



# USHST Fatal Accident Reduction Efforts

## Analysis, Scoring, & Implementation Process

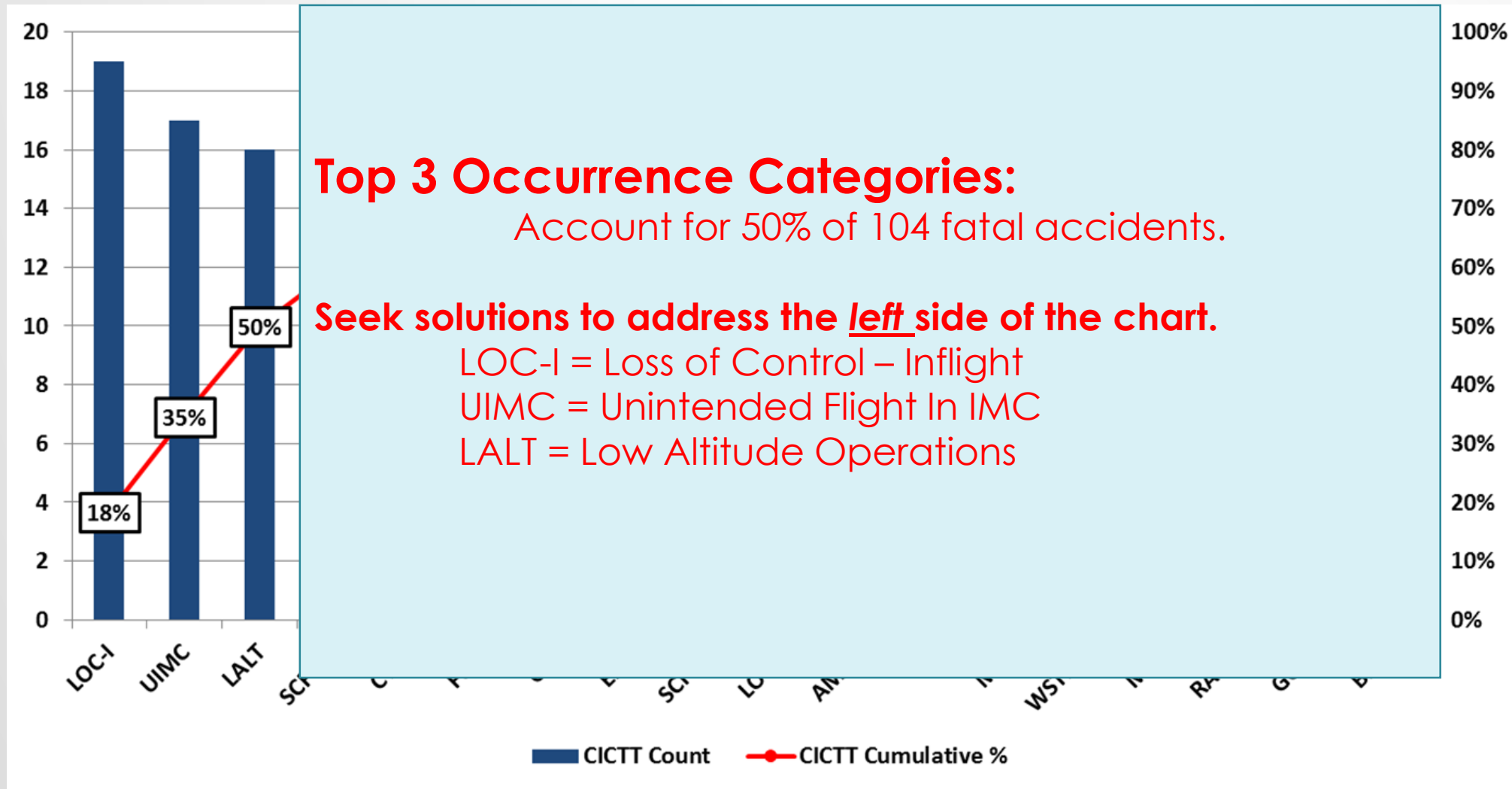


