EHEST

Component of ESSI

European Helicopter Safety Team

Analysis & Implementation - the European Experience

IHSS 2009

John Vincent, EASA
Marieke van Hijum, EASA
Tony Eagles, CAA UK
John Steel, CAA Ireland

Michel Masson, EASA
Martin Bernandersson, CAA Sweden

1. SETTING THE SCENE

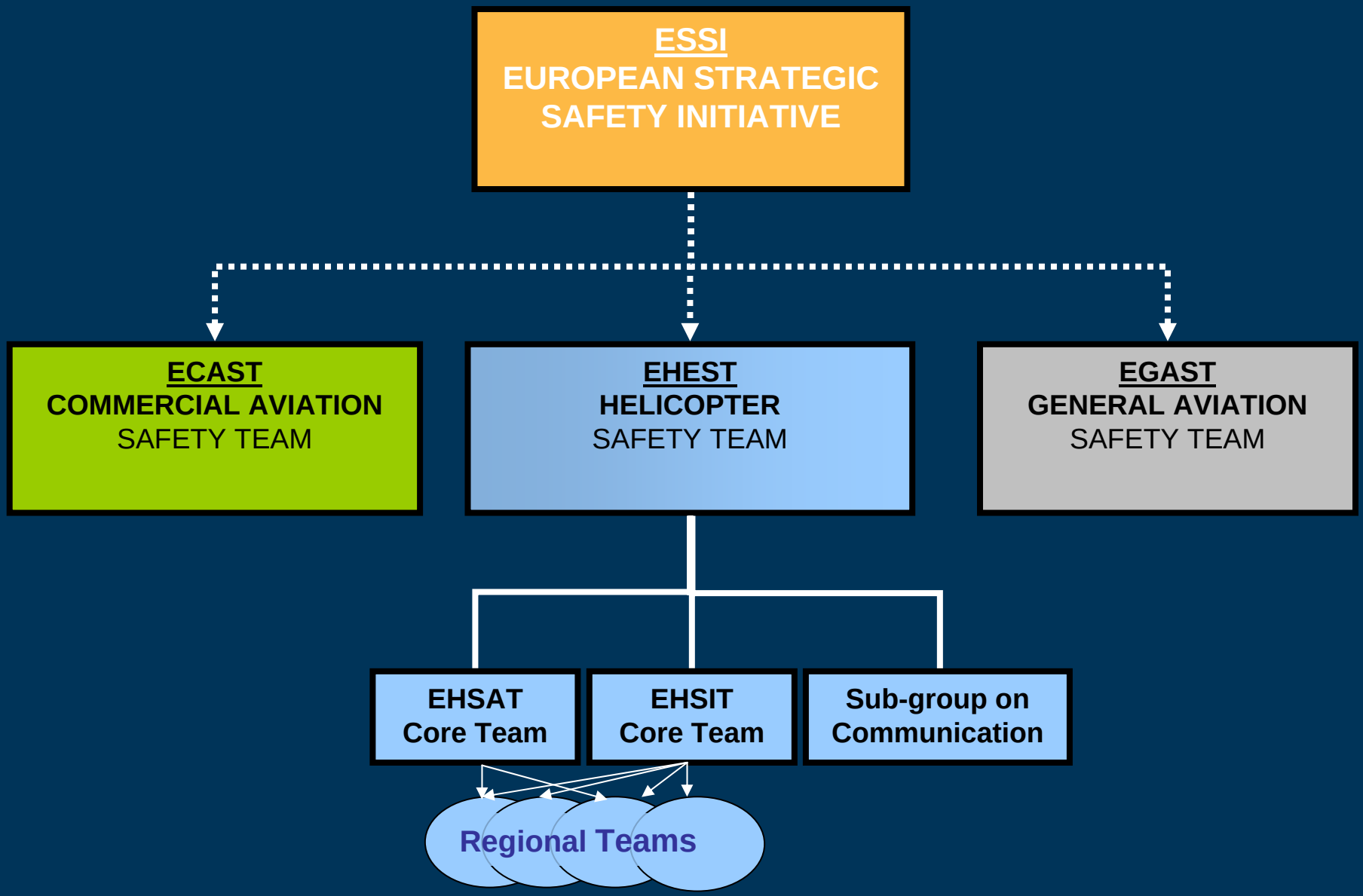
2. METHODOLOGY

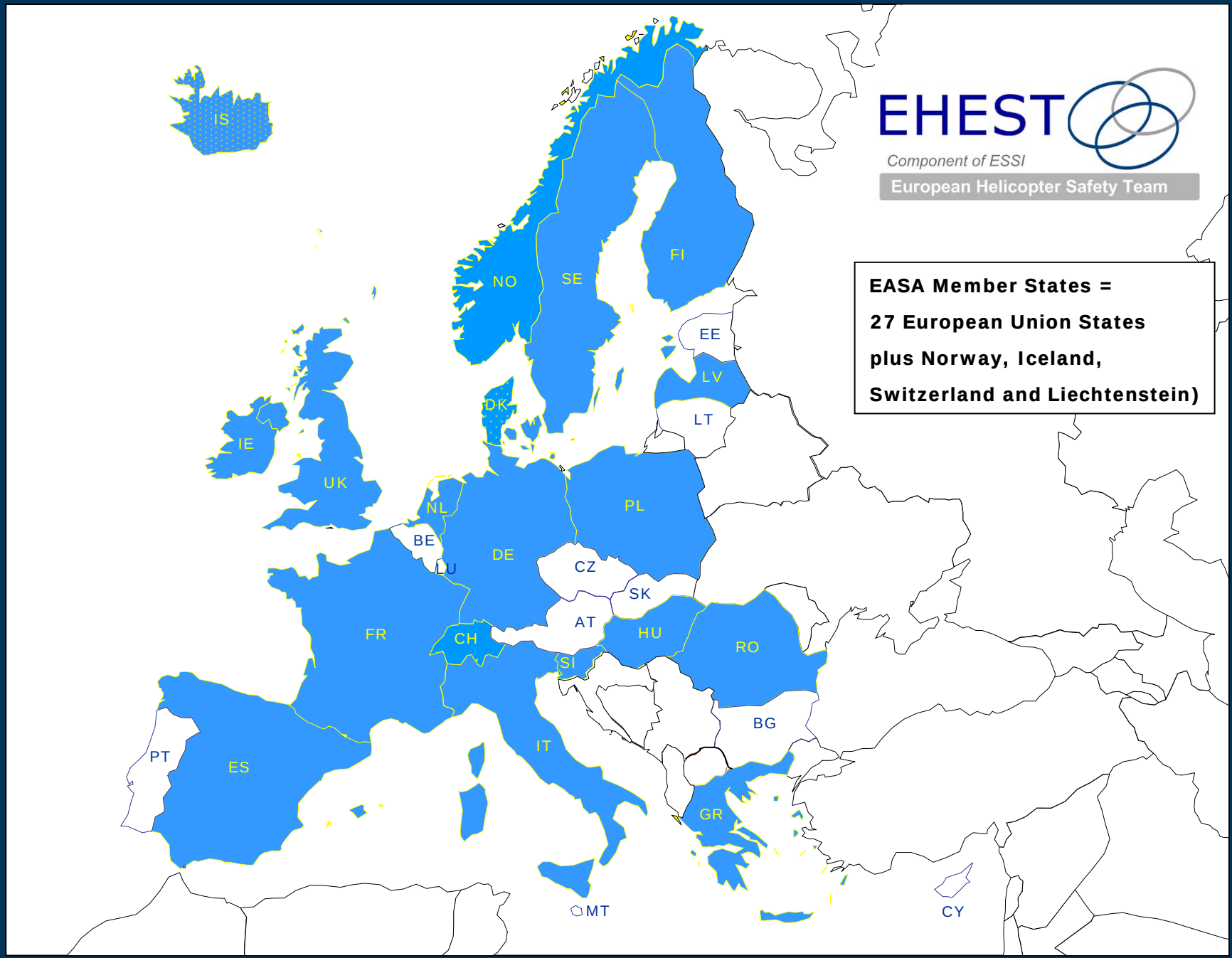
3. INTERIM RESULTS

4. CONCLUDING REMARKS

Photo Vasco Morao

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


ESSI
EUROPEAN STRATEGIC SAFETY INITIATIVE
ECAST
COMMERCIAL AVIATION
SAFETY TEAM
EHEST
HELICOPTER
SAFETY TEAM
EGAST
GENERAL AVIATION
SAFETY TEAM
EHSAT
Core Team
EHSIT
Core Team
Sub-group on
Communication
Regional Teams


EHEST
Component of ESSI
European Helicopter Safety Team
EASA Member States =
27 European Union States
plus Norway, Iceland,
Switzerland and Liechtenstein)
IS
NO
SE
FI
EE
LV
LT
DK
IE
UK
NL
BE
LU
DE
PL
CZ
SK
AT
HU
RO
FR
CH
SI
BG
PT
ES
IT
GR
MT
CY

Why regional EHSAT analysis teams?

