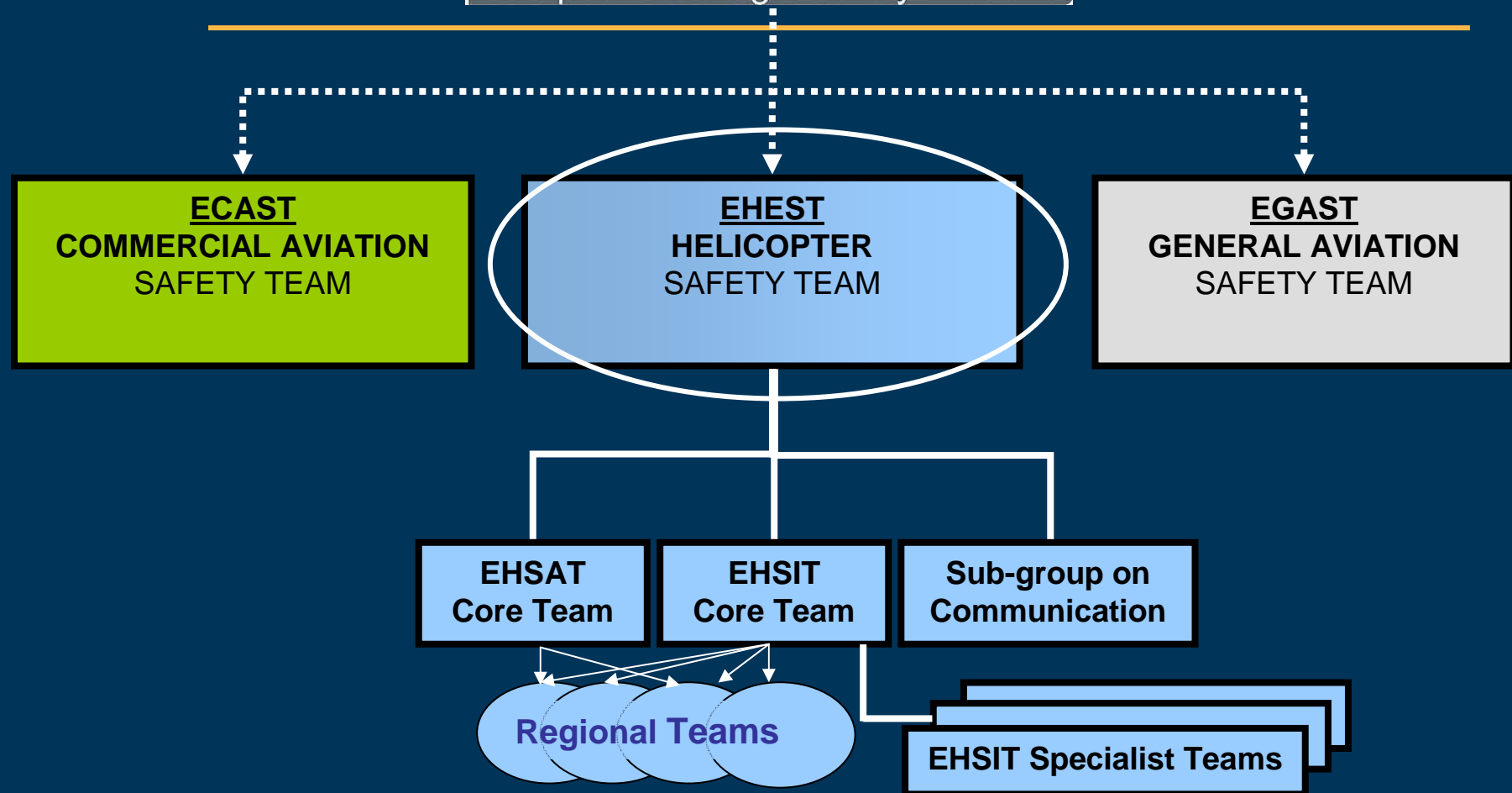


# The European Strategic Safety Initiative ESSI

- **10 year programme (2006-2016) aimed at improving aviation safety in Europe, and for the European citizen worldwide**
- **Partnership, with more than 150 organisations**
- **Powered by industry and facilitated by EASA**



[www.easa.europa.eu/essi](http://www.easa.europa.eu/essi)







