



U.S. Helicopter Safety Team (USHST)

Report



Helicopter Safety Enhancements

Loss of Control – Inflight, Unintended Flight in IMC, and Low-Altitude Operations

October 3, 2017

I. Introduction

In 2016, the U.S. Helicopter Safety Team (USHST) adopted a goal of a 20% reduction in the U.S. fatal¹ helicopter accident rate by 2020 to 0.61 per 100,000 flight hours.² As part of an effort to achieve this goal, the USHST also adopted a process—derived from efforts undertaken in commercial aviation and fixed-wing general aviation—to develop and prioritize data-driven risk mitigations more closely aligned with the processes of two other key public–private safety groups, the Commercial Aviation Safety Team and the General Aviation Joint Steering Committee.

This report explains the development and content of the USHST’s first risk mitigations under this process, called Helicopter Safety Enhancements (H-SEs).

II. Background

a. The U.S. Helicopter Safety Team (USHST)

The International Helicopter Safety Team (IHST) was created in 2005 as part of an effort to reduce the worldwide helicopter accident rate by 80% within 10 years. Modeled after the Commercial Aviation Safety Team (CAST), the IHST’s mission is to establish partnerships in countries with significant helicopter operations and encourage development and implementation of risk mitigations by sharing lessons learned through accident analysis. In 2013, the USHST was established as a regional partner to the IHST, focused on improving the overall safety of the U.S. civil helicopter industry.

The USHST is a volunteer organization comprised of U.S. government and industry professionals. The USHST is governed by a Steering Committee, co-chaired by government and industry representatives. The Steering Committee provides the team with strategic guidance and direction, conducts membership outreach, and provides linkage to the IHST.

The USHST’s data-driven focus is supported by its Safety Analysis Team (SAT), which analyzes data and provides recommendations to the Steering Committee for areas of study and effort. The SAT also develops metrics to measure the effectiveness of safety recommendations and outreach. Safety recommendations are developed through topic-specific Working Groups, which conduct in-depth data analyses of specific topics. The SAT reviews and provides input to the

¹ The USHST is dedicated to working toward preventing all accidents, however, the USHST is concentrating its prevention efforts first on fatal accidents, consistent with the approaches of CAST and the GAJSC.

² For the baseline, the USHST is using the fatal accident rate of 0.76, the average fatal accident rate for the prior five years that have final and reliable data (2009-10, 2012-2014), based on the FAA’s General Aviation survey. During the past fifteen years, the helicopter fatal accident rate has been trending downward, but it has been below 0.61 only twice, and spiked in 2008 and 2013.

Steering Committee on Working Group recommendations. The Steering Committee reviews and approves recommendations.

The USHST’s Outreach Team coordinates the development of outreach programs for the distribution and implementation of Steering Committee-approved safety recommendations and engages industry through industry- and issue-specific focus groups.

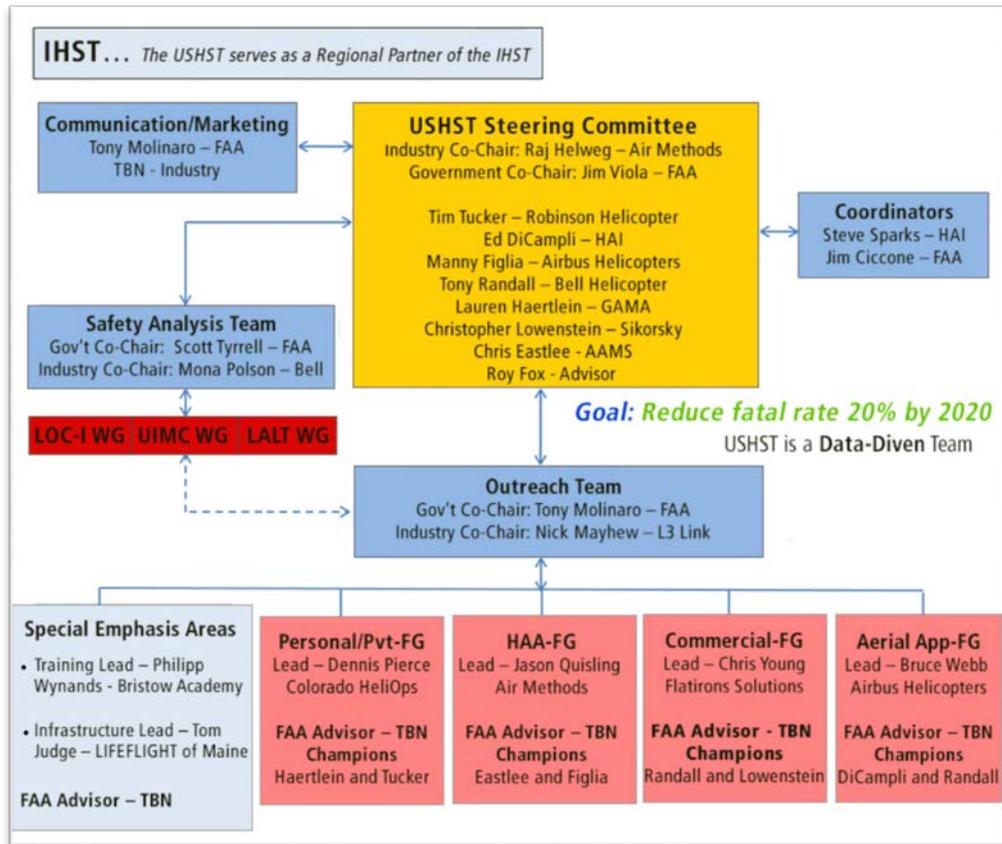


Figure 1: USHST Organizational Chart.

Full membership is detailed in Appendix A.

b. USHST 2.0

The Commercial Aviation Safety Team (CAST) was created in 1998 to reduce the commercial aviation fatality rate in the United States. CAST is credited with reducing the fatal accident rate in the U.S. commercial aviation industry by 83% in 10 years.

In the mid-1990s, the General Aviation Steering Committee (GAJSC) was established to focus on general aviation accidents in parallel to the CAST. In January 2011, the GAJSC adopted a structured, strategic, data-driven process to developing risk reduction measures and committed to reducing the general aviation fatal accident rate to no more than 1 fatal accident per 100,000 flight hours by 2018.

To achieve this goal, the GAJSC decided to first focus on loss of control fatal accidents. According to an FAA analysis, 40.2% of general aviation accidents are “Loss of Control” accidents, as defined according to CAST/ICAO Common Taxonomy Team (CICTT) occurrence categories.³ GAJSC working groups analyzed general aviation safety data to develop intervention strategies aimed at preventing or mitigating problems associated with causes of loss of control fatal accidents. Later, the GAJSC focused on powerplant failure fatal accidents. The GAJSC has published and implemented safety enhancements addressing accidents in both categories.

In 2016, the USHST adopted an approach to accident analysis to more closely align itself with the structure and process of the CAST and GAJSC. To support this work, the SAT was tasked with analyzing National Transportation Safety Board (NTSB) data from 104 fatal helicopter accidents from between 2009 and 2013, assigning a single CICTT occurrence category that best characterized each event, and determining the most common CICTT occurrence categories. Based on this analysis, the SAT found that the three most common CICTT occurrence categories were:

1. **Loss of Control – Inflight (LOC-I):** Loss of aircraft control while, or deviation from intended flightpath, inflight. Loss of control inflight is an extreme manifestation of a deviation from intended flightpath. The phrase “loss of control” may cover only some of the cases during which an unintended deviation occurred.
2. **Unintended Flight in IMC (UIMC):** Unintended flight into Instrument Meteorological Conditions (IMC).
3. **Low-Altitude Operations (LALT):** Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes takeoff or landing phases).

The SAT determined that these three categories of fatal accidents accounted for half (52) of the fatal accidents analyzed, and were responsible for more fatalities (104) than the remaining 15 CICTT categories combined (96).

³ The CICTT occurrence categories are common taxonomies and definitions and are used to classify occurrences (accidents and incidents) at a high level to permit analysis. The definitions are accompanied by usage notes that clarify appropriate use of each occurrence category for both fixed wing and rotorcraft.