- Maximise usage of resources:
  - working on local data, less travelling
- Relations between partners already established
- Team aware of local context
- Implementations/action plans also have to be implemented on regional level
- Languages used in accident investigation reports

1. SETTING THE SCENE

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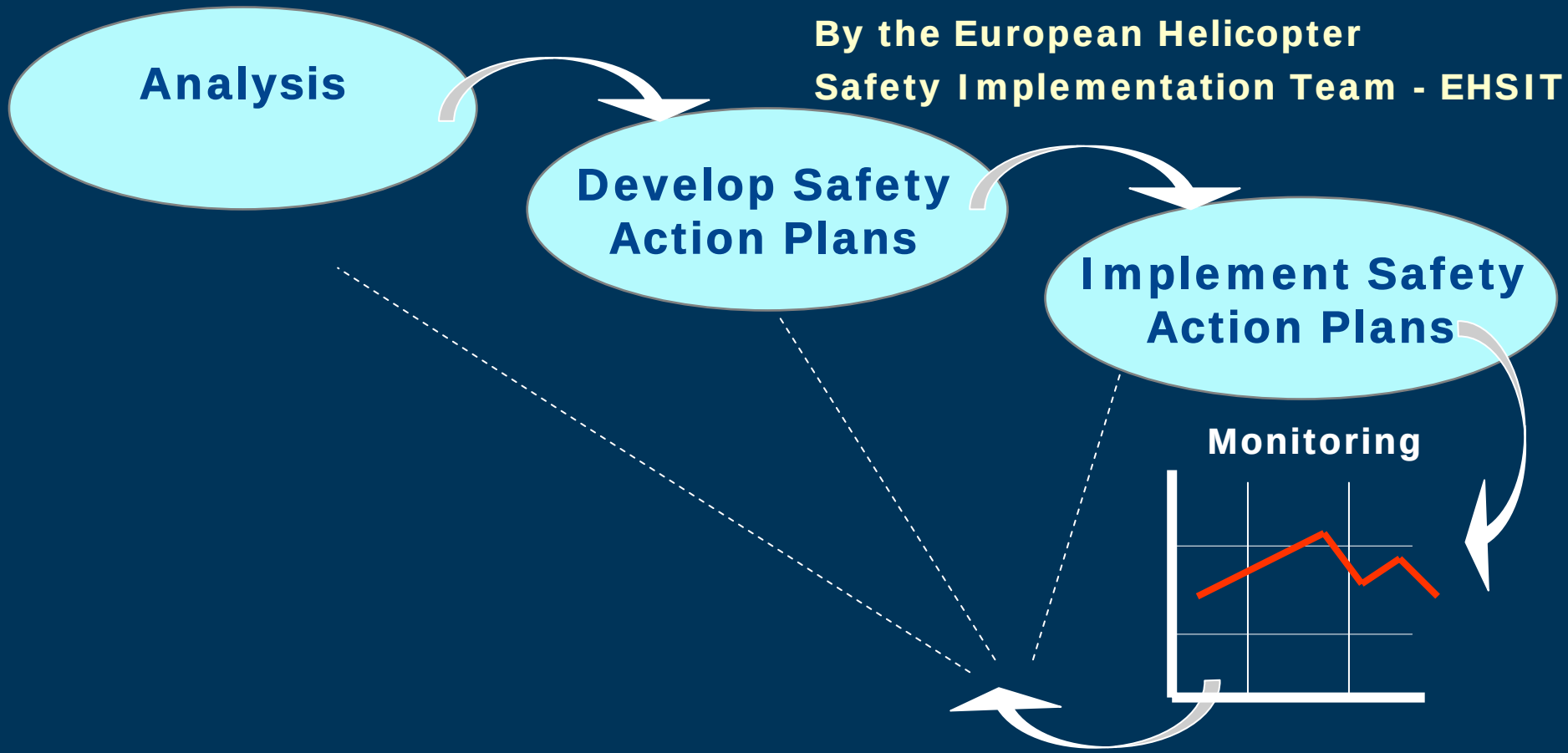
Photo Eurocopter

General Process

By the European Helicopter Safety Analysis Team - EHSAT

By the European Helicopter Safety Implementation Team - EHSIT



Scope of analysis

- Helicopter Accidents (definition ICAO Annex 13)
- Date of occurrence period 2000 - 2005
- State of occurrence located in Europe
- Where an Accident Investigation Board final report is available

Approach

- Data driven approach
- Maintain international compatibility
  - Reviewing accidents using a standard method adapted from IHST
  - Added specific analysis on human factors (HFACS)
- Format allows comparison with data from other regions