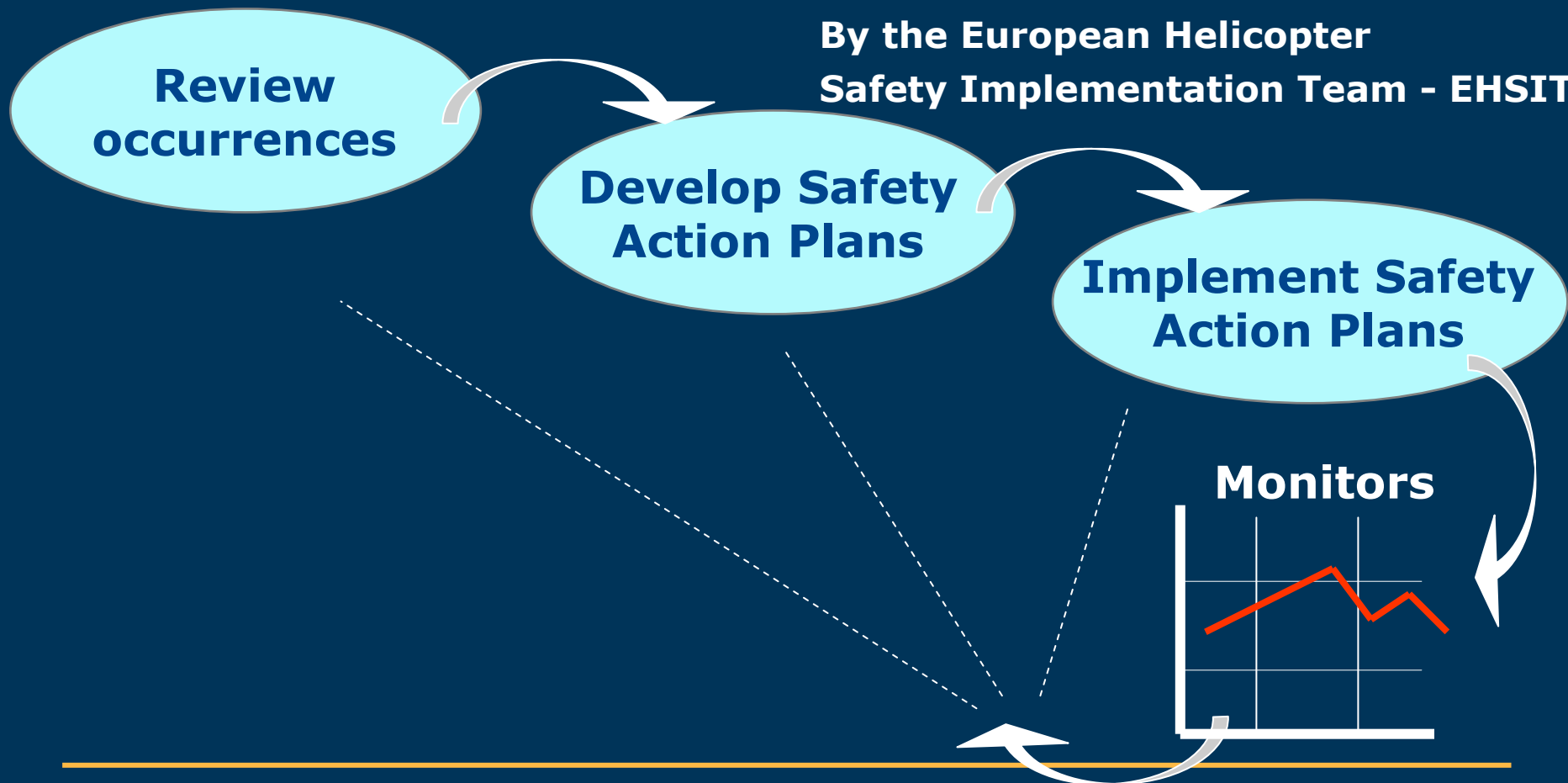
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Picture Source Eurocopter

# General Process

By the European Helicopter Safety Analysis Team - EHSAT

By the European Helicopter  
Safety Implementation Team - EHSIT



# 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 Europe
  - ➔ **For this purpose Europe is defined as the EASA Member States (27 EU + plus Iceland, Liechtenstein, Norway and Switzerland)**
- ✦ Where a final report from Accident Investigation Board is available

# Analysis Methodology

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**1. Collect general occurrence information  
*from accident report***



**2. Describe and analyse the accident  
*Identify events (what happened)  
and factors (why it happened) in free text***



**3. Assign standard codes to factors  
*Standard Problem Statements (SPS)  
from IHST taxonomy and HFACS***



**4. Produce Intervention Recommendations (IR)**



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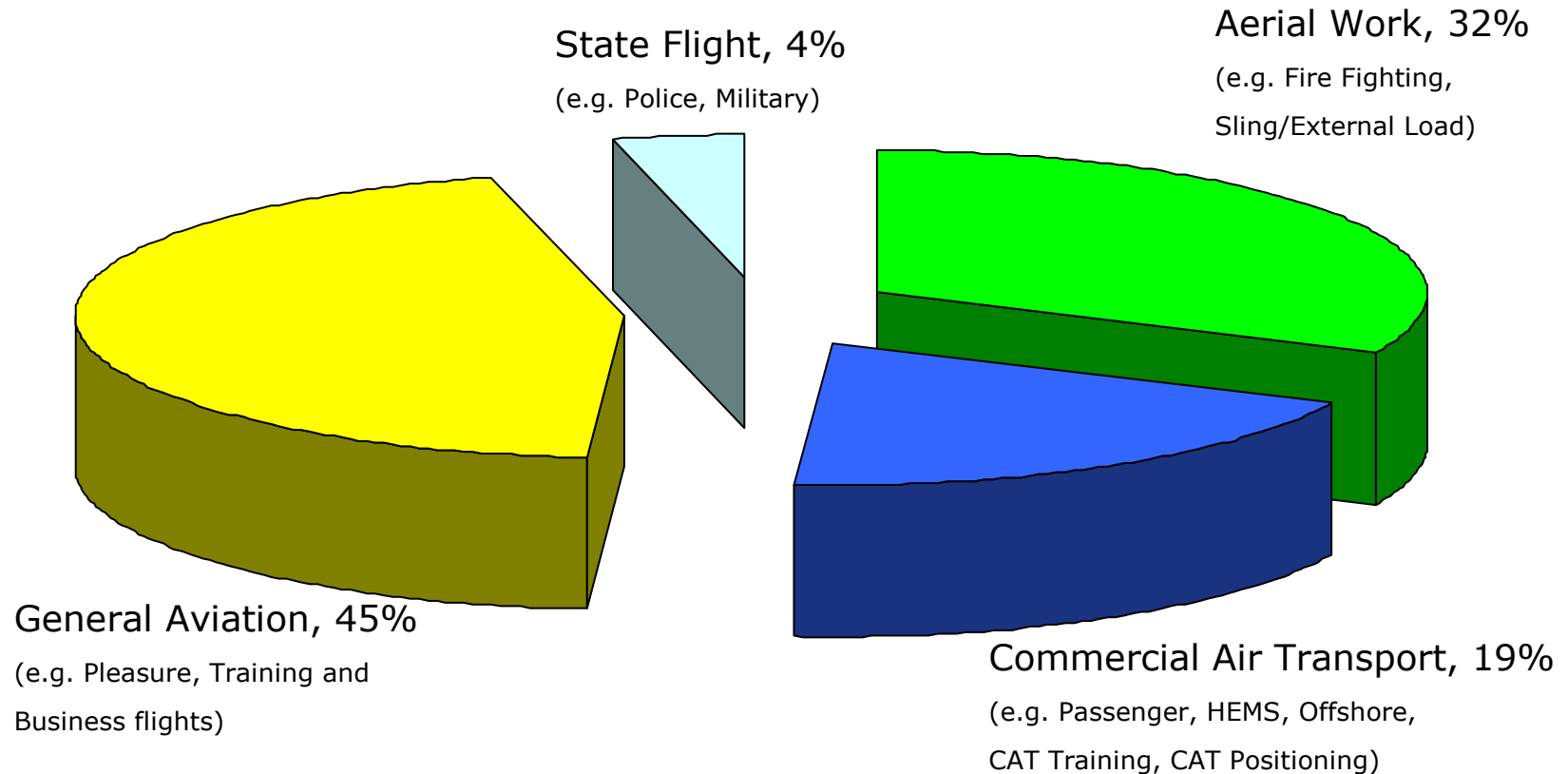
Picture Source Eurocopter