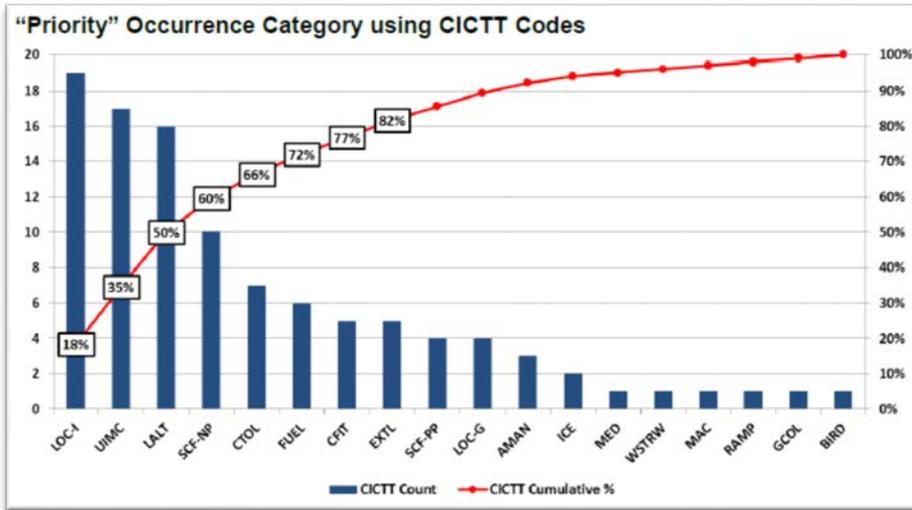


Figure 2: Pareto Chart of U.S. Civil Helicopter Fatal Accident Data (2009-2013) by CICTT Category

The SAT also analyzed the accident data by industry and found that the top four industries with the most fatal accidents were:

1. Personal/Private
2. Helicopter Air Ambulance (HAA)
3. Commercial
4. Aerial Application

These four industries were found to account for 59% of the fatal accidents analyzed.

Based on this analysis, the USHST Steering Committee voted to prioritize addressing fatal accidents categorized as LOC-I, UIMC, and LALT, and focus outreach efforts on reaching personal/private operations, HAA, commercial operations, and aerial application.

III. Accident Scoring and Helicopter Safety Enhancement Development

a. Accident Selection

LOC-I, UIMC, and LALT events each accounted for a comparable percentage of fatal accidents between 2009 and 2013. Because the percentages for each category were comparable, and the total number of accidents lower for rotorcraft than fixed-wing, advisers to the USHST who had worked with CAST and the GAJSC recommended the USHST analyze the fifty-two fatal accidents from LOC-I, UIMC, and LALT as a single, aggregated data set in the interest of efficiency.

b. Accident Analysis and Scoring

The USHST established a cross-functional working group of twenty-five to thirty subject matter experts to score the fatal accidents. Participants came from a variety of backgrounds, ensuring a broad experience in the interest of the most thorough analysis possible. Among the subject

matter experts from government and industry were accident investigators, pilots, mechanics, certification and continued operational safety specialists, aviation inspectors, helicopter manufacturer representatives, medical doctors, and helicopter industry organizations.

The working group set an aggressive but achievable timetable to complete the analysis and scoring of the fatal accidents through three separate, three-day, in-person meetings conducted in January, February, and March 2017. In addition, to allow a more efficient work effort, during each meeting the subject matter experts were split into two smaller, equally sized groups. The larger group met at the beginning and end of each work day to ensure continuity, review progress, and address any questions that had come up through the course of the analysis.

To score an accident, the working group began by reviewing all of the accident information available in the NTSB docket. Prior to each meeting, each attending working group member was assigned two fatal accidents to review, with redundancy in work assignments ensuring at least two or more working group members were thoroughly familiar with each fatal accident. The working group then assigned “Standard Problem Statements” (SPSs) to describe the specific problems (*e.g.*, what things went wrong and contributed to the fatal outcome?) underlying the accident and any contributing factors,⁴ if applicable. For each SPS, the working group assigned an intervention strategy (IS) or multiple ISs. In many cases, an SPS or IS created for one accident was applicable to another fatal accident in the data set. By the conclusion of the working group’s effort, 117 unique ISs were developed.

After identifying the problems and interventions strategies, the group then scored each standard problem statement on a scale of 0 to 6⁵ 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 strategy also was scored on a scale of 0 to 6⁶ for:

- P2: In the “perfect” world, how effective will the IS be in eliminating fatal accidents/fatalities related to this SPS.
- C: In the “real” world, how effective will the IS be in eliminating fatal accidents/fatalities related to this SPS (confidence level).

The P1, A, P2, and C values were input into a mathematical formula, developed by both the CAST and GAJSC, to calculate Overall Effectiveness (OE).

⁴ Additional information that provides clarification or explanation.

⁵ An average of the votes of each individual member was taken.

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Each IS was further scored for Feasibility on a scale of 1 to 3 across six factors (technical, financial, operational, schedule, regulatory, and sociological), which were averaged. The final score for each IS was the product of the Overall Effectiveness and Feasibility (OE * F). The final scores were used to rank the ISs. A “Mendoza Line,”⁷ or cut-off point, was drawn at twenty-five ISs, to determine which the USHST would implement. The “Mendoza Line” was used to acknowledge the resources available for implementation are limited and to ensure the USHST’s collective efforts remain focused on ISs that have the highest priority to make a safety impact.

The twenty-five ISs were assigned to an individual expert or a team of subject matter experts from the working group to develop each into a detailed helicopter safety enhancement or H-SE. The writers tasked with developing each H-SE had to evolve the original IS from a two or three sentence concept into a detailed plan for implementation. In the past, the USHST had struggled to transition from analysis to prioritized implementation; the H-SEs are critical to achieve prioritized, detailed implementation plans.

Below is a sample to the H-SE format, which explains the contents.

Helicopter Safety Enhancement (H-SE) #: Title	
Safety Enhancement Action:	Brief description of the recommendation.
Expected Implementers:	Organizations or subgroups expected and or desired to be involved in the H-SE implementation. Where possible, efforts were made to contact the relevant entities if they were not directly involved in the drafting process, however this was not always possible.
Statement of Work:	Explanation of why the USHST developed this H-SE, the individual steps that will be taken to implement the H-SE (which are discussed in further detail in the Outputs), and the fatal accidents that prompted the development of the H-SE.
Relation to Current Aviation Community Initiatives:	Any known initiatives currently in place or under development in the aviation community that relate to the recommendation(s).
Performance Goal Indicators:	Metrics by which to assess successful implementation.

⁷ The Mendoza Line is an expression from baseball for a cut-off point. In the USHST’s scoring work, members of the SAT analyzed the rank ordered scores that were calculated for each IS. The SAT found that after the 25th ranked IS, the scores began a steeper drop off from the highest scored IS. The SAT initially proposed the Mendoza Line, then presented the proposal to the working group for discussion and approval. The working group agreed that the 25th ranked IS was a logical cut-off point and approved the Mendoza Line.

Key Milestones:	Breakdown of the timelines for the individual Outputs.
Potential Obstacles:	Known impediments to achieving the H-SE. (Note that potential obstacles do not include impediments to up-take in the field. For example, if the H-SE involves training guidance, obstacles to training organizations adopting the guidance are not included, unless the adoption of the training guidance is identified as a metric.)
Detailed Implementation Plan Notes:	Additional information the H-SE drafters wanted to convey to the implementers, e.g., considerations or expectations.
CICCT Code:	CAST/ICAO Common Taxonomy Team code for the accidents that spurred the development of the recommendation.
Output 1:	Subtitle for Output 1, one of the actions to implement the recommendation.
Description:	Brief description of the output.
Lead Organization:	Organization(s) expected to have primary responsibility for Output 1.
Supporting Organizations:	Organization(s) expected to support the Lead Organization in implementing Output 1.
Actions:	Specific actions to be taken.
Output Notes:	Additional information from the drafters specific to the output.
Time Line:	Completion timeline for the output.
Target Completion Date:	Date of completion based on the timeline.