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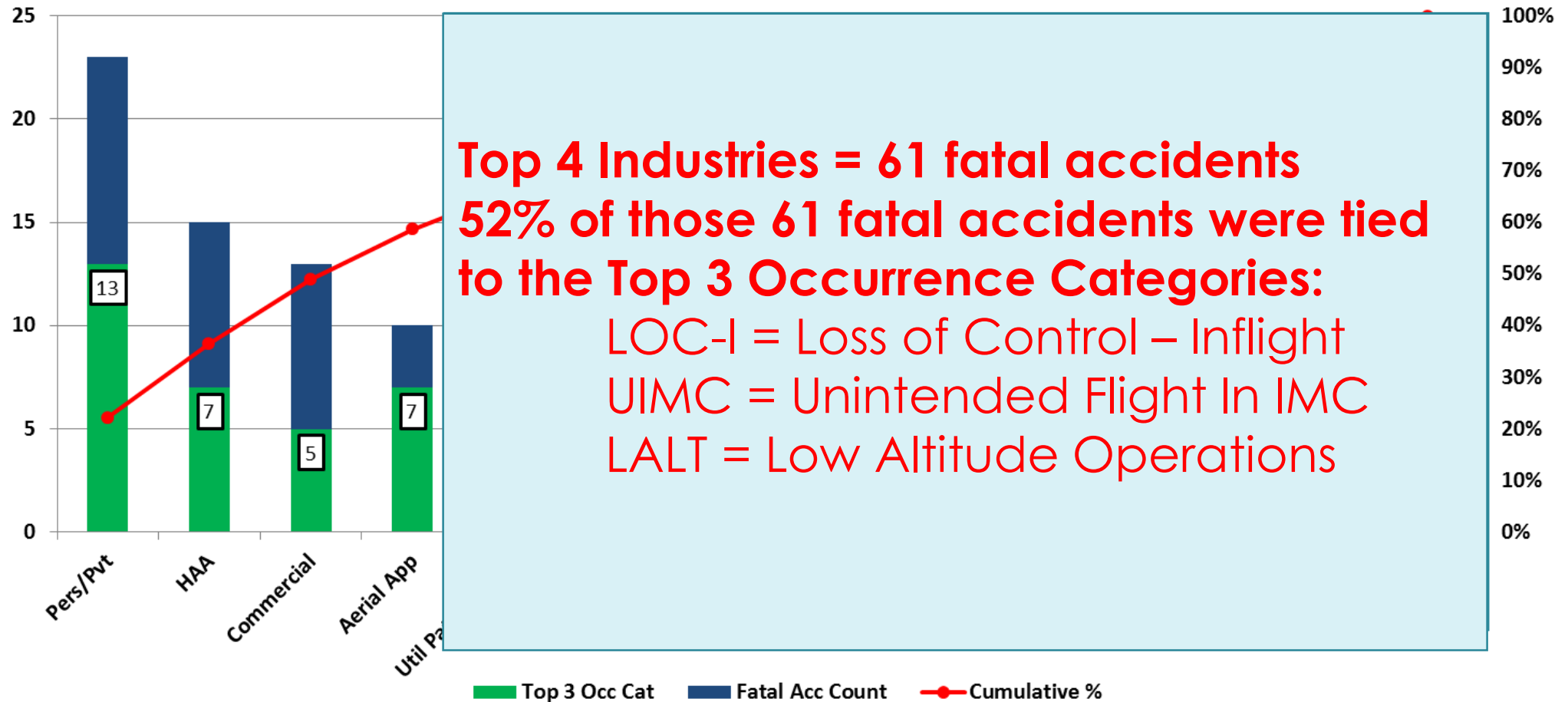
# INITIAL HIGH LEVEL ANALYSIS PROCESS