# Scope of interim dataset

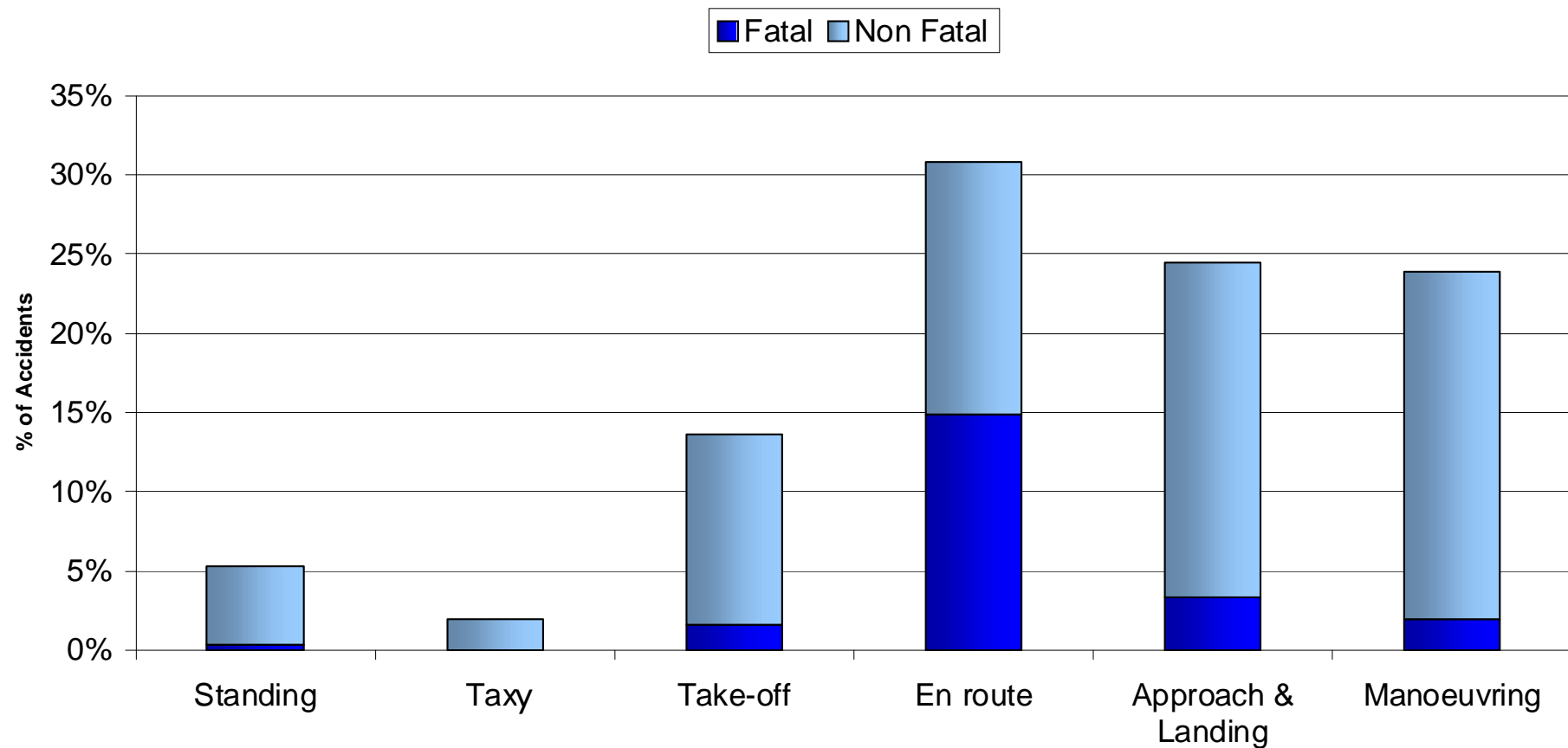
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- Total of 303 accidents within timeframe 2000-2005 have been analysed (as of 20 Aug. 2009)
- Covers work from 11 Regional Teams across Europe
  - ★ Estimated to be some 75% of the published reports available