Analysis Methodology EHSAT

1. Collect general occurrence information

2. Describe and analyse the accident

3. Assign standard codes to factors

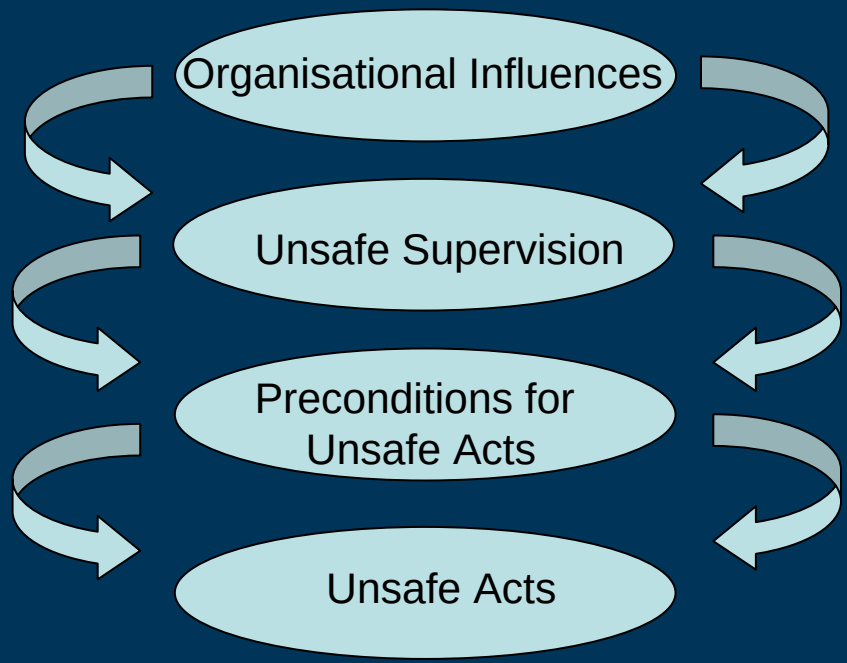
Standard Problem Statements (SPS) and

Human Factors Analysis and Classification System (HFACS)

4. Produce Intervention Recommendations (IR)

Human Factors Analysis and Classification System (HFACS)

- HFACS by Wiegmann and Shappell
  - Proven tool for analysing unsafe acts / human errors and their causes
  - Human error is the start of HFACS classification not the conclusion
  - Over 170 codes in 4 areas



http://hfacs.com/

Benefits of using HFACS

- Human Factors (HF) need to be addressed if the objective of achieving an 80% reduction in helicopter accident rates by 2016 is to be realised
- HFACS is a well documented system based on a sound theoretical framework that addresses HF in a detailed and structured manner
- HFACS gives the opportunity to address errors and violations as well as organisational aspects
- Also gives the opportunity to address maintenance issues (HFACS ME)

1. SETTING THE SCENE

2. METHODOLOGY

3. INTERIM RESULTS

General Data

SPS and HFACS Analysis

Intervention Recommendations

4. CONCLUDING REMARKS

Photo AgustaWestland

Scope of interim dataset

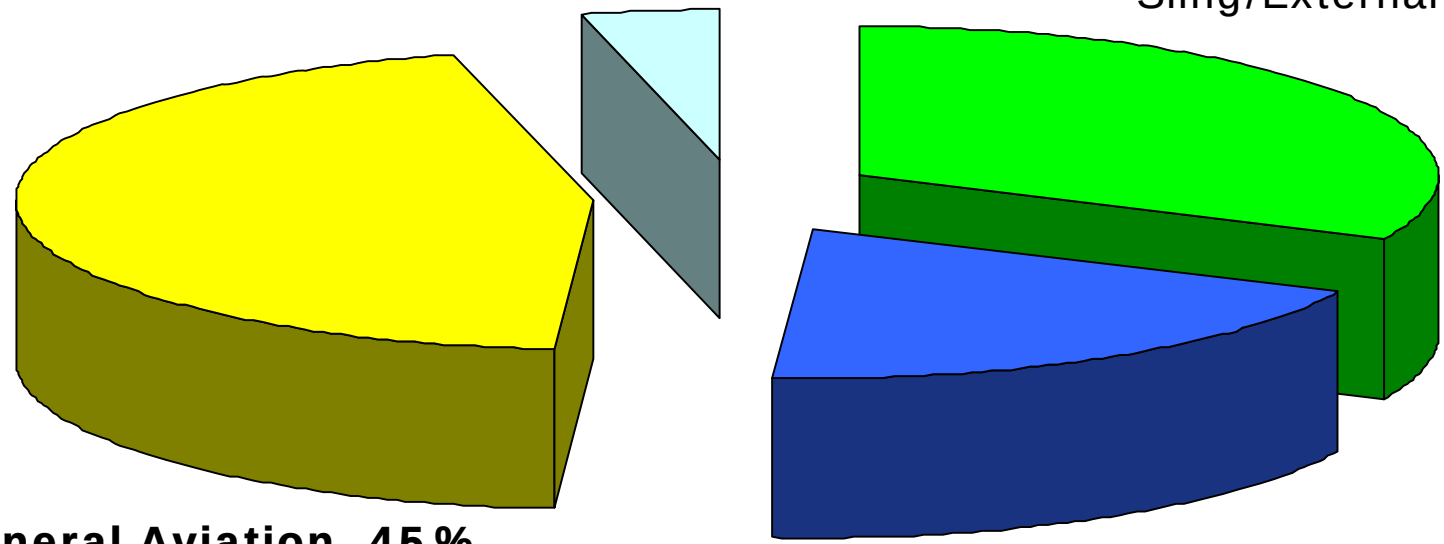
- Total of 303 accidents within timeframe 2000-2005 have been analysed (as of Aug 09)
  - Covers work from 11 Regional Teams across Europe
  - Estimated to be some 75% of the published reports available
- Standard Problem Statements
  - In total 1775 statements recorded
- HFACS
  - In total 818 factors recorded

Accident Distribution over Type of Operation

EHSAT Dataset

State Flight, 4%
(e.g. Police, Military)