- Reviewed NTSB reports for 104 fatal accidents (2009-2013)
- Categorized each according to:
  - CAST/ICAO Common Taxonomy Team (CICCT) Occurrence Categories
    - Occurrence Categories succinctly define “what happened”
  - Industry sector

# “PRIORITY” OCCURRENCE CATEGORY BY CICTT CY 2009 – 2013 (104 FATAL ACCIDENTS)



# FATAL ACCIDENTS BY INDUSTRY CY 2009 – 2013 (104 FATAL ACCIDENTS)



# USHST WORKING GROUP FORMED

TASK: COMPLETE ANALYSIS & SCORING OF 52 FATAL ACCIDENTS IN THE LOC-I, UIMC, AND LALT CATEGORIES

## **OEMs**

- Airbus Helicopters
- Bell Helicopter
- Robinson Helicopter
- Sikorsky

## **Operators**

- Air Methods
- Bristow Academy
- Dallas Police

## **Electronics/Avionics**

- EIT

## **Industry Organizations**

- GAMA
- HAI

## **Simulation Providers**

- L3 Link Simulation and Training

## **Academia/Research**

- Embry Riddle Aeronautical University
- Florida Institute of Technology
- MITRE

## **Safety Performance**

- Aerodirections

## **Government**

- U.S. Fish & Wildlife Service
- FAA
  - Aircraft Certification
  - Civil Aerospace Medical Institute (CAMI)
  - Flight Standards
  - Office of Accident Investigation & Prevention
  - Technical Center

# USHST ANALYSIS & SCORING PROCESS

## 52 LOC-I/UIMC/LALT FATAL ACCIDENTS

- **Working Group (WG) used historical proven method**
  - Same process as Commercial Aviation Safety Team (CAST) and General Aviation Joint Steering Committee (GAJSC)
- **Reviewed complete NTSB docket**
- **Established multiple Standard Problem Statements (SPSs) per fatal accident**
  - What things went wrong and contributed to the outcome?
- **For each SPS, established one (or more) Intervention Strategy (IS)**
  - How do we fix each problem?
- **WG created 117 ISs through their analysis**
- **Completed scoring to determine rank order of each IS**
  - $\text{Rank} = \text{Overall Effectiveness (OE)} * \text{Feasibility (F)}$
  - Overall Effectiveness was result of scores from 4 different variables combined in a mathematical formula
  - Feasibility was the result of average score from 6 “Feasibility” factors

# EXPLANATION OF SCORING PROCESS

- **Each SPS was scored on a scale of 0 to 6 for:**
  - **P1:** The importance of the SPS in contributing to the particular fatal accident being analyzed.
  - **A:** The applicability of the SPS in contributing to all future fatal accidents/fatalities.
- **Each Intervention was scored on a scale of 0 to 6 for:**
  - **P2:** In the “perfect” world, how effective will the Intervention be in eliminating fatal accidents/fatalities related to this SPS.
  - **C:** In the “real” world, how effective will the Intervention be in eliminating fatal accidents/fatalities related to this SPS (confidence level).
- **P1, A, P2, and C each weighed into a mathematical formula that determined overall effectiveness (OE) for each intervention.**

# EXPLANATION OF SCORING PROCESS (CONTINUED)

- **Each intervention was also scored on a scale of 1 to 3 across 6 different “Feasibility” (F) factors:**
  - Technical
  - Financial
  - Operational
  - Schedule
  - Regulatory
  - Sociological
- **Feasibility was the average from the scores of all 6 factors.**
- **Final score = OE \* F**



# PRIORITIZATION OF INTERVENTIONS

- **OE \* F: determined the final rank order of each intervention.**
- **A “Mendoza Line” was drawn and prioritized the list of interventions.**
  - Above the Mendoza Line: Pursued as helicopter safety enhancements (H-SEs).
  - Below the Mendoza Line: Not pursued at this time, but may be addressed later.
- **Of the 117 interventions, 25 were above the Mendoza Line.**
  - Individuals or teams volunteered to author H-SE plans.
  - Some of the H-SEs were easily combined; total number reduced from 25 to 22.