IV. Approved Safety Enhancements

During H-SE development, some of the intervention strategies were combined, reducing the total to twenty-two. The H-SE development process was accomplished through multiple levels of revision and review over a period of 5 months. Each H-SE was reviewed a minimum of four times and in most cases more than six times. This detailed level of scrutiny by multiple members from the working group ensured that each H-SE remained true to the intent of the original IS concept tied to the data driven analysis. At the conclusion of the review process, each draft H-SE was reviewed by the SAT and then provided to the USHST Steering Committee for review and approval in mid-July 2017.

On August 31, 2017, the USHST Steering Committee approved implementation for eighteen of the proposed H-SEs. The remaining H-SEs were deferred for further development. The approved H-SEs are included in Appendix B.

V. Future Work

A designated focal assigned to each H-SE will provide accountability for implementation of each H-SE. The focal will ensure H-SE progress is provided to the USHST Outreach Team. The USHST Outreach Team will manage information-sharing about the H-SEs to:

- Previously noted top four fatal accident industries
- Instructional/Training sector since it is a conduit to ALL other helicopter industries

The USHST has developed a method to track and assess H-SE implementation. The SAT also will work to devise methods of analyzing whether USHST efforts have impacted the U.S. civil helicopter fatal accident rate, and make recommendations to the USHST Steering Committee about future work.

Appendix A: List of USHST Members Participants

Accident Analyses, Scoring, and Helicopter Safety Enhancement (H-SE) Development

Nicky	Armour	MITRE
Jill	Browning	Sikorsky
Scott	Burgess	Embry-Riddle Aeronautical University
Jeffrey	Byrd	EIT Avionics
Keith	Cianfrani	Helicopter Association International
James	Ciccone	FAA, Flight Standards
Mark	Colborn	Dallas Police Department
Nolan	Crawford	FAA, Flight Standards
Steve	Cusick	Florida Institute of Technology
Steve	Earsom	US Fish & Wildlife Service
Manny	Figlia	Airbus Helicopters
Roy	Fox	IHST
Kate	Fraser	FAA, Office of Accident Investigation & Prevention
Steve	Gleason	Sikorsky
Tom	Glista	FAA, Flight Standards
Lauren	Haertlein	General Aviation Manufacturers Association
Raj	Helweg	Air Methods
Walt	Hogan	FAA, Office of Accident Investigation & Prevention
Cliff	Johnson	FAA, Technical Center
Thomas	Judge	Lifeflight of Maine
Wayne	Keeton	SAFE International, Inc
Gerald	Kosbab	AeroDirections, LLC
Robert	Matthews	International Society of Air Safety Investigators
Joe	May	EIT Avionics
Nick	Mayhew	L3 Link Simulation & Training
Zac	Noble	Helicopter Association International
Mona	Polson	Bell Helicopter
Jason	Quisling	Air Methods
Matt	Rigsby	FAA, Office of Accident Investigation & Prevention
Stan	Rose	Helicopter Association International
Lee	Roskop	FAA, Aircraft Certification
Bill	Salazar	FAA, Civil Aerospace Medical Institute
Steve	Sparks	Helicopter Association International
Corey	Stephens	FAA, Office of Accident Investigation & Prevention
John	Strasburger	FAA, Aircraft Certification
Harold	Summers	Helicopter Association International
Tim	Tucker	Robinson Helicopter Company
Scott	Tyrrell	FAA, Aircraft Certification
Mike	Webb	FAA, Flight Standards
Nick	Webster	National Transportation Safety Bureau
Philipp	Wynands	Bristow Academy/Metro Aviation

Appendix B:

Approved Helicopter Safety Enhancements (H-SEs)

1. Safety Culture and Professionalism (H-SE 19A)
2. Detection and Management of Risk Level Changes During Flight by Pilots and Nonflying Crew (H-SE 22A)
3. Helicopter Final Walk Around/Security of External Cargo (H-SEs 28 & 112 Merged)
4. Develop/Publish ACS Rotorcraft-Helicopter Series (H-SE 30)
5. Add Progressive Approach to Training Autorotations to Helicopter Flying Handbooks (H-SE 37)
6. Stability Augmentation System (SAS)/Autopilot (H-SE 70)
7. Technology to Prevent Unintended Loss of Engine Power (H-SE 75)
8. Improve Simulator Modeling for Outside-the-Envelope Flight Conditions (H-SE 81)
9. Helicopter Flight Data Monitoring (H-SE 82)
10. Enhanced Helicopter Vision Systems (H-SE 91)
11. Threat and Error Management for Initial and Recurrent Pilot Training (H-SEs 115 & 128 Merged)
12. Improve Make/Model Transition Training (H-SE 116)
13. Competency-based Training Assessments in Initial Pilot Training (H-SE 117)
14. Recommended Practices for Standardization of Autorotation and Emergency Aircraft Handling Training (H-SE 122)
15. Increased Simulation/Education to Develop Safe Decision Making (H-SE 123)
16. Improve Understanding of Basic Helicopter Aerodynamics (H-SE 124)
17. Pre-Flight Risk Assessment for Student Flights (H-SE 125)
18. Training for Recognition/Recovery of Spatial Disorientation (H-SE 127A)

**Helicopter Safety Enhancement (H-SE) 19A:
Safety Culture and Professionalism**

Safety Enhancement Action:	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.
Expected Implementers:	<ul style="list-style-type: none"> • FAA Safety Team (FAAST) • Helicopter Association International (HAI) Safety Committee (SC) • Academia (e.g., Embry Riddle Aeronautical University (ERAU)) • USHST Outreach Team
Statement of Work:	<p>In general, safety culture is defined as the attitude, beliefs, perceptions, and values that individuals share in relation to safety in their operations. The goal of this H-SE is for an effective safety culture to be defined in terms of more tangible concepts for operators and mechanics. It seeks to promote effective safety culture beyond just another executive level philosophy or “binder on a shelf” program to an ingrained daily pattern of behavior for the frontline work force in the helicopter community. An effective safety culture must be relatable to the day-to-day tasks that make up the job function of helicopter professionals.</p> <p>Through implementation of this H-SE, potentially more individuals can relate to the purpose of an effective safety culture and how they can adapt some reasonable steps in their daily tasks that are consistent with an effective safety culture. This should lead to an increase in sound aeronautical decision making, better judgment in managing risk, and more consistent compliance to rules and regulations established to ensure a safe aviation system.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. Define safety culture in terms of the individual operator or mechanic (include single pilot, single mechanic, and operation specific considerations). 2. Promote definition of “effective safety culture” as defined in Output 1 of this H-SE. 3. Improve mentoring by engaging operators who have already adopted an effective safety culture and used it to change their operations. Connect these operators with those in the rotorcraft