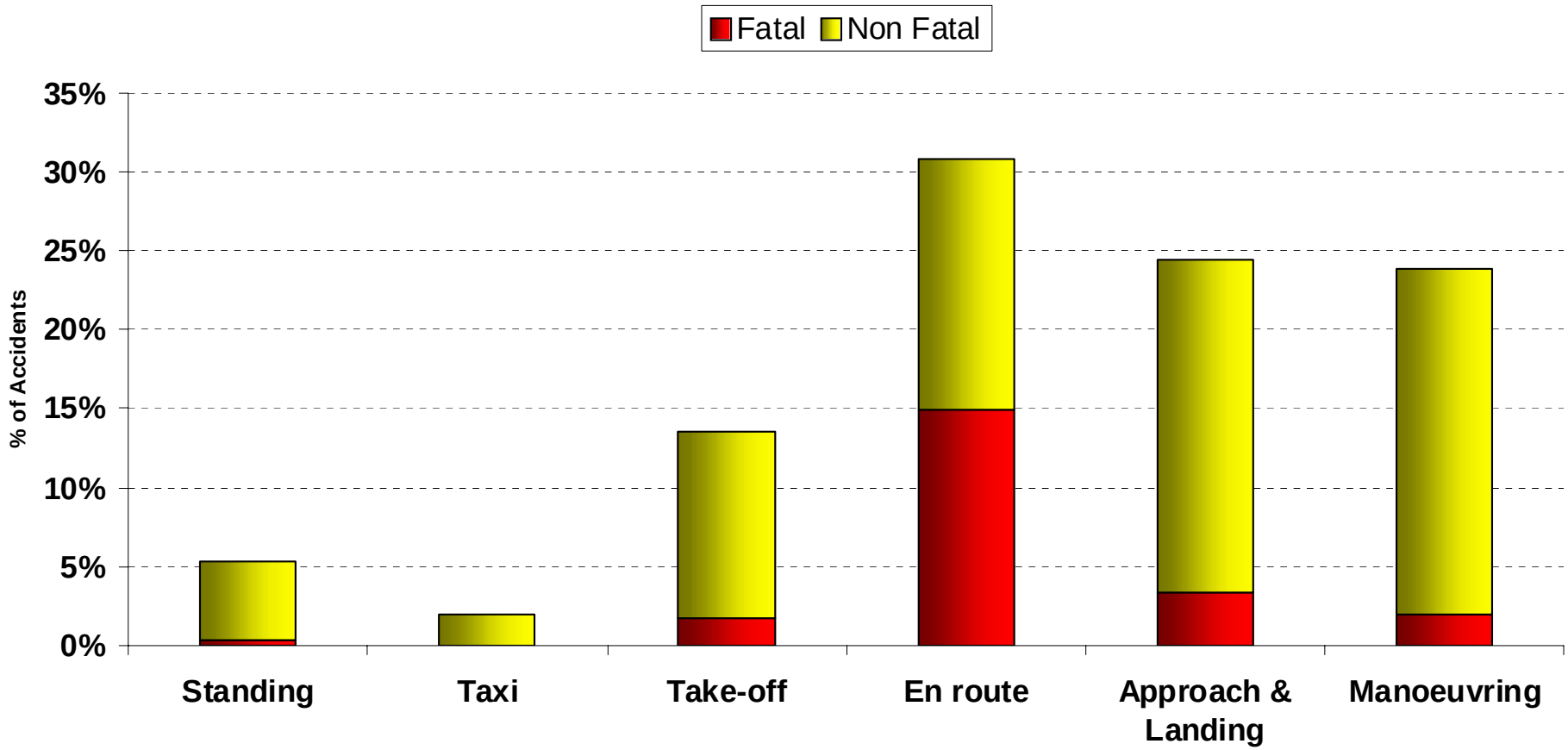
Aerial Work, 32%
(e.g. Fire Fighting, Sling/External Load)



General Aviation, 45%
(e.g. Pleasure, Training and Business flights)

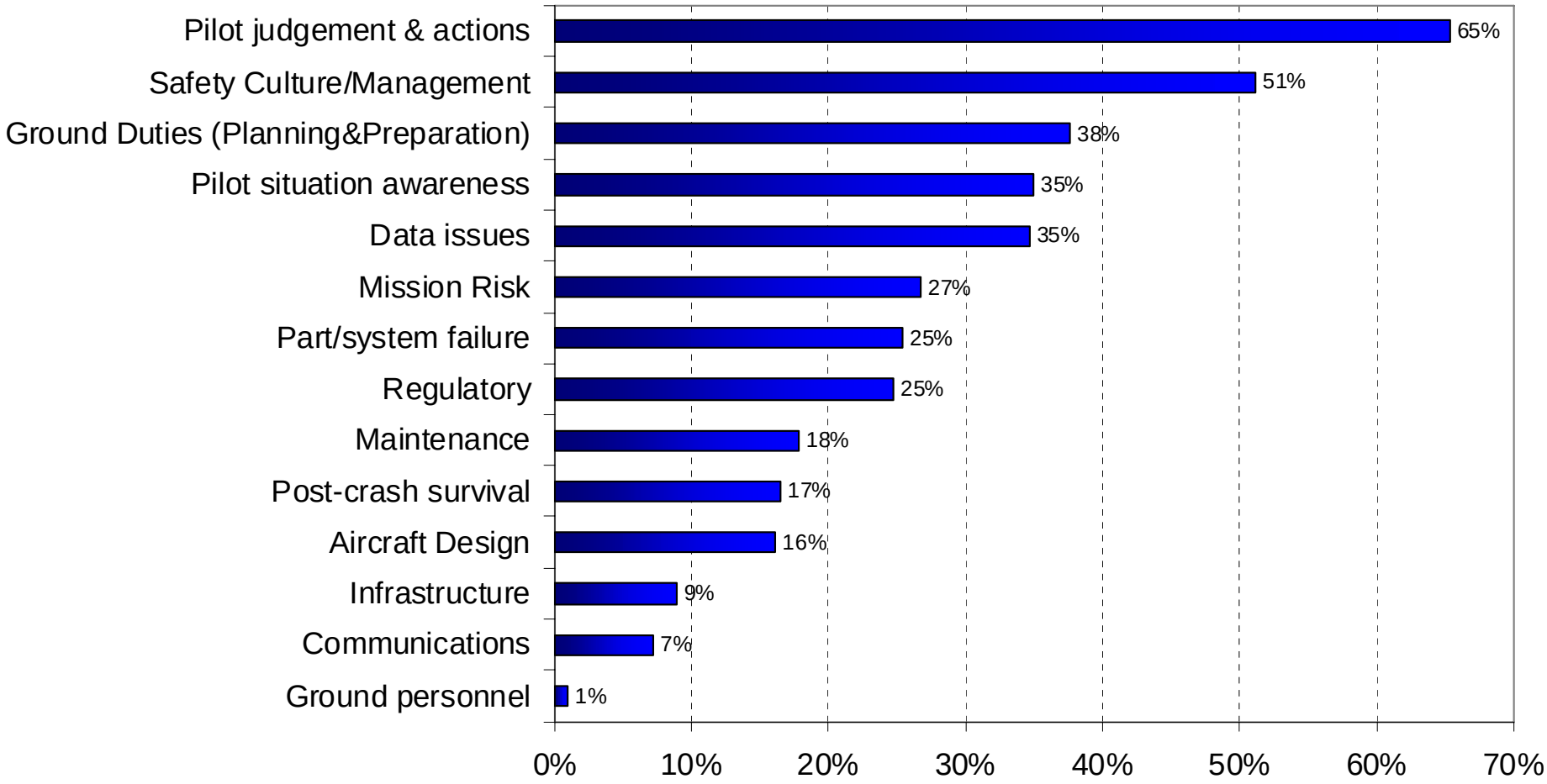
Commercial Air Transport, 19%
(e.g. Passenger, HEMS, Offshore, CAT Training, CAT Positioning)