# DEVELOPMENT OF SAFETY ENHANCEMENTS

- **Safety enhancements are the detailed plans for implementing the highest priority interventions.**
  - Who? (Designate lead and supporting organizations)
  - What? (The specific step-by-step plan, including outputs)
  - When? (Implementation schedule for each output)
  - Did it work? (Implementation measurement)
- **Review process was thorough.**
  - April: Rough draft review via face to face meeting (Leesburg, VA)
  - May: Progress feedback telecons with every author
  - June: 1<sup>st</sup> Level Review (3 member team)
  - Early July: 2<sup>nd</sup> Level Review (7 member team)
  - Mid July: Submission to Steering Committee
  - Late August: Steering Committee votes finalized

# CURRENT STATUS

- **Steering Committee unanimously approved 18 of 22 H-SEs**
  - 4 of H-SEs “deferred” for add’l work
- **Staggered start dates for H-SEs**
  - Earliest began Sep 2017; Latest begins June 2018
- **Established list of “focals” for each H-SE**
  - Single point contacts for communication, accountability, and progress
- **Report of H-SE process was approved by the USHST Steering Committee and is available on the USHST website.**

# H-SEs APPROVED FOR IMPLEMENTATION

## 19A Safety Culture and Professionalism

Government and industry to develop a definition of an effective safety culture that is more applicable and relatable to the day-to-day work of frontline helicopter professionals, and promote an understanding of this application-based definition to the helicopter community.

## 22A Detection and Management of Risk Level Changes During Flight by Pilots and Nonflying Crew

Outreach: Industry to develop and promote recommended practices for pilot and nonflying crewmembers to (1) detect increased risk levels during the course of a flight, (2) effectively communicate the increased risk level to each other, and (3) make a decision on the appropriate risk mitigation.

## 28 Helicopter Final Walk Around/Security of External Cargo

Outreach: Industry and the FAA to (1) develop guidelines/recommended practices for helicopter preflight inspection, final walk around, and postflight inspection and (2) to promote the guidelines/recommended practices to the training community and general pilot community.

## 30 Develop/Publish ACS Rotorcraft- Helicopter Series

Policy: FAA, with support from industry, to develop and publish the new Airman Certification System (ACS) Rotorcraft-Helicopter series to replace the current Practical Test Standards (PTS) for internal and external industry stakeholders for airman certification.

# H-SEs APPROVED FOR IMPLEMENTATION

**37 Add Progressive Approach to Training Autorotations to Helicopter Flying Handbook**

FAA to amend Helicopter Flying Handbook (FAA-H-8083-21A) to incorporate progressive approach to training autorotations.

**70 Stability Augmentation System (SAS) / Autopilot**

Technology/Equipment: Industry and FAA to encourage development and installation of a stability augmentation system (SAS) and/or simple autopilot in light helicopters.

**75 Technology to Prevent Unintended Loss of Engine Power**

Technology/Equipment: Industry and FAA to encourage development and installation of Full Authority Idle Protection devices to prevent unintended loss of engine power.

**81 Improve Simulator Modeling for Outside-the-Envelope Flight Conditions**

Technology/Equipment: FAA and industry to provide recommendations for improving simulator mathematical physics models for level A-D Full Flight Simulators (FFSs), basic and advanced Aviation Training Devices (ATDs), and Level 4-7 Flight Training Devices (FTD) for outside-the-envelope flight conditions.

# H-SEs APPROVED FOR IMPLEMENTATION

## 82 Flight Data Monitoring

Technology/Equipment: FAA and industry promote installation and use of data recording devices (e.g., HFDM, camera recording) for purposes of: (1) detection and monitoring of aircraft and engine limitations that were exceeded, (2) collecting and preserving more data relevant to accident investigation, and (3) detecting and correcting procedural noncompliance.