	<p>community who need mentoring. The intent is help the individual or organization being mentored to gain the knowledge and skill to establish an effective safety culture in their own operations.</p> <p>The following fatal accidents prompted this safety enhancement:</p> <table> <tr> <td>ANC13GA036</td> <td>CEN13FA010</td> </tr> <tr> <td>CEN10FA424</td> <td>CEN13FA295</td> </tr> <tr> <td>CEN10FA509</td> <td>ERA09FA417</td> </tr> <tr> <td>CEN11FA507</td> <td>ERA13GA046</td> </tr> <tr> <td>CEN12FA139</td> <td>WPR10FA133</td> </tr> <tr> <td>CEN13FA003</td> <td>WPR12FA282</td> </tr> <tr> <td>WPR13GA128</td> <td></td> </tr> </table>	ANC13GA036	CEN13FA010	CEN10FA424	CEN13FA295	CEN10FA509	ERA09FA417	CEN11FA507	ERA13GA046	CEN12FA139	WPR10FA133	CEN13FA003	WPR12FA282	WPR13GA128							
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CEN10FA509	ERA09FA417																				
CEN11FA507	ERA13GA046																				
CEN12FA139	WPR10FA133																				
CEN13FA003	WPR12FA282																				
WPR13GA128																					
Relation to Current Aviation Community Initiatives:	<p>Overlap with GAJSC SE-33: The FAA and industry will study what constitutes an effective safety culture and try to identify how to reach pilots who do not have/participate in an effective safety culture.</p> <p>http://www.gajsc.org/loss-of-control/</p>																				
Performance Goal Indicators:	<p>Total number of promotion and outreach efforts that educate on day-to-day safety culture. Total number of mentors paired with organizations/individuals with desire to be mentored on safety culture.</p>																				
Key Milestones:	<table> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date:</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>6</td> <td>Nov. 1 2017</td> <td>May 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>4</td> <td>May 1, 2018</td> <td>Sept. 1, 2018</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Sept. 1, 2018</td> <td>Sept. 1, 2019</td> </tr> <tr> <td>Completion:</td> <td>22 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date:</u>	Output 1:	6	Nov. 1 2017	May 1, 2018	Output 2:	4	May 1, 2018	Sept. 1, 2018	Output 3:	12	Sept. 1, 2018	Sept. 1, 2019	Completion:	22 months		
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Output 3:	12	Sept. 1, 2018	Sept. 1, 2019																		
Completion:	22 months																				
Potential Obstacles:	<ul style="list-style-type: none"> • Effective outreach to the individual work force level across industry. • Gaining participation of enough organizations or individuals with a complete understanding of safety culture to participate and train others throughout the industry. 																				
Detailed Implementation Plan Notes:	<ul style="list-style-type: none"> • Incorporate into existing FAA Outreach programs to include FAAST Team. • Promote through HAI, ALEA, NBAA, other comparable industry organizations and through helicopter industry conventions. 																				

	<ul style="list-style-type: none"> The GAJSC has a significantly longer implementation timeline for the related safety recommendation on culture; it may be necessary to revise timelines for this H-SE once the USHST Outreach Team begins Output 1 and evaluates both support and existing materials.
CICTT Code:	LOC, UIMC or LALT
Output 1:	
Description:	Define safety culture in terms of the individual operator or mechanic (include single pilot, single mechanic, and operation specific considerations).
Lead Organization:	USHST Outreach Team
Supporting Organizations:	Academia
Actions:	<ol style="list-style-type: none"> USHST Outreach Team will research existing definitions of safety culture in terms of the individual operator or mechanic (include single pilot, single mechanic, and operation specific considerations). Solicit support from academic institutions (such as ERAU) as needed. The intent is to ensure the definition is relatable and applicable on an individual level. USHST Outreach Team will review work already completed on GAJSC SE 33 and leverage SE 33 progress to assist with defining safety culture. Identify gaps in existing safety culture definition. Develop an improved safety culture definition based on Actions 1 & 2.
Output Notes:	The definition should be structured as something that the front-line work force can identify with and embrace as applicable to what they do on a day-to-day basis.
Time Line:	6 months
Target Completion Date:	May 1, 2018
Output 2:	
Description:	Promote definition of “effective safety culture” as defined in Output 1 of this H-SE.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> HAI SC FAAST
Actions:	Using a variety of media, USHST Outreach Team will promote day-to-day safety culture to the rotorcraft community, as defined by Output 1. Promotional outreach may vary in approach from publications on the

	USHST website and social media, to magazines/news, to public presentations at regional events such as FAAST seminars or large gathering events such as HAI's annual Heli Expo.
Output Notes:	USHST Outreach Team will track the number of promotion efforts made for safety culture and the number of individuals reached.
Time Line:	4 months
Target Completion Date:	Sept. 1, 2018
Output 3:	
Description:	Improve mentoring by engaging operators who have already adopted an effective safety culture and used it to change their operations. Connect these operators with those in the rotorcraft community who need mentoring to help the individual or organization being mentored to gain the knowledge and skill to establish an effective safety culture.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI SC • FAAST
Actions:	<ol style="list-style-type: none"> 1. USHST Outreach Team will establish a framework of existing aviation networks that could be used to establish a safety culture mentoring program. Intent is to use both individuals and organizations to serve in this capacity. 2. USHST Outreach Team Focus Groups will actively engage with their respective industry sectors to connect individuals or organizations to a safety culture mentor. The USHST Outreach Team will facilitate an initial dialogue with the two parties to get the connection process started.
Output Notes:	<p>The intent in Output 3 is to move beyond presentations and general promotion. This output will result in taking organizations or individuals that are already practicing day-to-day safety culture effectively and connecting them relationally with those that are still learning. This should help move the concept from theoretical and into actual day-to-day practice.</p> <ol style="list-style-type: none"> 1. USHST Outreach Team will track the following: <ol style="list-style-type: none"> a. The number of individuals and organizations who are approached to serve as mentors in the safety culture network. b. The number of individual and organization who agree to serve as mentors in the safety culture network. Use the number from 1b divided by 1a to calculate a percentage.

	<ul style="list-style-type: none"> c. The number of individuals and organizations who are approached to receive mentoring in the safety culture network. d. The number of individuals and organization who agree to receive mentoring in the safety culture network. Use the number from 1d divided by 1c to calculate a percentage. e. For those who chose not to participate as either the mentor or the one being mentored, ask why. It may be for a positive reason rather than a negative reason. They may choose not to participate because they are already involved in a good program that works for them (perhaps better than the USHST's). If it is a negative reason, the USHST should consider how to overcome that obstacle.
Time Line:	12 months
Target Completion Date:	Sept. 1, 2019

**Helicopter Safety Enhancement (H-SE) 22A:
Detection and Management of Risk Level Changes During Flight by Pilots and Nonflying Crew**

<p>Safety Enhancement Action:</p>	<p>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.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • Helicopter Association International (HAI) Safety Committee • Helicopter Association International (HAI) Utilities, Patrol, and Construction (UPAC) Committee • Commission on Accreditation of Medical Transport Systems (CAMTS) – Executive Director • Airborne Law Enforcement Association – Safety Program Manager • USHST Outreach Team • USHST Special Emphasis Area (SEA) Training Team • Academia (e.g., UAA, PEGASAS, ERAU) • FAA Safety Team (FAAST)
<p>Statement of Work:</p>	<p>The flight environment is often dynamic, and not every contingency can be anticipated or scripted in advance. The pilot in command (PIC) is ultimately responsible for the safety of a flight; however, non-flying crewmembers have a pivotal responsibility in working with the PIC to ensure safety. When unexpected changes are encountered, it is paramount that the PIC and the non-flying crewmembers quickly detect the elevation of risk, communicate it to each other, and collectively decide on a reasonable resolution or mitigation. This H-SE will work to promote recommended practices for effectiveness at each stage in the process (detection, communication, and decision).</p> <p>Project:</p> <ol style="list-style-type: none"> 1. Gather and review existing research materials on: <ol style="list-style-type: none"> a. How people make decisions in demanding, real world situations (naturalistic decision making). b. Crew resource management for applicability to rotorcraft operations. 2. Apply information from Output 1 to develop recommended practices for identifying changes that present high risks in the helicopter flying environment for both pilot and non-flying crewmembers. Develop educational materials containing