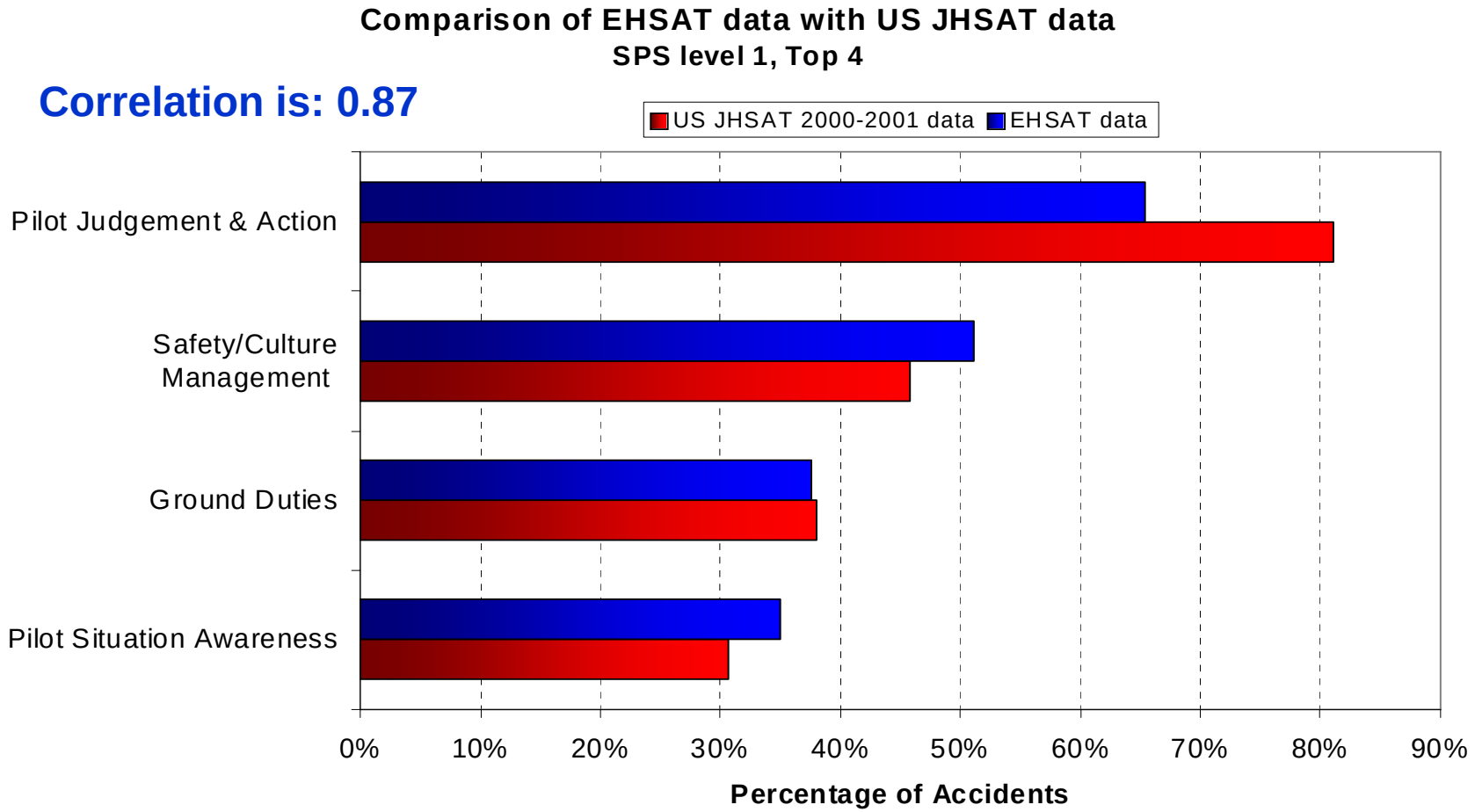
Accident Distribution over Phase of Flight
EHSAT Dataset



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

EHSAT Dataset





- High correlation with US results on SPS level 1
- Lower levels SPS show some differences

Example scenarios

- Example accident scenarios presented for
  - Commercial Air Transport
  - Aerial Work
  - General Aviation – Pleasure Flight
  - General Aviation – Training
- Scenarios illustrate the most identified SPS statements and HFACS codes for the types of operation

An example Commercial Air Transport scenario

- 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.

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Loss of Visual Reference

Inadequate decisions

Pilot felt pressure

An example Commercial Air Transport scenario

SPS	HFACS
Pilot decision making	Decision Making - Operation
Self induced pressure	Risk assessment – Operation
Failed to follow procedures	Skill-based errors
Flight profile unsafe	Whiteout/Vision restricted
Inadequate oversight	Channelized attention
Reduced visibility	Communication critical information/Planning
Selection of inappropriate landing site	Pressing
Management – Failure to enforce company SOPs	Procedural Guidelines

An example Aerial Work scenario

- A Pilot had been tasked to carry out aerial application of a field using the helicopter.
- Prior to commencing the aerial work task the pilot did not carry out an inspection of the intended operating area.
- During the course of the sortie the wind direction changed and the pilot was forced to adjust his spraying pattern.
- As result his new flight path brought him into conflict with some trees.
- While trying to manoeuver to avoid the trees the pilot struck a power line and as a result the helicopter lost control and crashed.

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Inadequate pre flight preparation

Distracted by presence of trees

Pressure to complete task

An example Aerial Work scenario

SPS	HFACS
Mission involves flying near hazards	Risk assessment - Operation
Mission requires low/slow flight	Decision making – Operation
Inadequate consideration of obstacles	Channelized att./Inattention
Pilot decision making	Misperc. of operational cond.
Diverted attention, distraction	Mission Planning
Selection of inappropriate landing site	Excessive motivation to succeed
Customer/company pressure	Fatigue
	Supervision inadequate
	Doctrine

An example General Aviation – Pleasure flight scenario

- 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.
- Shortly after the loss of radar contact the helicopter suffered an in-flight collision with terrain.

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No weather forecast obtained

No flight plan filed

No contact established with ATC

Inadvertent IMC

Limited experience

An example General Aviation – Pleasure flight scenario

SPS
Pilot inexperienced
Mission planning
Pilot decision making
Inadequate standards and regulations
Wilful disregard for rules and SOPs
Inadvertent entry into IMC
Failed to recognise cues to terminate course of action

HFACS
Risk assessment – Operation
Overcontrol/Undercontrol
Procedural error
Violation – Lack of discipline
Mission planning
Overconfidence
Vision restricted by meteorological conditions
Limited total experience

An example General Aviation - Training scenario

- 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.