## 91 Enhanced Helicopter Vision Systems

FAA and industry to research, develop, and promote the use of enhanced helicopter vision systems (EHVS) technologies (e.g. Night Vision Goggles, Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems, etc.) to assist in recognizing and preventing unplanned flight into degraded visibility conditions due to weather and to increase safety during planned flight at night.

## 115/128 Threat and Error Management for Initial and Recurrent Pilot Training

Training: FAA and industry to develop best practices for, and promote, the teaching of Threat and Error Management (TEM) as part of initial and recurrent pilot training.

## 116 Improve Make/Model Transition Training

Training: FAA and industry improve make/model transition by ensuring familiarity and understanding of new “model specific” equipment.

# H-SEs APPROVED FOR IMPLEMENTATION

**117 Competency-based Training and Assessments in Initial Pilot Training**

Training: FAA and industry to provide guidance on improved initial helicopter pilot training to competency in the following areas: (1) aircraft performance and limitations; (2) in-flight power and energy management training, to include prevention and recovery, if required, from settling with insufficient power; (3) basic maneuvers not defined in current guidance but essential to positive aircraft control; (4) threat and error management (see H-SE 115-128); (5) mission planning; (6) aircraft systems; and (7) familiarity with Pilot Operating Handbook.

**122 Recommended Practices for Standardization of Autorotation and Emergency Aircraft Handling Training**

Training: Convene team of training industry experts to develop consensus on recommended practices for standard training of the Certified Helicopter Flight Instructor on autorotations and emergency aircraft handling.

**123 Increased Simulation/Education to Develop Safe Decision Making**

Training: FAA and industry to increase the use of relevant simulation to rehearse at risk scenarios to develop safe decision making and educate.

**124 Improve Understanding of Basic Helicopter Aerodynamics**

Training: FAA and industry to review and revise materials explaining basic helicopter aerodynamics to emphasize recognition of unsafe aerodynamic situations and apply appropriate corrective actions.

# H-SEs APPROVED FOR IMPLEMENTATION

125     **Pre-flight risk assessment for student flights**

Training: FAA and industry provide recommended practices to instructors for pre-flight risk assessment of student flights.

127A     **Training for Recognition/Recovery of Spatial Disorientation**

Industry develop training for recognition of spatial disorientation and recovery to controlled flight. Industry to emphasize the use of all available resources installed on the aircraft (to include automation, such as increased use of autopilot).



# H-SEs DEFERRED FOR REWORK

<b>Utilities Patrol and Construction</b> <b>13A (UPAC) Recommended Practice Guide</b>	Outreach: Industry to promote the recommended practice guides for utility patrol operations within industry and its customers.
<b>90 Use of UAS in High Risk Environments/Operations</b>	Technology/Equipment: FAA and industry will encourage the increased use of UAS (Unmanned Aircraft Systems) in high risk environments and operations.
<b>100 Digital Copilot</b>	Technology/Equipment: Industry to leverage the existing research on digital copilot sponsored by the GAJSC to create a low cost solution for the rotorcraft community.
<b>130 Education and Simulation on Hazards of Over-The-Counter Medication</b>	FAA and industry must emphasize the hazards of pilot's flying impaired by sedating over-the-counter (OTC) medication. This should be accomplished by renewed education/awareness initiatives and use of simulation during initial and recurrent simulator training.

# CLOSING THOUGHTS

- Successful implementation will result in fewer fatalities
- Full implementation plan for each approved H-SE is published at [www.ushst.org](http://www.ushst.org).
- We are recruiting volunteers that are interested in supporting the deployment of the H-SEs. Critical Period fro USHST