	<p>recommended practices, including recommendations for empowering non-flying crewmembers to recognize changes in the risk level and effectively communicate with the pilot flying.</p> <p>3. Distribute and promote educational materials.</p> <p>The following fatal accidents prompted this safety enhancement:</p> <table> <tr> <td>WPR12MA034</td> <td>WPR10GA097</td> </tr> <tr> <td>WPR12LA259</td> <td>ERA13LA057</td> </tr> <tr> <td>ERA13LA057</td> <td>WPR14LA008</td> </tr> <tr> <td>WPR13GA128</td> <td></td> </tr> </table>	WPR12MA034	WPR10GA097	WPR12LA259	ERA13LA057	ERA13LA057	WPR14LA008	WPR13GA128													
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WPR12LA259	ERA13LA057																				
ERA13LA057	WPR14LA008																				
WPR13GA128																					
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • FAA SMS Voluntary Program for 135 (and other) Operators • FRAT – Use of Flight Risk Analysis tool (from GAJSC site) • GAJSC Loss of Control Working Group 1, SE-9, Part 135 Safety Culture: Public education campaign on the safety benefits of standard operating procedures (SOP) for 14 CFR 91 positioning legs, flight risk assessment tools (FRAT), and Safety Management Systems (SMS). • Risk Management Handbook (FAA-H-8083-2) Chapter 4-2 http://go.usa.gov/jAJk. • “You Can Take it With You,” FAA Safety Briefing pg. 4, available at http://go.usa.gov/jAuV. 																				
Performance Goal Indicators:	<ul style="list-style-type: none"> • Educational materials developed. • Educational materials distributed and promoted. 																				
Key Milestones:	<table> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>12</td> <td>Oct. 1, 2017</td> <td>Oct. 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>12</td> <td>Oct. 1, 2018</td> <td>Oct. 1, 2019</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Oct. 1, 2019</td> <td>Oct. 1, 2020</td> </tr> <tr> <td>Completion:</td> <td>36 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	12	Oct. 1, 2017	Oct. 1, 2018	Output 2:	12	Oct. 1, 2018	Oct. 1, 2019	Output 3:	12	Oct. 1, 2019	Oct. 1, 2020	Completion:	36 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																		
Output 1:	12	Oct. 1, 2017	Oct. 1, 2018																		
Output 2:	12	Oct. 1, 2018	Oct. 1, 2019																		
Output 3:	12	Oct. 1, 2019	Oct. 1, 2020																		
Completion:	36 months																				
Potential Obstacles:	Challenges of balancing non-flying crew input with PIC responsibility.																				
Detailed Implementation Plan Notes:	Materials should include recommendations on training and mentoring crew to understand and implement the recommended practices.																				
CICTT Code:	UIMC, LALT																				

Output 1:	
Description:	Gather and review existing research materials on: <ul style="list-style-type: none"> a. How people make decisions in demanding, real world situations (naturalistic decision making). b. Crew resource management for applicability to rotorcraft operations.
Lead Organization:	USHST Outreach Team and SEA Training Team
Supporting Organizations:	Academic institutions
Actions:	USHSTs Outreach Team and SEA Training Team to coordinate with academic institutions on gathering and reviewing existing research regarding decision making and crew resource management that may be useful in developing recommended practices.
Output Notes:	
Time Line:	12 months
Target Completion Date:	Oct. 1, 2018
Output 2:	
Description:	Apply information from Output 1 to develop recommended practices for identifying changes that present high risks in the helicopter flying environment for both pilot and non-pilot crewmembers and develop educational materials containing recommended practices, including recommendations for empowering non-flying crewmembers to recognize changes in the risk level and effectively communicate with the pilot flying.
Lead Organization:	USHST Outreach Team and SEA Training Team
Supporting Organizations:	
Actions:	<ol style="list-style-type: none"> 1. USHST Outreach and SEA Training teams to develop recommended practices in coordination with appropriate industry engagement. 2. USHST Outreach and SEA Training teams to develop educational materials for implementing recommended practices.
Output Notes:	Different materials may be produced for different crew roles. Materials should be general but recognize operational variances. To ensure the best possible product, involve specific high risk operators to assist based on their SMS programs or practices (<i>i.e.</i> , EMS, Utility).
Time Line:	12 months

Target Completion Date:	Oct. 1, 2019
Output 3:	
Description:	Distribute and promote educational materials.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI • CAMTS • FAAST
Action:	USHST Outreach Team to develop and execute plan for distribution of educational materials to relevant segments of industry.
Output Notes:	A variety of media and approaches should be considered, including web-based materials as well as in-person presentations.
Time Line:	12 months
Target Completion Date:	Oct. 1, 2020

**Helicopter Safety Enhancement (H-SE) 28:
Helicopter Final Walk Around/Security of External Cargo**

Safety Enhancement Action:	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.
Expected Implementers:	<ul style="list-style-type: none"> • FAA AFS-800 • FAA Safety Team (FAAST) • USHST Safety Analysis Team (SAT) • USHST Special Emphasis Area (SEA) Training Team • Helicopter Association International (HAI) Safety Committee (SC) • Helicopter OEMs (GAMA to coordinate)
Statement of Work:	<p>The pilot in command is responsible for determining the airworthiness of the aircraft he/she is operating (14 C.F.R. § 91.7). An adequate preflight inspection and final walk around is key to determining the condition of an aircraft prior to flight. Post-flight inspection also can help to identify issues prior to the next flight.</p> <p>One of the fatal accidents reviewed by the USHST in the LOC-I dataset involved inadequate aircraft inspections. The USHST believes that better guidance on both how and why to conduct these inspections, as well as increased attention to their importance, may mitigate such events in the future.</p> <p>To help prevent fatal helicopter accidents resulting from inadequate aircraft inspections before and after flight, the civil helicopter community should develop guidance on and increase awareness of the importance of preflight inspection, the “final walk around” (a final safety check prior to flight), and postflight inspection.</p>

	<p>Due to their similarity, the USHST decided to merge another intervention strategy (IS) that ranked above the Mendoza Line in creation of this H-SE.</p> <ul style="list-style-type: none"> IS 112, Training: Conduct training on proper security of external cargo items. <p>Project:</p> <ol style="list-style-type: none"> Brief HAI SC on data regarding inadequate aircraft inspection. Develop guidelines/recommended practices for helicopter inspections, including preflight, final walk around, and post-flight. Promote the guidelines/recommended practices for helicopter inspections to the training community and the general pilot community. <p>The following fatal accident prompted this safety enhancement: WPR10FA440</p>																				
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> FAA M-Pamphlet: Advanced Preflight, <i>available at</i> https://www.faasafety.gov/standdown/content/faa_m_pamphlet.pdf HAI Pre-Flight Risk Assessment Tool (User's Guide available at https://www.rotor.org/fox/mission/hai_mra.pdf) FAA Safety Briefing March/April 2012, "Advanced Preflight," pg. 18 																				
Performance Goal Indicators:	<ul style="list-style-type: none"> Development of guidelines/best practices for aircraft inspections. Promotion of guidelines/best practices. 																				
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>6</td> <td>Nov. 1, 2017</td> <td>May 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>12</td> <td>May 1, 2018</td> <td>May 1, 2019</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>May 1, 2019</td> <td>May 1, 2020</td> </tr> <tr> <td>Completion:</td> <td>30 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	6	Nov. 1, 2017	May 1, 2018	Output 2:	12	May 1, 2018	May 1, 2019	Output 3:	12	May 1, 2019	May 1, 2020	Completion:	30 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																		
Output 1:	6	Nov. 1, 2017	May 1, 2018																		
Output 2:	12	May 1, 2018	May 1, 2019																		
Output 3:	12	May 1, 2019	May 1, 2020																		
Completion:	30 months																				
Potential Obstacles:	Achieving consensus on guidelines/best practices from experts. Resources to conduct promotional activities.																				
Detailed Implementation Plan Notes:	Promotion of guidelines/best practices should consider key aviation community and training events, including Heli-Expo.																				
CICCT Code:	LOC-I																				
Output 1:																					
Description:	Review data regarding inadequate aircraft inspection.																				