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Mission planning regards terrain and weather

Insufficient briefing of the student on the training plan

Student control inputs uncoordinated

The flight instructor interacted too late

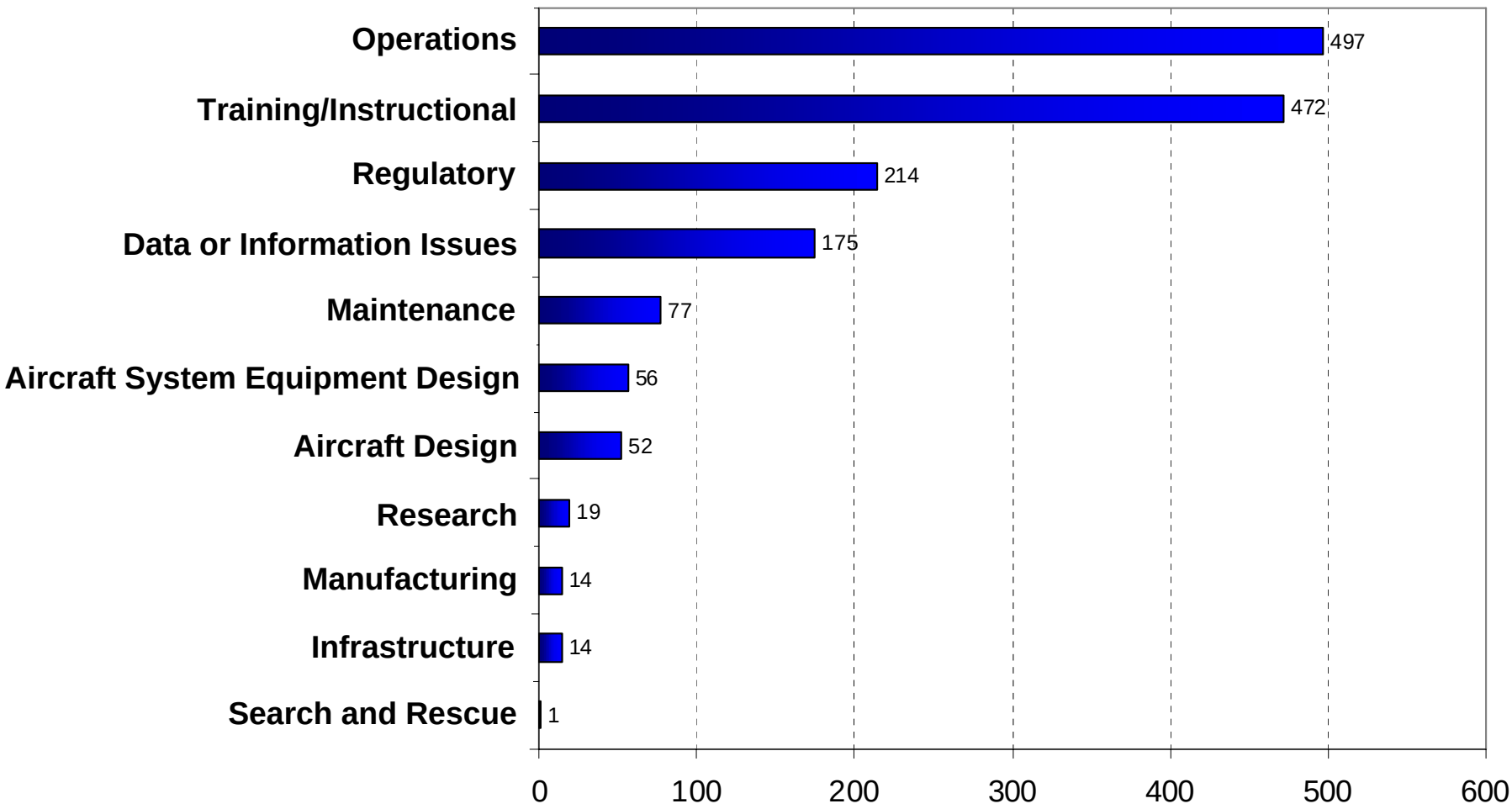
An example General Aviation - Training scenario

SPS	HFACS
Inadequate and untimely CFI action to correct student action	Risk assessment – Operation
Pilot decision making	Procedural error
Perceptual judgment errors	Overcontrol/Undercontrol
Inadequate mission planning: Weather and wind	Overconfidence
Training program management: CFI preparation and planning	Necessary action – Delayed
Inadequate landing procedures	Mission briefing
	Leadership/Supervision/ Oversight inadequate
	Training Program/Guidelines

Intervention Recommendations

- In total 11 Intervention Recommendation categories identified
- The categories help identify areas for working groups of EHSIT
- Note: some categories overlap but this suggests areas for additional focus

Total number of Intervention Recommendations (Level 1)



EHSIT data preparation

- Refinement of the Intervention Recommendations
  - Level 2 categorisation has been created
  - 1591 IRs undergoing consolidation by EHSIT Plenary
- Specialist teams on SMS/Operations and Training launched so far

Photo Martin Bernandersson

Consolidated IRs – SMS/Operations

- SMS: Should be adopted and applied by all operators
- SOPs: Should be prepared and applied for all activities
- RISK ASSESSMENT/PRE-FLIGHT PREPARATION: Emphasise the importance of Risk Assessment in mission planning

Consolidated IRs – SMS/Operations

- 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

Consolidated IRs - Training

- 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

Consolidated IRs - Training

- TRAINING PSYCHOLOGY/HUMAN FACTORS: Enhance instructor training in:
  - Monitoring students
  - Application of human factors principles
  - Instructor intervention criteria

Concluding remarks

- The top 4 identified SPS areas are:
  - Pilot judgment & actions
  - Safety culture/management
  - Ground duties/Mission preparation
  - Pilot situation awareness
- High correlation with US results on SPS level 1
- Differences can be observed for the various types of operation
- HFACS enhances the analysis of human factor issues

Concluding remarks

- Work continues within EHSIT:
  - The first two specialist teams (SMS/Operations and Training) were launched in September 2009
    - Data driven analysis
    - ECAST SMS and various safety culture material available for consideration
- Attention on communication with stakeholders
  - Private pilots, organisations, regulators…
  - EHEST Communications Sub-Group established
    - Liaising with EGAST (common challenges)

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?