## Accident Distribution over Type of Operation EHSAT Dataset



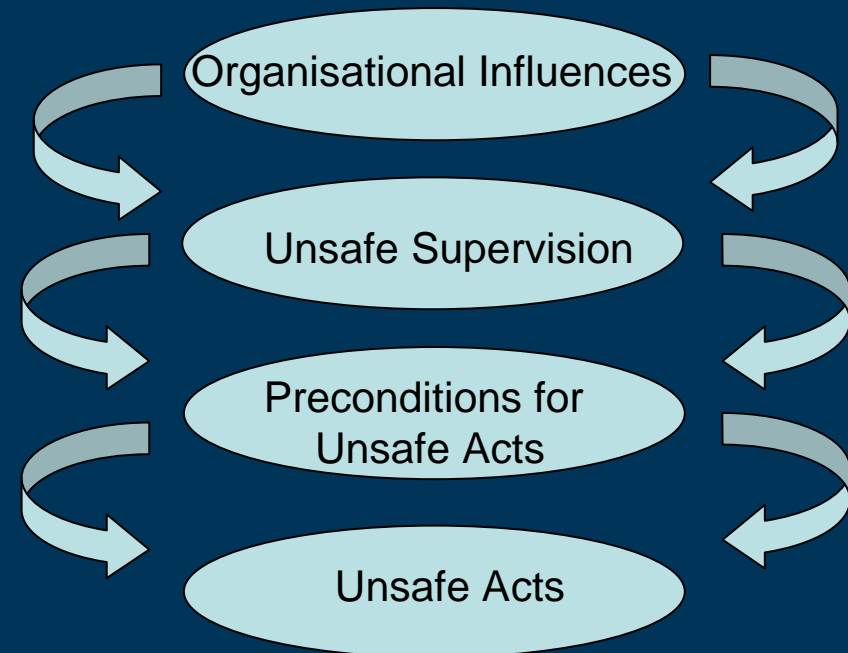
## Accident Distribution over Phase of Flight EHSAT Dataset



# Models used for identification of factors

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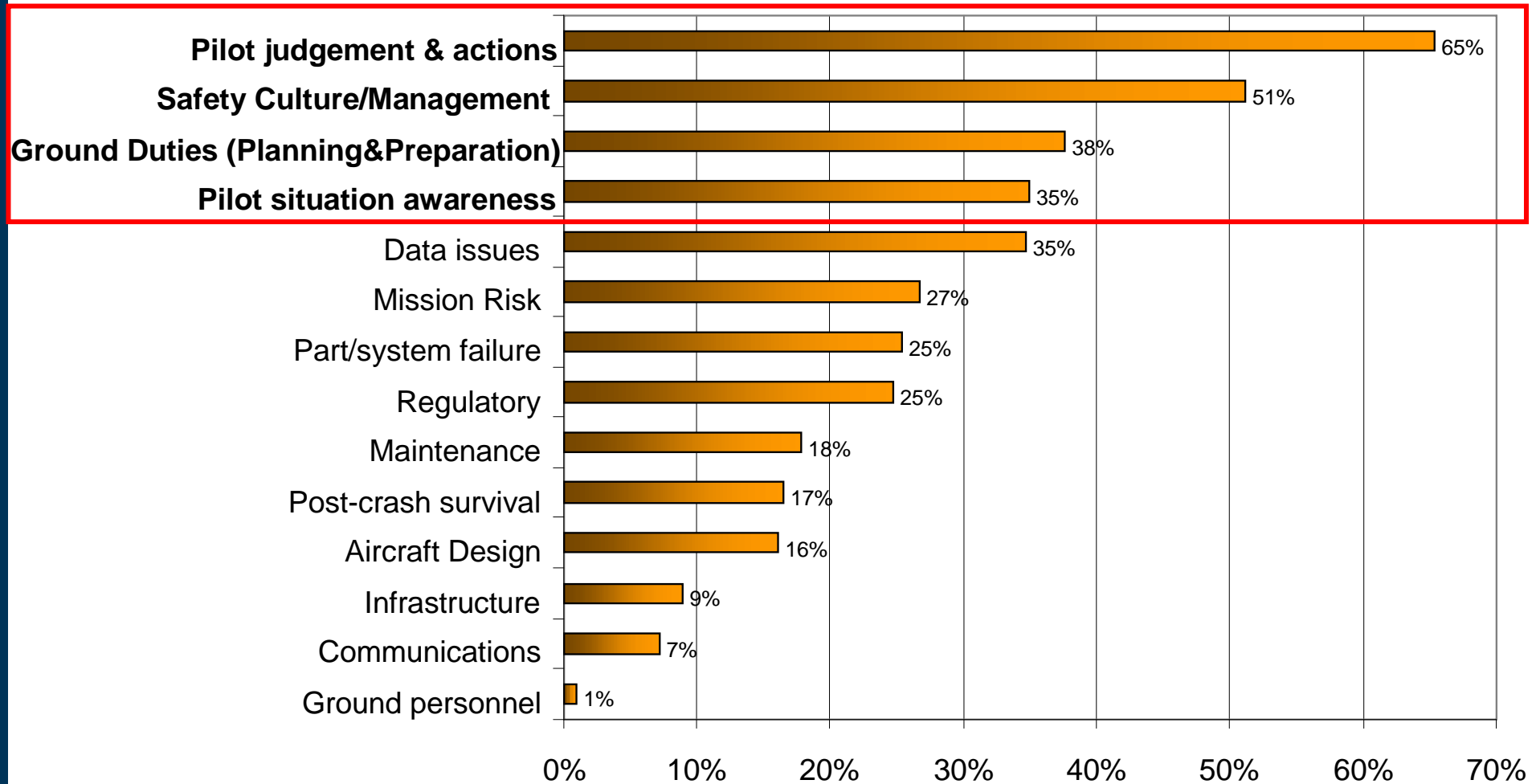
- Standard Problem Statements,
  - ✦ From the original, US team's methodology
  - ✦ 1775 factors recorded
- HFACS by Wiegmann and Shappell,
  - ✦ Added by the European team for a complementary analysis of Human Factors
  - ✦ 818 factors recorded