Lead Organization:	USHST SAT
Supporting Organizations:	HAI SC
Actions:	<ol style="list-style-type: none"> 1. USHST SAT to compile briefing on fatal accidents raising aircraft inspection concerns. 2. USHST SAT to review briefing with the HAI SC.
Time Line:	6 months
Target Completion Date:	May 1, 2018
Output 2:	
Description:	Develop guidelines/recommended practices for helicopter inspections, including preflight, final walk around, and post-flight.
Lead Organization:	HAI SC
Supporting Organizations:	<ul style="list-style-type: none"> • FAA AFS-800 • FAAST • Helicopter OEMs (GAMA to coordinate)
Actions:	<ol style="list-style-type: none"> 1. HAI SC, in conjunction with support from the FAA and OEMs, to develop guidelines/recommended practices for: <ol style="list-style-type: none"> a. Pre-flight inspection b. Final walk around c. Post-flight inspection 2. HAI SC, in conjunction with the FAA and industry support, to provide recommendations regarding promotion of guidelines/recommended practices.
Output Notes:	<p>HAI SC should consider existing materials on aircraft inspections. HAI SC may also consult aircraft type clubs for input on best practices.</p> <p>Guidelines/recommended practices should include both practical information regarding the conduct of said inspections, as well as color and context regarding the importance of said inspections. Guidelines/recommended practices should be broadly applicable, considering different operators and operations. OEMs and type clubs may provide aircraft-specific information and or resources.</p>
Time Line:	12 months
Target Completion Date:	May 1, 2019

Output 3:	
Description:	Promote the guidelines/recommended practices for helicopter inspections to the training community and the general pilot community.
Lead Organization:	HAI SC
Supporting Organizations:	<ul style="list-style-type: none"> • FAA AFS-800 • FAAST • USHST SEA Training Team
Actions:	<ol style="list-style-type: none"> 1. HAI SC and USHST SEA Training Team to conduct outreach to training providers regarding inspection guidelines/recommended practices. 2. HAI SC and USHST SEA Training Team to present guidelines/recommended practices at key industry events. 3. HAI SC to brief the Airman Certification Systems (ACS) Working Group on guidelines/recommended practices to inform inspection requirements in standards. 4. FAAST to conduct outreach on emphasizing appropriate inspections, including thorough use of the guidelines/recommended practices, to designated pilot examiners for initial applicants as well as applicants for advanced certifications and ratings. 5. FAAST to conduct outreach on emphasizing appropriate inspections to the pilot community.
Output Notes:	At the time that this H-SE was drafted, the ACS Working Group had not yet been chartered to include helicopter.
Time Line:	12 months
Target Completion Date:	May 1, 2020

**Helicopter Safety Enhancement (H-SE) 30:
Develop/Publish ACS Rotorcraft-Helicopter Series**

<p>Safety Enhancement Action:</p>	<p>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.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • FAA (e.g., AFS-630, AFS-800) • Aviation Rulemaking Advisory Committee (ARAC) – Airman Certification Systems (ACS) Working Group (WG) Committee • Helicopter Association International (HAI) Training Committee (TC) • USHST Special Emphasis Area (SEA) Training Team • FAA Safety Team (FAAST) • Flight training providers (GAMA to coordinate)
<p>Statement of Work:</p>	<p>To help prevent fatal accidents during airman training and certification, the FAA will develop the new ACS series for Rotorcraft-Helicopter to replace the PTS for airman certification. Support from this effort will include diverse expertise from the helicopter community and other industry stakeholders. The new helicopter ACS will contribute to safety by making practical tests meaningful and relevant to actual operations and contribute to the standardization of teaching, learning and testing.</p> <p>Currently, the FAA and industry, through the ACS WG, has developed and published several new ACS for fixed-wing certification. Building on that success, the new ACS for helicopter will be designed to communicate the aeronautical knowledge, risk management, and flight proficiency standards for a more integrated and systematic approach to certification of helicopter pilots. This approach will provide both safety risk management and safety assurance processes through which internal and external stakeholders identify and evaluate regulatory changes, safety recommendations and other factors that require modification of airman testing and training materials. The new helicopter ACS will promote safety in the form of ongoing engagement with both external stakeholders of the aviation training industry and FAA policy division. Development of an ACS and associated guidance in collaboration with a diverse group of aviation training experts will provide a systematic approach to all components of the airman certification system, including knowledge test question development and conduct of the practical test.</p> <p>Project:</p>

	<ol style="list-style-type: none"> 1. FAA and industry to develop new ACS for Rotorcraft-Helicopter series to replace the current PTS. 2. Implement and conduct outreach to transition from Rotorcraft-Helicopter PTS to new ACS. <p>From within the USHST’s dataset of 52 LOC-I, UIMC, and LALT fatal accidents from 2009-2013, there was one fatal accident that occurred during an airman certification flight that led to this H-SE. The USHST LOC-I, UIMC, and LALT working group found that contributing factors to this accident indicated a need to develop and implement an ACS for helicopter certification. The following fatal accident prompted this safety enhancement: ERA10FA283</p>																
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • GA-JSC (LOC WG 1 and LOC WG 2) pursued the following comparable outcomes through SE-32 (Airman Certification Standards): An integrated Airman Certification Standards (ACS) document that aligns the aeronautical knowledge testing standards required by 14 CFR Part 61 with the flight proficiency standards (“Areas of Operation”) set out in 14 CFR Part 61 and the existing Practical Test Standards (PTS). Once this Safety Enhancement is fully implemented, the goal of introducing risk management into airman testing and training will be realized. • Fixed-wing ACS information is available at https://www.faa.gov/training_testing/testing/acs/. 																
Performance Goal Indicators:	Release of new ACS for Rotorcraft-Helicopter series to replace the current PTS.																
Key Milestones:	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 20%; text-align: center;"><u>Total Months</u></th> <th style="width: 20%; text-align: center;"><u>Start Date</u></th> <th style="width: 30%; text-align: center;"><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td style="text-align: center;">24–36</td> <td style="text-align: center;">Jan. 1, 2018</td> <td style="text-align: center;">Jan. 1, 2021</td> </tr> <tr> <td>Output 2:</td> <td style="text-align: center;">12</td> <td style="text-align: center;">Jan. 1, 2021</td> <td style="text-align: center;">Jan. 1, 2022</td> </tr> <tr> <td>Completion:</td> <td colspan="3" style="text-align: center;">36 to 48 months</td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	24–36	Jan. 1, 2018	Jan. 1, 2021	Output 2:	12	Jan. 1, 2021	Jan. 1, 2022	Completion:	36 to 48 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>														
Output 1:	24–36	Jan. 1, 2018	Jan. 1, 2021														
Output 2:	12	Jan. 1, 2021	Jan. 1, 2022														
Completion:	36 to 48 months																
Potential Obstacles:	Funding for all facets of the effort.																
Detailed Implementation Plan Notes:	The FAA has developed the ACS through policy so this H-SE would not require regulatory rulemaking. The current ACS WG consists of the FAA and a diverse group of industry stakeholders. The addition of helicopter industry stakeholders to the ACS WG is essential to contribute to the development and implementation of a new ACS for Rotorcraft-Helicopter. The FAA and industry ACS WG will																

	meet quarterly to discuss progression and further develop the new ACS Rotorcraft-Helicopter series.
CICTT Code:	LOC-I
Output 1:	
Description:	Develop new ACS for Rotorcraft-Helicopter series to replace the current PTS.
Lead Organization:	FAA – AFS-630
Supporting Organizations:	<ul style="list-style-type: none"> • ARAC ACS WG Committee • AFS-800 • Flight training providers (GAMA to coordinate) • USHST SEA Training Team
Actions:	<ol style="list-style-type: none"> 1. If not already completed, add agenda item for the ARAC - ACS WG quarterly meeting, to introduce new helicopter industry participants and discuss efforts and roles within the WG for the new ACS. 2. Establish timelines and address progression of each ACS. 3. Conduct review of each helicopter ACS and address comments and required changes before release to industry.
Output Notes:	
Time Line:	24–36 months
Target Completion Date:	Jan. 1, 2021
Output 2:	
Description:	Implement and conduct outreach to transition from Rotorcraft-Helicopter PTS to new ACS.
Lead Organization:	FAA – AFS-630
Supporting Organizations:	<ul style="list-style-type: none"> • AFS-800 • FAAST • HAI • USHST SEA Training Team • Flight training providers (GAMA to coordinate)
Actions:	<p>Nearing completion of ACS, conduct promotion to industry via FAA ACS outreach using the following media:</p> <ul style="list-style-type: none"> • Airman Certification Standards Briefing • (https://www.faa.gov/training_testing/testing/acs/media/acs_briefing.pdf) • Airman Certification Standards FAQ • (https://www.faa.gov/training_testing/testing/acs/media/acs_faq.pdf)