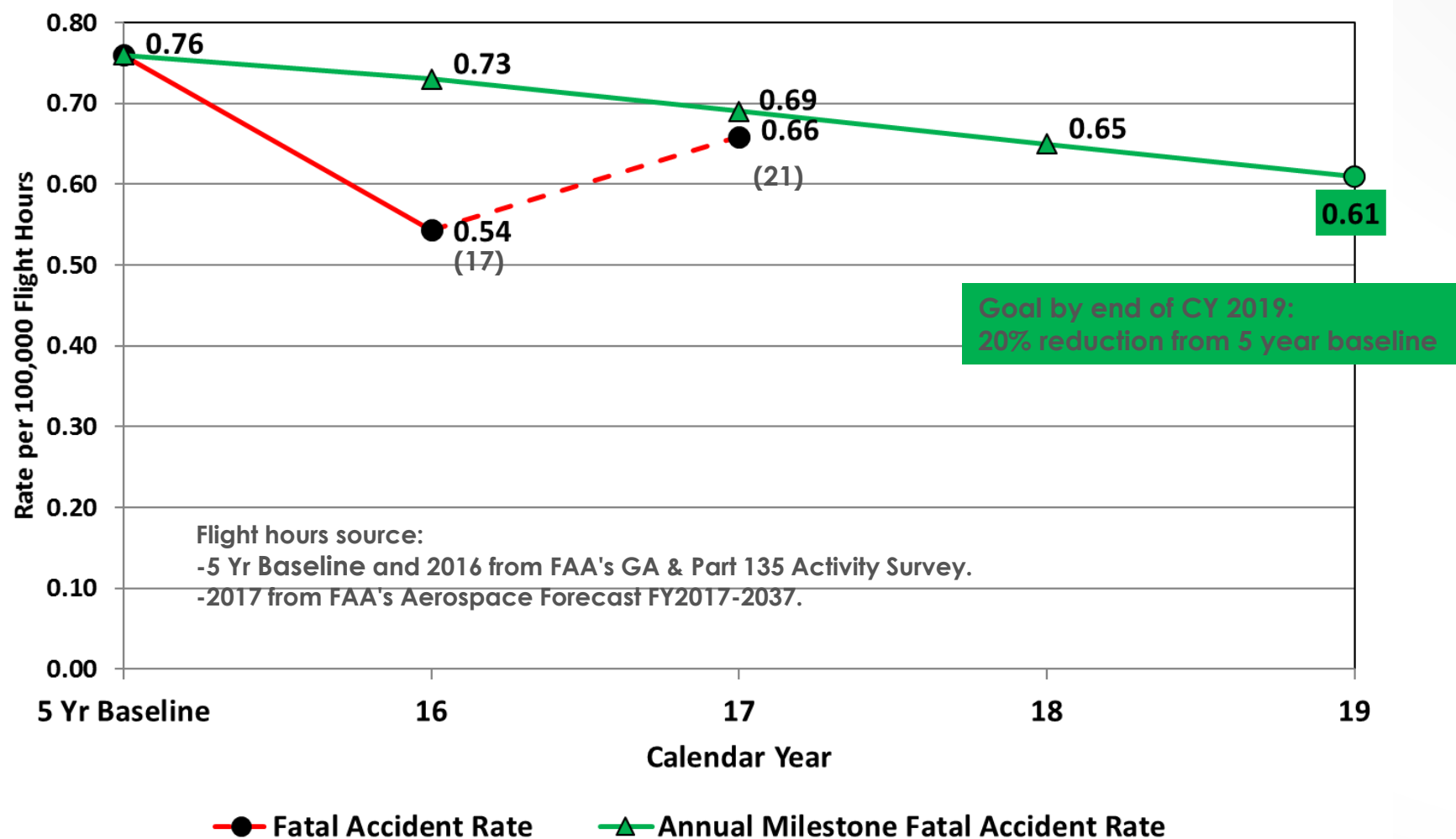


# USHST

**United States Helicopter Safety Team**  
Our Vision: A Civil Helicopter Community With Zero Accidents



## U.S. Helicopter Fatal Accident Rate (EOM November 2017)





# Federal Aviation Administration Rotorcraft Safety Conference

23 – 25 October 2018  