<http://hfacs.com/>

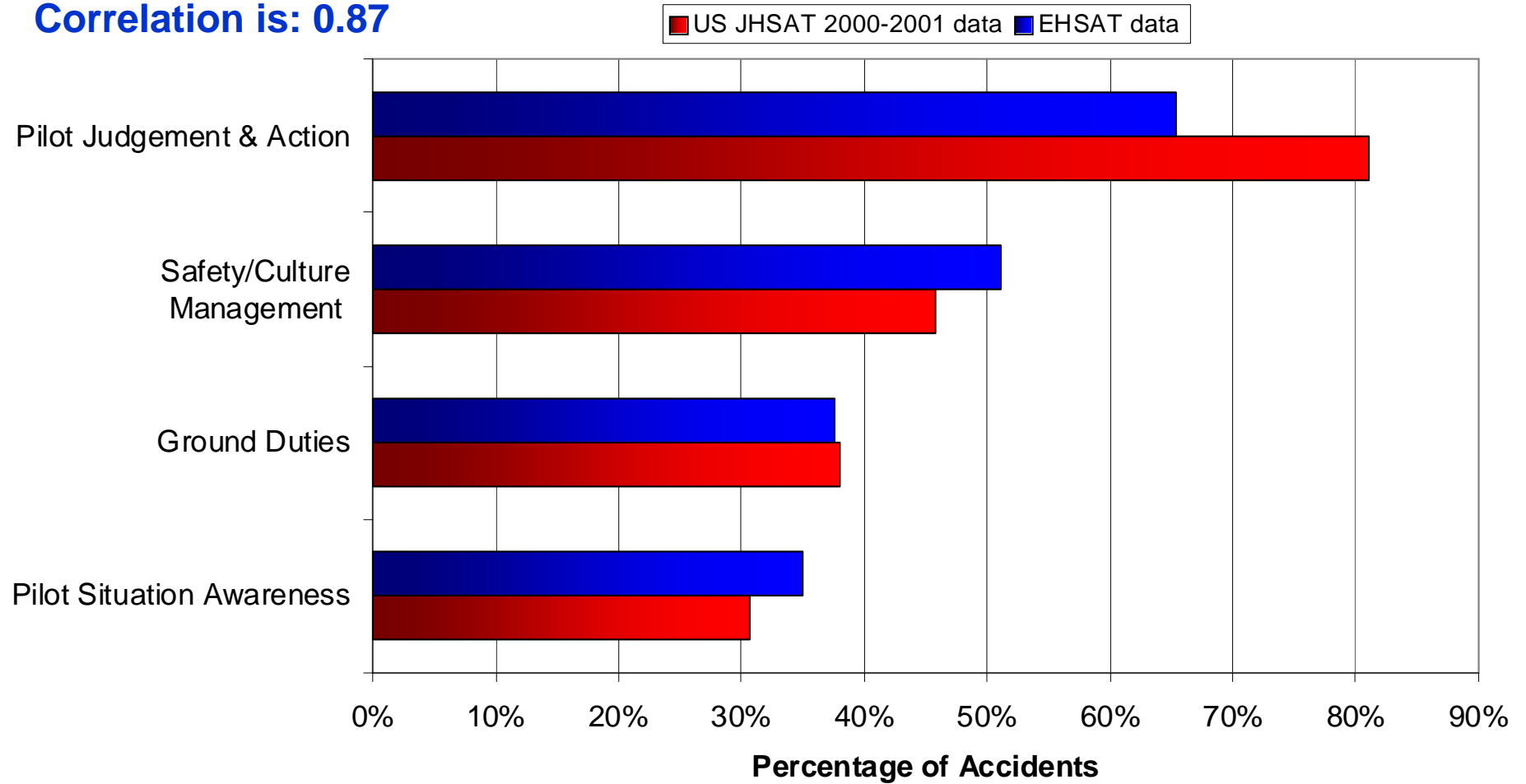
# SPS analysis results

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



## Comparison of EHSAT data with US JHSAT data SPS level 1, Top 4

**Correlation is: 0.87**



# Aerial Work – Fire Fighting

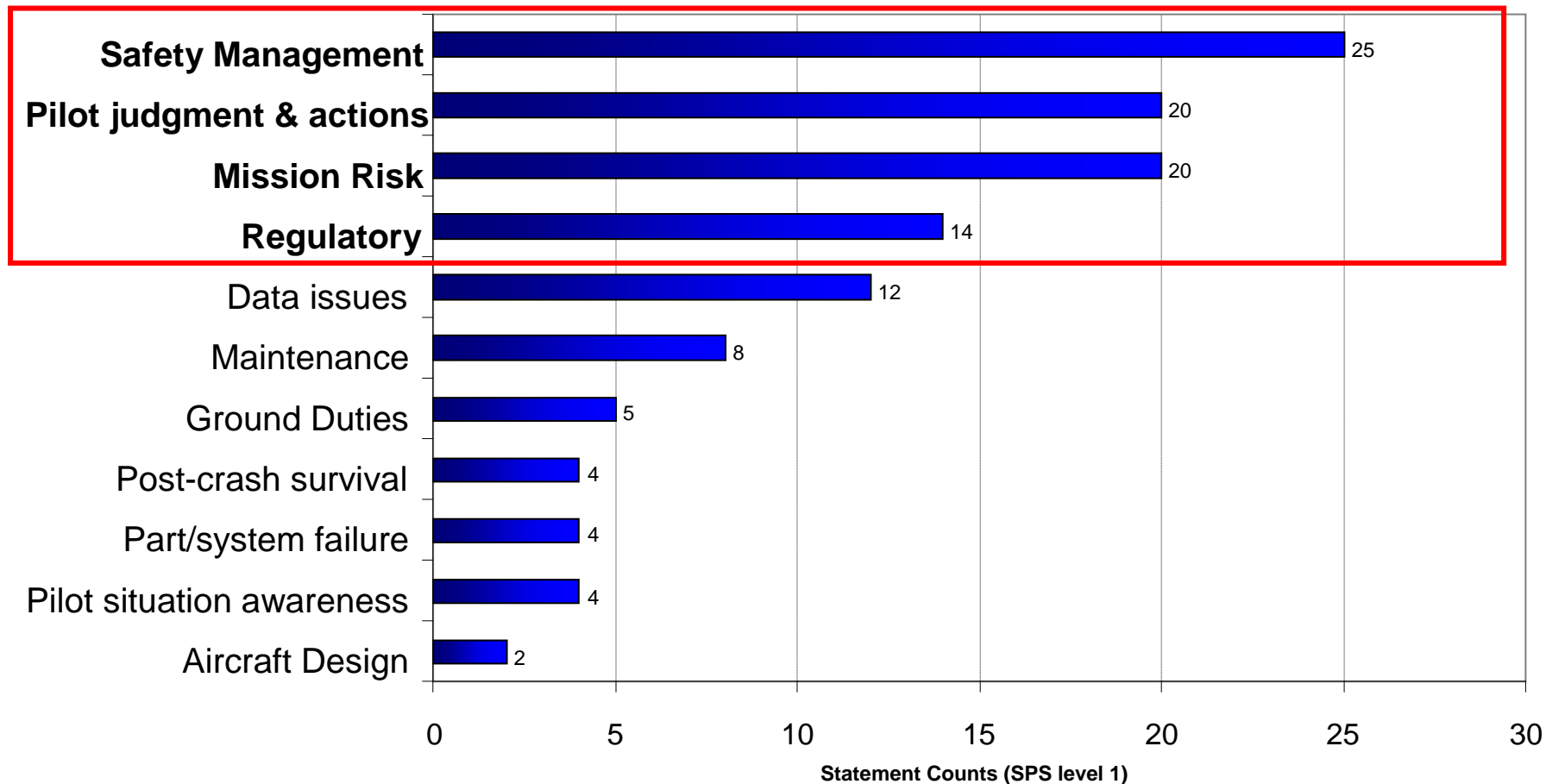