	<ul style="list-style-type: none"> • Airman Certification Standards Brochure • (https://www.faa.gov/training_testing/testing/acs/media/acs_brochure.pdf) • ACS Tips for Evaluators • (https://www.faa.gov/training_testing/testing/acs/media/acs_tips.pdf) • Previously Recorded Webinars, which explain how to use the ACS • (https://www.youtube.com/watch?v=8uTXkiahw2k) <p>Supporting organizations for Output 2 should use every opportunity to promote this message to the helicopter community, whether it be through mass industry events (e.g., Heli-Expo), regional FAAST seminars, or smaller, locally organized events. The USHST SEA Training Team should use their networks and connections in the instructional/training sector to maximize promotion of this information. In addition to face to face events, all other forms of media should be utilized to ensure the broadest possible promotion effort.</p>
Output Notes:	
Time Line:	12 months (<i>to establish an initial promotion effort following completion of Output 1; promotion will be ongoing after 12 months</i>)
Target Completion Date:	Jan. 1, 2022

**Helicopter Safety Enhancement (H-SE) 37:
Add Progressive Approach to Training Autorotations to Helicopter Flying Handbook**

Safety Enhancement Action:	FAA to amend Helicopter Flying Handbook (FAA-H-8083-21A) to incorporate progressive approach to training autorotations.
Expected Implementers:	<ul style="list-style-type: none"> • FAA – AFS-630, AFS-800, AFS-250, FAA Safety Team (FAAST) • USHST Special Emphasis Area (SEA) Training Team • Helicopter Association International (HAI) Safety Committee (SC) • Helicopter Association International (HAI) Training Committee (TC)
Statement of Work:	<p>To help prevent fatal rotorcraft accidents due to improper or poor training techniques, the rotorcraft community needs improved training techniques encouraging the use of a progressive approach during flight training operations. As applied to autorotations, the intended meaning of “progressive approach” is that the maneuver is introduced over a number of flight lessons. The initial lessons introduce the basic concepts and the maneuver is entered and recovered at higher altitudes. In subsequent flights, as the student develops the necessary skills, the level of difficulty is gradually increased when both the entry and the recovery are performed at lower altitudes.</p> <p>The most effective way to further formalize the progressive approach is through the Helicopter Flying Handbook (HFH).</p> <p>Project:</p> <ol style="list-style-type: none"> 1. FAA to work with industry on researching and evaluating helicopter progressive training techniques as detailed in AC 61-140A for autorotations and operational data. 2. FAA to incorporate progressive training findings into the Helicopter Flying Handbook (FAA-H-8083-21A). FAA should work with industry on any other areas that should be addressed in the HFH during this revision. 3. FAA, HAI, and USHST to conduct outreach on the latest revisions of HFH for helicopter operators. <p>The following fatal accidents prompted this safety enhancement: ERA09FA497 WPR13GA128</p>

Relation to Current Aviation Community Initiatives:	<p>The USHST Training Working Group (TWG) and the FAA jointly issued Advisory Circular (AC) 61-140A, which introduced a progressive approach to autorotation training. This document should be used as a reference in incorporating a progressive training approach into the HFH. https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1029928</p> <p>Other USHST H-SEs (115_128 and 124) also plan to recommend revisions to the same FAA Handbook referenced in H-SE 37. Submission of revisions from each H-SE must be closely coordinated together to ensure consistency of recommendations. There is a benefit to aligning all of them for a single, collective submission with the goal to have all recommendations incorporated during a single revision cycle of the handbook.</p>																				
Performance Goal Indicators:	<p>Progressive training approach published in the HFH. Systematic, deliberate outreach to as many as possible in overall U.S. helicopter community to promote and educate the progressive training approach.</p>																				
Key Milestones:	<table border="0" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>12</td> <td>June 1, 2018</td> <td>June 1, 2019</td> </tr> <tr> <td>Output 2:</td> <td>30</td> <td>June 1, 2019</td> <td>Dec. 1, 2021</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Dec. 1, 2021</td> <td>Dec. 1, 2022</td> </tr> <tr> <td>Completion:</td> <td>54 Months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	12	June 1, 2018	June 1, 2019	Output 2:	30	June 1, 2019	Dec. 1, 2021	Output 3:	12	Dec. 1, 2021	Dec. 1, 2022	Completion:	54 Months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																		
Output 1:	12	June 1, 2018	June 1, 2019																		
Output 2:	30	June 1, 2019	Dec. 1, 2021																		
Output 3:	12	Dec. 1, 2021	Dec. 1, 2022																		
Completion:	54 Months																				
Potential Obstacles:	<ul style="list-style-type: none"> • Pushback from the FAA on amending the HFH to achieve the normal periodic timeline updates. • FAA approval process delays for revising the HFH. • Disagreement within industry on HFH revisions (<i>e.g.</i>, terminology). • Challenges reaching the end users through outreach, training, and feedback. 																				
Detailed Implementation Plan Notes:	<p>Significant dates to consider would be HAI’s HELI-EXPO and any other industry conventions for outreach.</p>																				
CICTT Code:	<p>LOC-I, LALT</p>																				
Output 1:																					

Description:	FAA to work with industry on researching and evaluating helicopter progressive training techniques as detailed in AC 61-140A for autorotations and operational data.
Lead Organization:	FAA AFS-630
Supporting Organizations:	<ul style="list-style-type: none"> • AFS-250 / AFS-800 • USHST SEA Training Team • HAI SC
Actions:	<ol style="list-style-type: none"> 1. Research and evaluate the current advisory guidance. 2. AC 61-140A was based on USHST data and currently supplements and expands the guidance from the HFH. Assess AC 61-140A to determine what additional research, if any, is necessary to justify taking the expanded guidance on autorotations found in this AC and publishing it as principal guidance in the HFH. 3. If further research is necessary, the FAA will solicit input from the USHST SEA Training Team. 4. Determine if additional research is required on pilot performance and human factors related to the progressive approach. 5. Determine if a complete review of the HFH is necessary, to include reclassification of training autorotations by removing the topic from the emergency section.
Output Notes:	
Time Line:	12 months
Target Completion Date:	June 1, 2019
Output 2:	
Description:	FAA to incorporate progressive training findings into the Helicopter Flying Handbook (FAA-H-8083-21A). FAA should work with industry on any other areas that should be addressed in the HFH during this revision.
Lead Organization:	FAA AFS-630
Supporting Organizations:	<ul style="list-style-type: none"> • AFS-250 / AFS-800 • USHST SEA Training Team • HAI SC
Actions:	Amend and republish a revised version of the HFH that includes the progressive approach to training autorotations.
Output Notes:	
Time Line:	30 months (6 months for <u>approval</u> of the advisory circular amendment <i>project</i> and 24 months to amend and republish from time advisory circular amendment project is approved).

Target Completion Date	December 1, 2021
Output 3	
Description:	FAA, HAI, and USHST to conduct outreach on the latest revisions of HFH for helicopter operators.
Lead Organization:	FAAST
Supporting Organizations:	<ul style="list-style-type: none"> • USHST Outreach Team • HAI TC • HAI SC • AFS 630
Actions:	<ol style="list-style-type: none"> 1. FAA to use FAAST and other outreach to brief changes to HFH at flight schools. 2. FAA to require DPE's to place special emphasis on progressive approach and AC 61-140A during CFI practical tests. 3. USHST Outreach Team and industry to formulate outreach plan and highlight HFH changes at every opportunity (<i>e.g.</i>, Heli-Expo, AMTC, Heli Offshore, regional FAAST conferences, other safety conferences). 4. Document progress of outreach effort (who contacted, number of attendees, etc.).
Output Notes:	
Time Line:	12 months
Target Completion Date:	December 1, 2022

**Helicopter Safety Enhancement (H-SE) 70:
Stability Augmentation System (SAS) / Autopilot**

Safety Enhancement Action:	Technology/Equipment: Industry and FAA to encourage development and installation of a stability augmentation system (SAS) and/or simple autopilot in light helicopters.
Expected Implementers:	<ul style="list-style-type: none"> • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • FAA – AIR, Compliance & Airworthiness Division • FAA/EASA Part 27 Rewrite Committee • USHST – Outreach Team • HAI – Technical Committee • Aircraft Electronics Association (AEA) • Electronics manufacturers (GAMA to coordinate) • Helicopter manufacturers (GAMA to coordinate) • Helicopter flight training providers
Statement of Work:	<p>The USHST Safety Analysis Team identified loss of control inflight (LOC-I) as one of the top three most common occurrence categories of fatal civil helicopter accidents in their 2009-2013 dataset. Current light helicopters have flight characteristics that are challenging and demanding of pilot work load. The purpose of this H-SE is to increase safety by encouraging the development and installation of stability augmentation system (SAS) or autopilot devices that increase the flight stability of light helicopters.</p> <p>SAS/autopilot devices must be designed to reduce the incidence of loss of control inflight (LOC-I), and should consider new and retrofit configurations not currently supported by similar devices. The devices should also consider low visibility, low ceilings, and unintended IMC, and preferably enhance safety without requiring pilot action. A SAS/autopilot device may embody commercial off-the-shelf (COTS) pneumatic, electronic, MEMS or mechanical devices to sense or control helicopter motion.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. USHST to coordinate formation of H-SE 70 team.