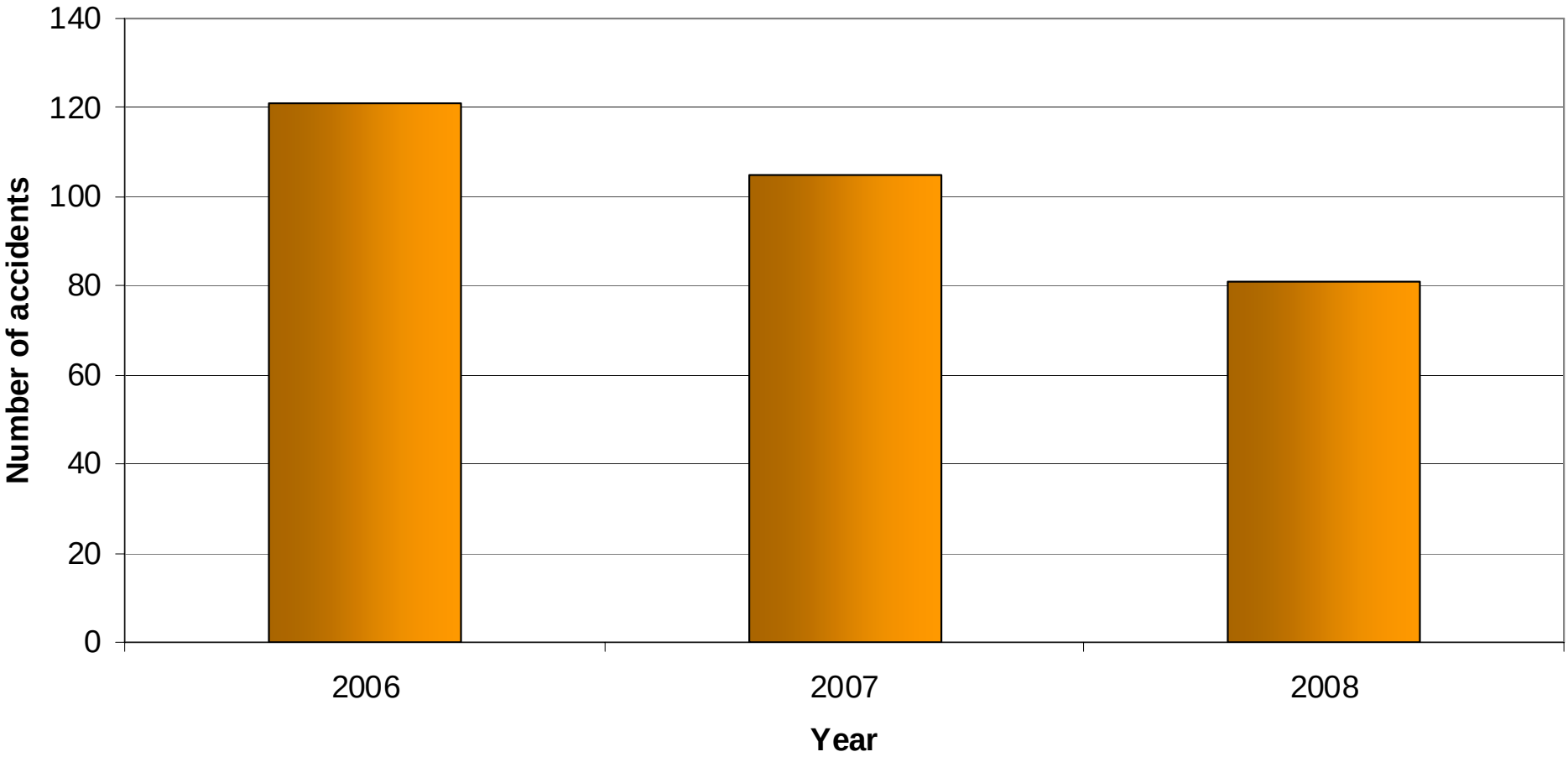
Mailbox: ehest@easa.europa.eu

Annex

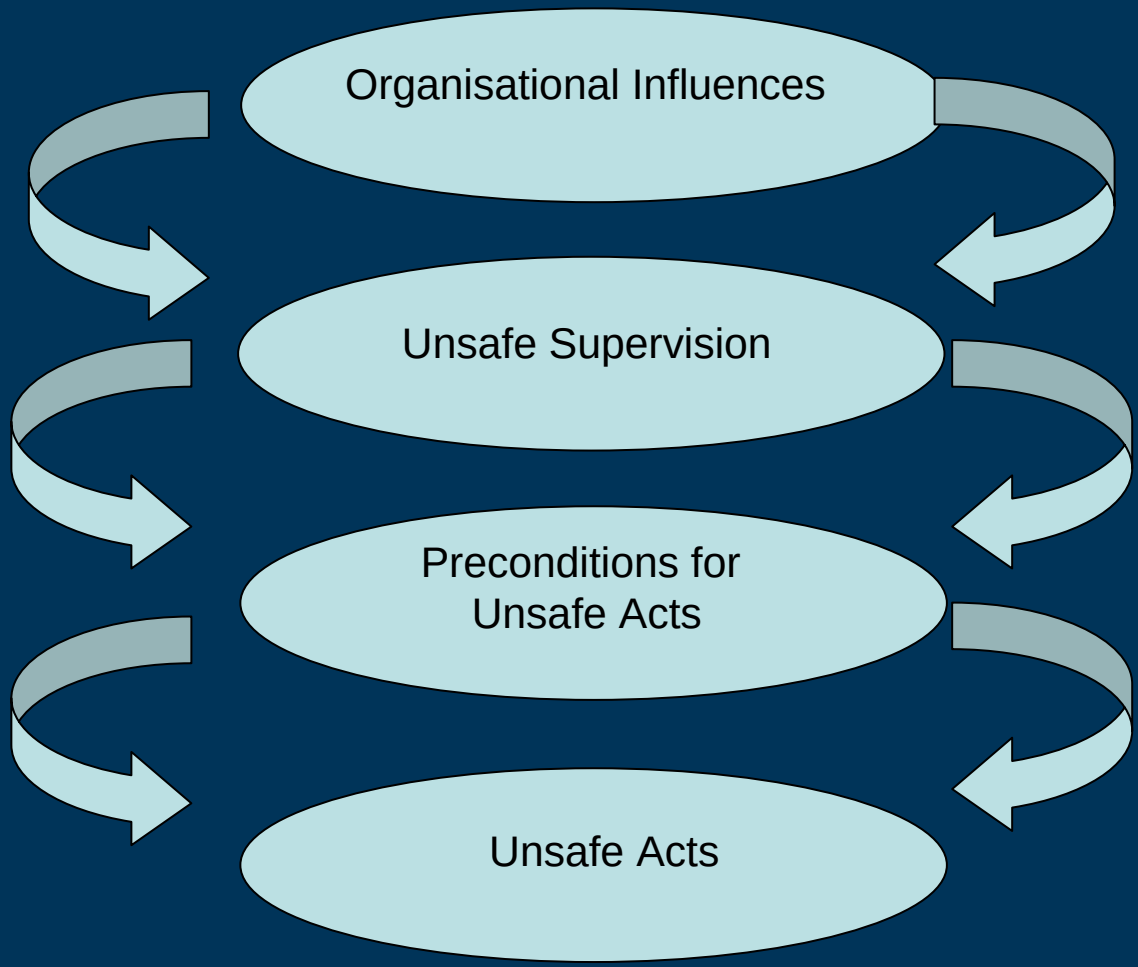
Number of Helicopter Accidents per Year

EASA MS Registered, CAT+AeW+GA

Source: EASA Annual Safety Review

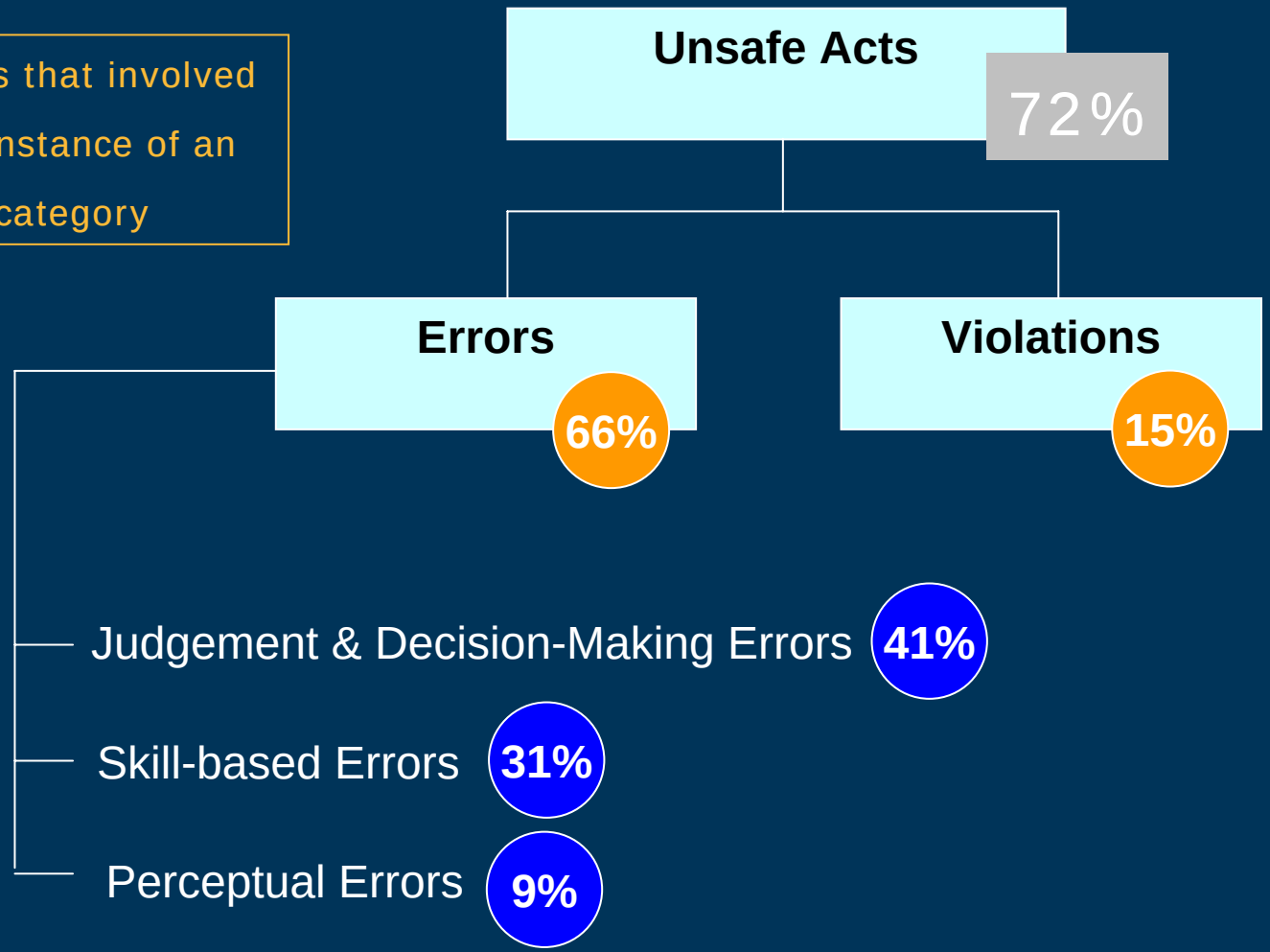