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*Focus on fire fighting accidents:*

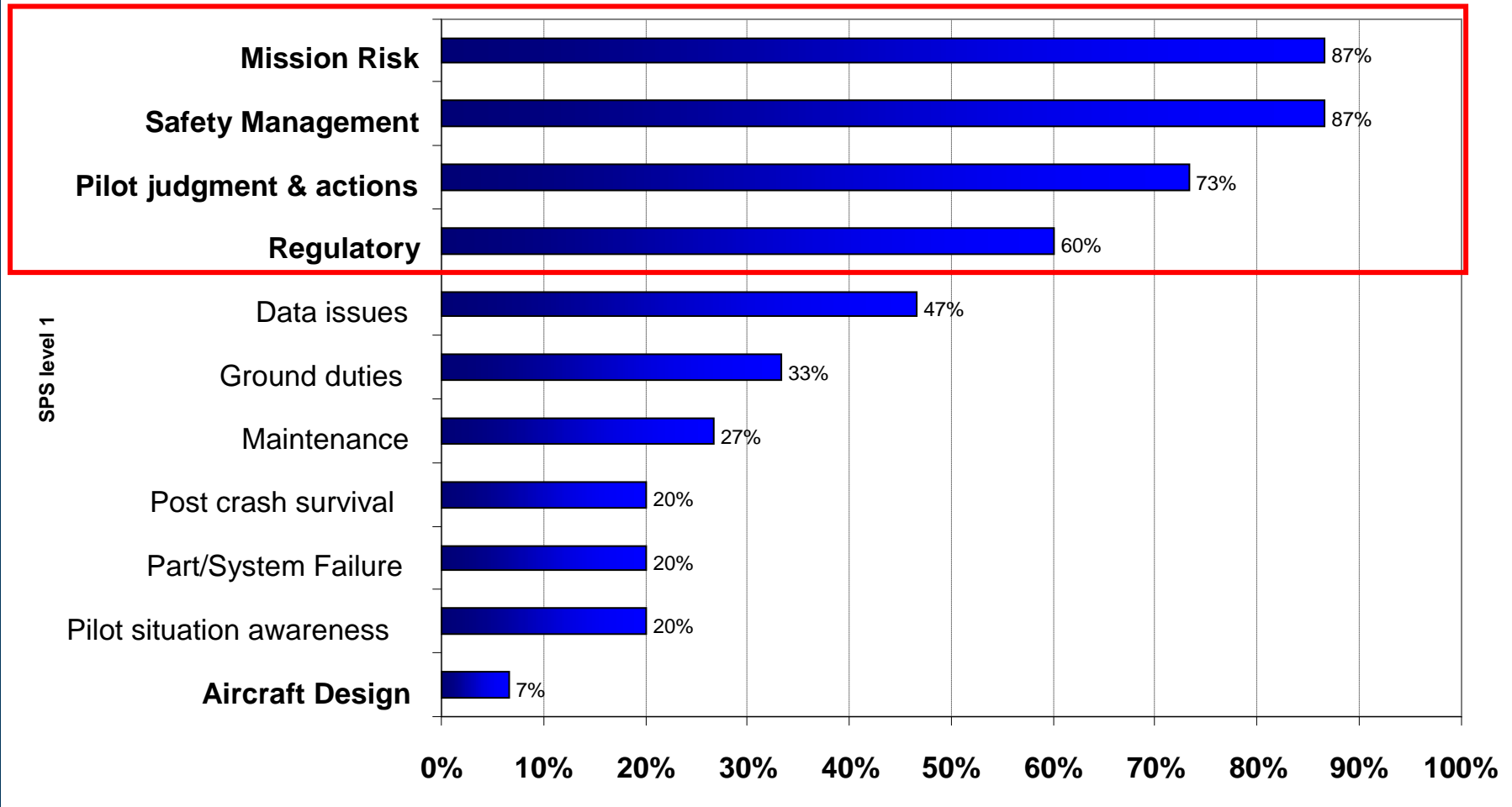
- So far 15 accidents (out of 303) in the EHSAT database:
  - ★ 13 from Spain and 2 from Italy
  - ★ 1 out of 15 is fatal accident with total 1 fatality