Dallas/Fort Worth, Texas

<http://faahelisafety.org/>



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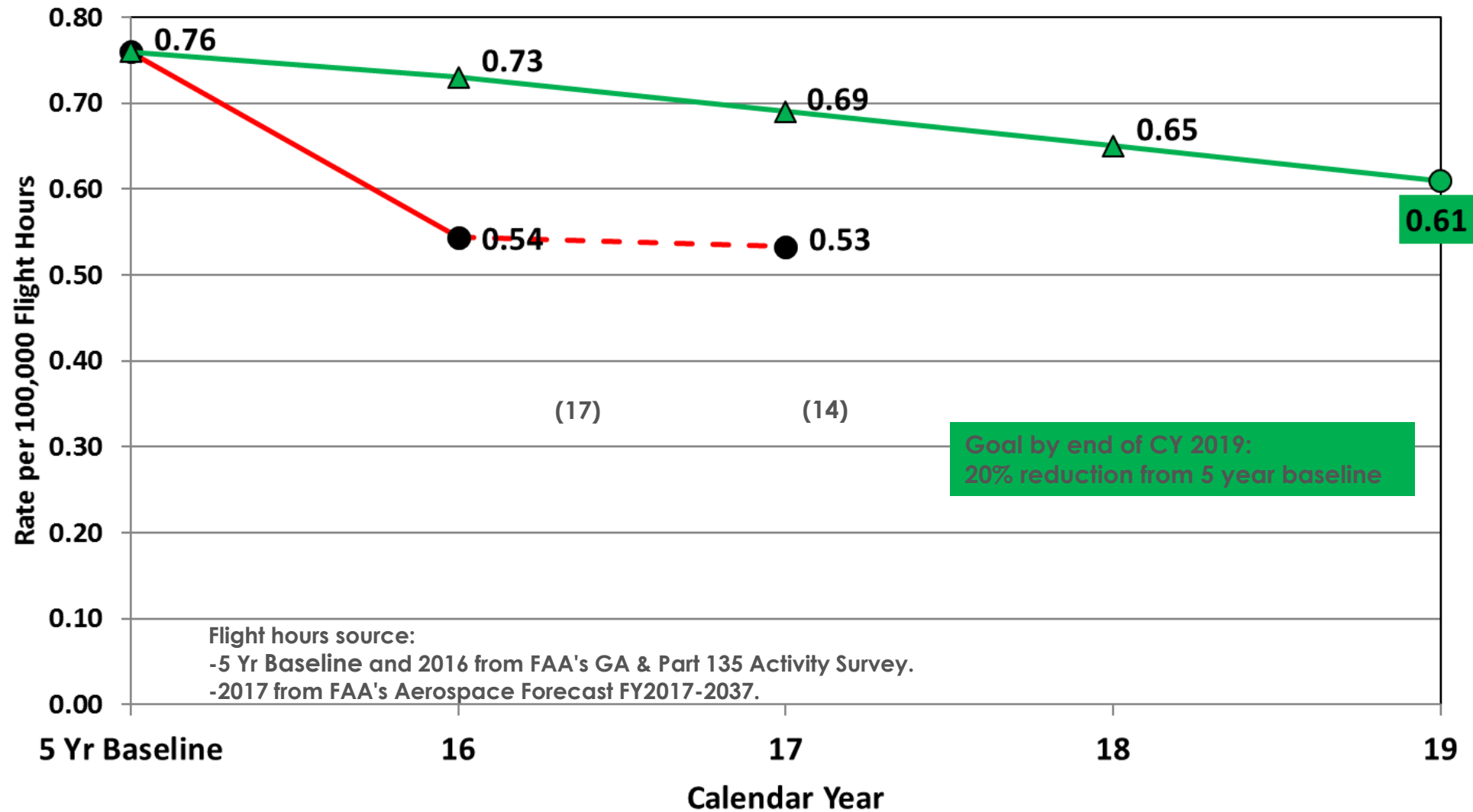
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# U.S. HELICOPTER FATAL ACCIDENT RATE

(YTD 30 SEPTEMBER 2017)



● Fatal Accident Rate

▲ Annual Milestone Fatal Accident Rate