HFACS Overall Picture



HFACS model – upper levels

% of Accidents that involved at least one instance of an HFACS category



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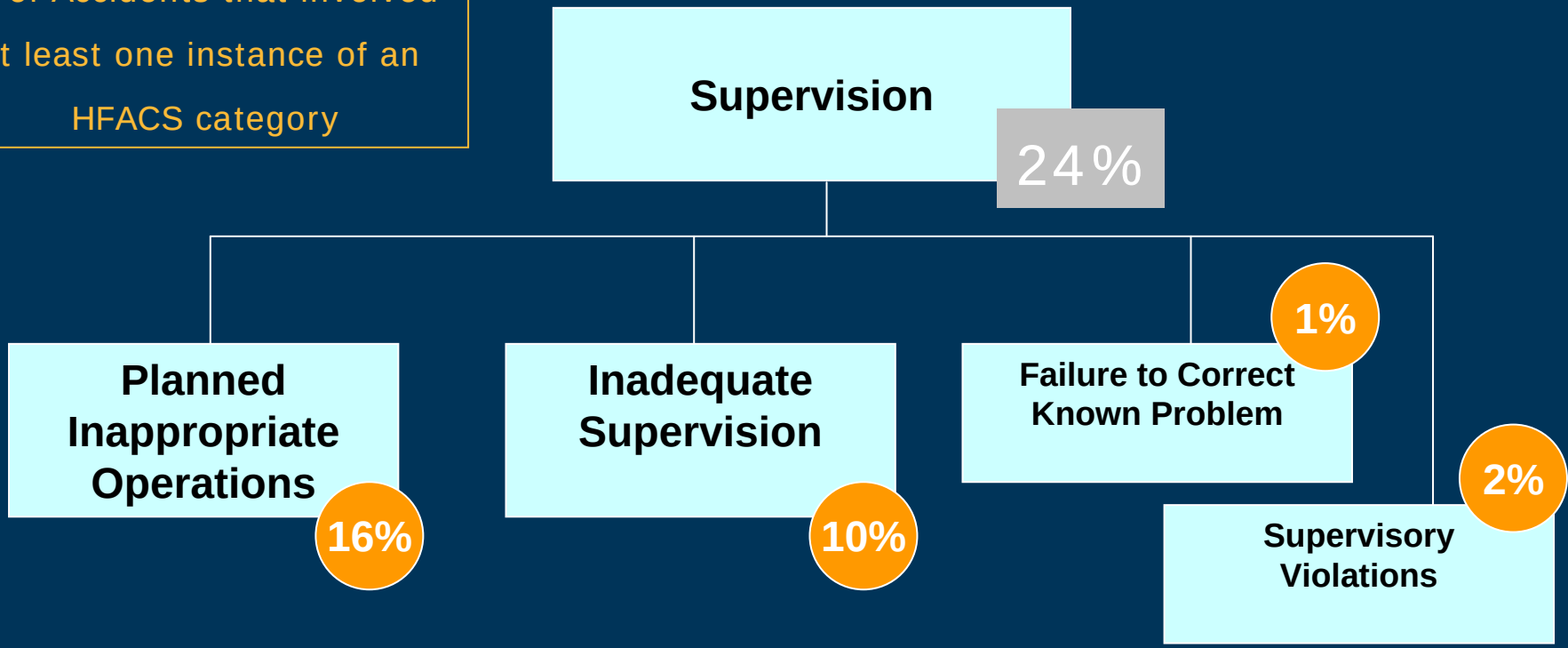

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