## SPS level 1 Statement Counts

EHSAT database, Type of Operation Aerial Work - Fire Fighting



**% of Accidents where SPS level 1 has been identified at least once**  
EHSAT Database, Type of Operation Aerial Work - Fire Fighting



# 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. He 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 were injured. **Pilot felt pressure**  
**Insufficient company guidelines**

# An example Fire Fighting scenario

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- The helicopter was operating in fire fighting mission, dropping water using a bambi bucket system.
- The pilot had already performed 8 runs.
- After the 9<sup>th</sup> water drop and when the helicopter was in a turn, the tail rotor hit a wire.
- The pilot performed an emergency landing. The helicopter was substantially damaged and the pilot received serious injuries.

# An example Fire Fighting scenario

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- The helicopter was operating in fire fighting mission, dropping water using a bambi bucket system.

**Repetitive tasks in short time**

- The pilot had already performed 8 runs.

- After the 9<sup>th</sup> water drop and when the helicopter was in a turn, the tail rotor hit a wire.

**Restricted visibility**

**Pressure**

- The pilot performed an emergency landing. The helicopter sustained substantial damage and the pilot received minor injuries.

**Distracted**

**Unsuitable area for emergency landing**

# SPS and HFACS 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 Misprioritization

Risk Assessment – During Operation

Excessive Motivation to succeed

Channelized attention

Crew/team composition

Organisational process



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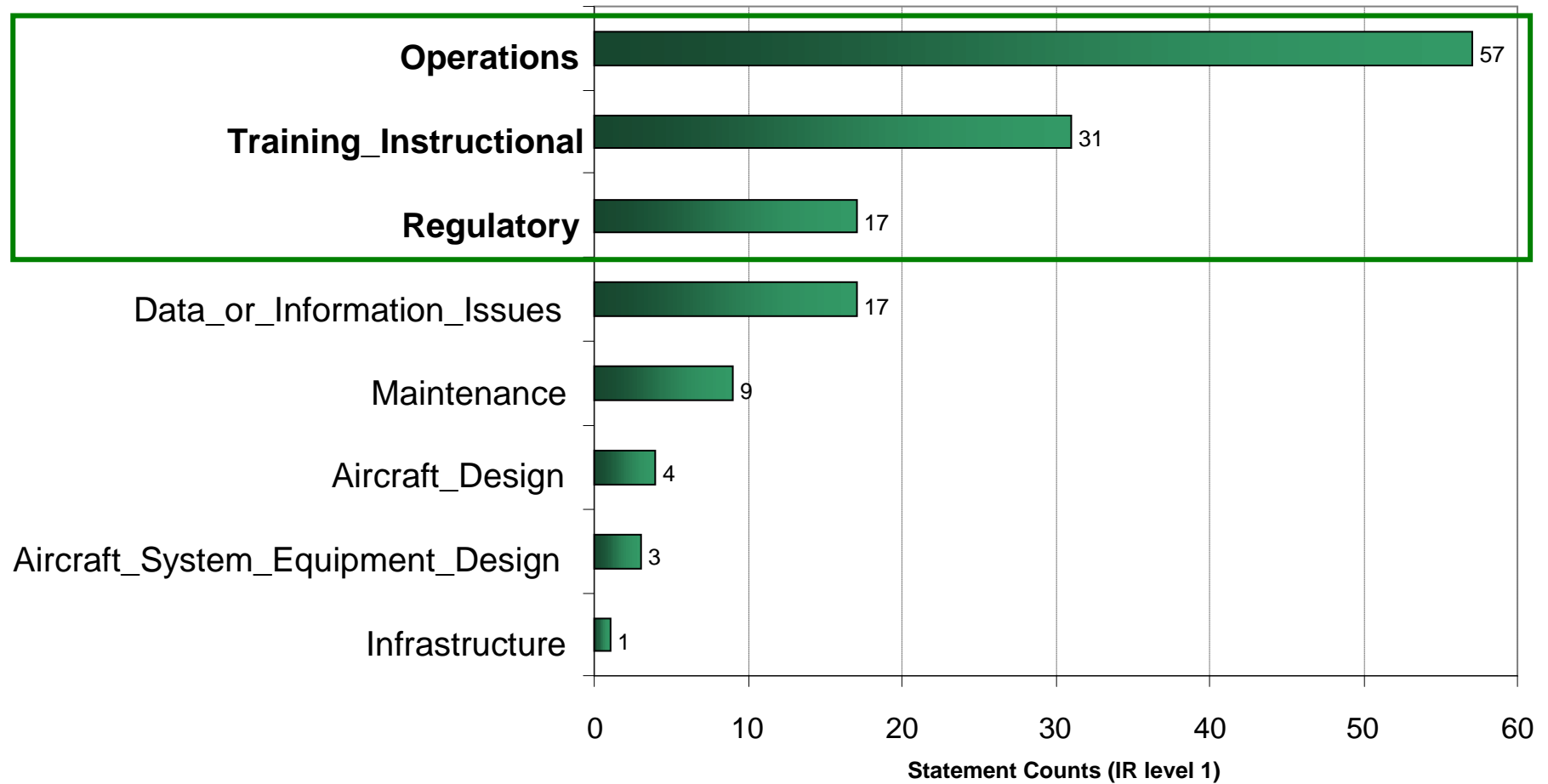
## Example of areas identified for IRs for fire fighting (not prioritised)

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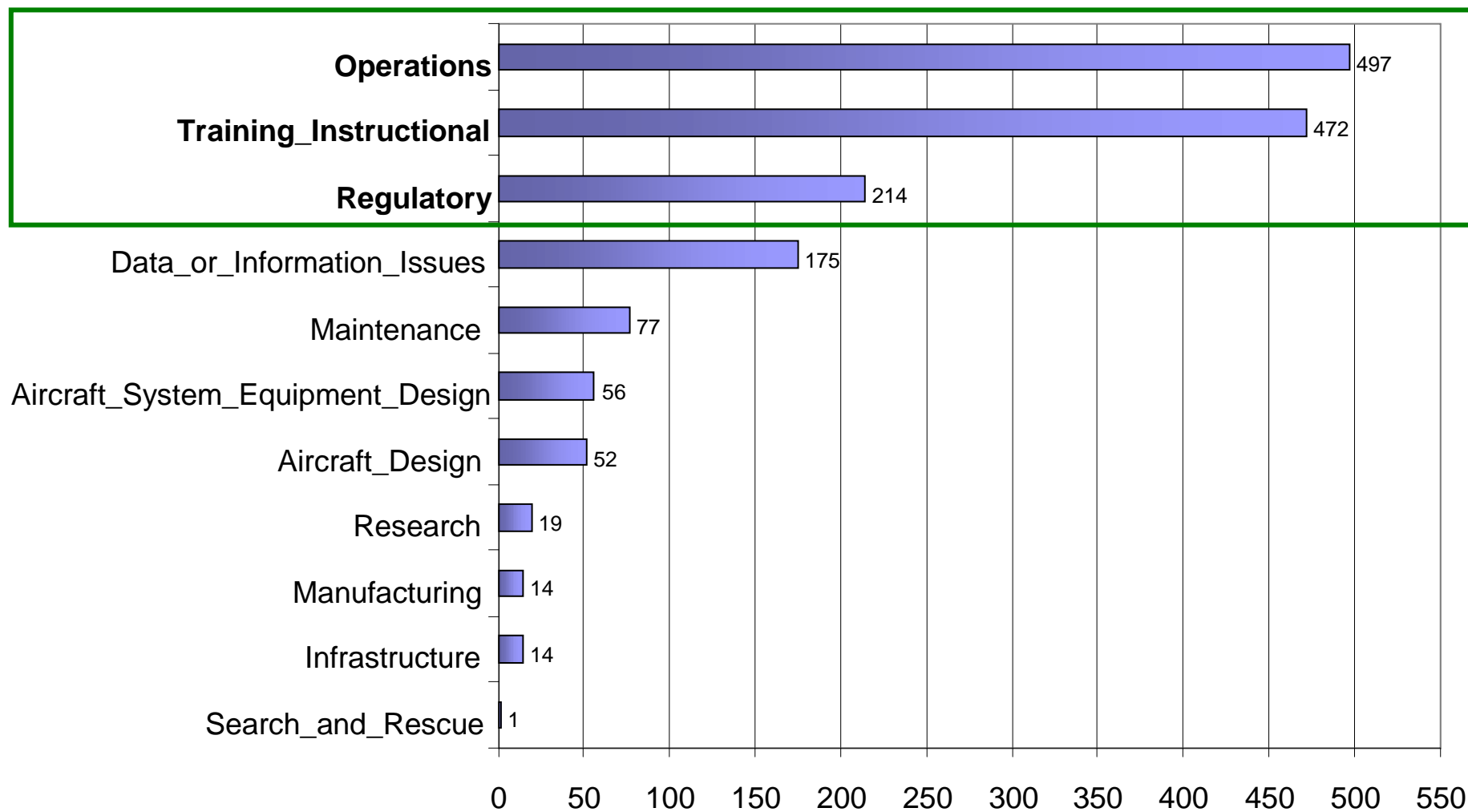
- Best practices for landing site selection
- Promotion of safety culture
- Risk assessment training
- Improvement of flight procedure training and mission specific training
- Certification of surplus aircraft
- Personal safety equipment such as helmets
- Compliance with SOP
- Investigation: Data/information issues

## Intervention Recommendations level 1 Statement Counts

EHSAT database, Type of Operation Aerial Work - Fire Fighting



## Intervention Recommendations (Level 1) for all operations – All accidents



# Specialist Teams on SMS & Operations and on Training

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- Intervention recommendations were aggregated and consolidated by the EHSIT
- And handed over to Specialist Teams tasked to develop safety enhancements



# IHST Safety Toolboxes

Login || Register || Wednesday,




# IHST

International Helicopter Safety Team

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Enter Title

- In parallel, IHST US has published Safety Toolboxes on:
  - ✦ SMS
  - ✦ Helicopter Flight Data Monitoring
  - ✦ Risk Assessment



➤ Freely accessible on: [www.ihst.org](http://www.ihst.org)



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# Concluding remarks

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- Fire Fighting accidents are part of the accidents set
  - ✦ Accident scenarios help understanding the problems
  - ✦ At high level, same Intervention Recommendation types as for other operations
  - ✦ At lower level, Intervention Recommendations are specific
- Work continues within EHSIT and its Specialist Teams
- Continuous cooperation with IHST US
- Attention on communication with stakeholders
- To join the initiative, please contact:

[EHEST@easa.europa.eu](mailto:EHEST@easa.europa.eu)

# European Helicopter Safety Team - EHEST



*Thank you for your attention  
Questions?*

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