	<ol style="list-style-type: none"> 2. H-SE 70 team to meet with FAA regarding certification pathways for SAS/autopilot technology for light helicopters. 3. H-SE 70 team to draft White Paper that identifies the need and pathways to certification for SAS/autopilot technology for light helicopters. White Paper should discuss available options as well as future technological needs. 4. H-SE 70 team to promote White Paper to FAA (including Parts 27/29 rewrite working groups) and industry. <p>The following fatal accidents prompted this safety enhancement:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">WPR10FA055</td> <td style="width: 50%;">CEN13FA003</td> </tr> <tr> <td>CEN13FA010</td> <td>WPR13FA080</td> </tr> <tr> <td>ERA09FA537</td> <td>ERA13FA273</td> </tr> <tr> <td>CEN11FA468</td> <td>WPR13GA128</td> </tr> </table>	WPR10FA055	CEN13FA003	CEN13FA010	WPR13FA080	ERA09FA537	ERA13FA273	CEN11FA468	WPR13GA128
WPR10FA055	CEN13FA003								
CEN13FA010	WPR13FA080								
ERA09FA537	ERA13FA273								
CEN11FA468	WPR13GA128								
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • Current SAS/autopilot systems exist. • Non required Safety Enhancing Equipment (NORSEE) is a reduced certification burden afforded to safety enhancing equipment that is not required by existing regulations. <p>http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgPolicy.nsf/0/5C598C7741CE2FC286257B7B00647060?OpenDocument. FAA is considering a NORSEE autopilot.</p>								
<p>Performance Goal Indicators:</p>	<ul style="list-style-type: none"> • Meeting with FAA concerning certification pathways. • Drafting for H-SE 70 White Paper. • Promotion of White Paper to FAA. • Promotion of White Paper to industry. 								

Key Milestones:	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	
	Output 1:	2	Oct. 1, 2017	Dec. 1, 2017
	Output 2:	6	Dec. 1, 2017	Jun. 1, 2018
	Output 3:	12	Jun. 1, 2018	Jun. 1, 2019
	Output 4:	6	Jun. 1, 2019	Dec. 1, 2019
	Completion:	26 months		
Potential Obstacles:	Coordinating meetings with regulatory authorities. Economic feasibility.			
Detailed Implementation Plan Notes:	The following considerations may impact recommendations addressed in the White Paper: <ul style="list-style-type: none"> i. Existing technology solutions should be examined first. ii. The weight penalties of adding a SAS/autopilot to smaller Part 27 rotorcraft are important. iii. Assess if Approved Model List Supplemental Type Certificate (AML-STC) is a realistic option. iv. Consider increasing inherent stability as part of initial light helicopter design. 			
CICTT Code:	LOC-I, UIMC			
Output 1:				
Description:	USHST to coordinate formation of H-SE 70 team.			
Lead Organization:	USHST			
Supporting Organizations:	HAI – Technical Committee, OEMs (GAMA to coordinate)			
Actions:	USHST to convene team of subject matter experts to support H-SE 70.			
Output Notes:				
Time Line:	2 months			
Target Completion Date:	Dec. 1, 2017			
Output 2:				
Description:	Meet with FAA regarding certification pathways for SAS/autopilot technology for light helicopters.			
Lead Organization:	H-SE 70 Team			

Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • HAI – Technical Committee • Electronics manufacturers (GAMA to coordinate) • Helicopter manufacturers (GAMA to coordinate)
Actions:	<ol style="list-style-type: none"> 1. H-SE 70 team to coordinate meeting with FAA – Rotorcraft Standards Staff to: <ol style="list-style-type: none"> a. Describe the need for a SAS/Autopilot system for light helicopters to FAA b. Describe SAS/Autopilot system safety benefits to FAA c. Discuss potential paths for certification. Key points should include any potential NORSEE path, how to ensure maximum relief from DO178/254, and best path for reduced certification burdens from FAA.
Output Notes:	
Time Line:	6 months
Target Completion Date:	June 1, 2018
Output 3:	
Description:	Draft White Paper that identifies the need and pathways to certification for SAS/autopilot technology for light helicopters.
Lead Organization:	H-SE 70 team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI – Technical Committee • Electronics manufacturers (GAMA to coordinate) • Helicopter manufacturers (GAMA to coordinate)
Actions:	<ol style="list-style-type: none"> 1. H-SE 70 team to draft White Paper. 2. H-SE 70 team to submit White Paper to USHST Steering Committee for review and approval.
Output Notes:	<p>White Paper should discuss available technological options as well as future technological needs. A SAS/autopilot device may embody COTS pneumatic, electronic, MEMS or mechanical devices to sense or control helicopter motion.</p> <p>White Paper should address retrofitting existing fleet as well as implementation in new aircraft. Retrofit should be realistically bounded and perhaps prioritization should be assigned to those makes/models of helicopters that make up the largest percentage of the U.S. fleet.</p>
Time Line:	12 months
Target Completion Date:	June 1, 2019

Output 4:	
Description:	Promote White Paper to FAA (including Parts 27/29 rewrite working groups) and industry.
Lead Organization:	H-SE 70 team
Supporting Organizations:	<ul style="list-style-type: none"> • USHST Outreach Team • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • FAA – AIR, Compliance & Airworthiness Division
Actions:	<ol style="list-style-type: none"> 1. H-SE 70 team to promote White Paper to FAA. 2. H-SE 70 team to promote White Paper to industry.
Output Notes:	Promotion should include electronic or in-person meetings. Team may want to coordinate with FAA/EASA Part 27 Rewrite Committee.
Time Line:	6 months
Target Completion Date:	Dec. 1, 2019

**Helicopter Safety Enhancement (H-SE) 75:
Technology to Prevent Unintended Loss of Engine Power**

Safety Enhancement Action:	Technology/Equipment: Industry and FAA to encourage development and installation of Full Authority Idle Protection devices to prevent unintended loss of engine power.
Expected Implementers:	<ul style="list-style-type: none"> • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • FAA – AIR, Compliance & Airworthiness Division • USHST – Outreach Team (primarily Personal/Private and Aerial Application Focus Groups) • HAI – Technical Committee • Electronics manufacturers, Piston Engine manufacturers, and Helicopter manufacturers (GAMA to coordinate)
Statement of Work:	<p>This H-SE was intended primarily targeted at unintended loss of engine power in piston engine helicopters. Rapid throttle reduction is one of the common scenarios in which this situation can occur.</p> <p>Within the USHST LOC-I dataset, one fatal accident involved rapid throttle chop resulting in loss of engine power. The FAA and industry should encourage the development and installation of full authority idle protection (FAIP) devices (comparable to a full authority digital engine control or FADEC). This would increase safety by reducing the risk of engine stoppage during flight training maneuvers, particularly simulated engine failure in a piston helicopter. The type of device being suggested would be capable of ensuring the engine remains running at a nominal RPM despite a pilot making a rapid throttle reduction.</p> <p>The device may embody commercial off-the shelf (COTS) pneumatic, electronic or mechanical control to ensure the engine remains running at a practical RPM during a throttle chop. Fuel, spark, air and throttle plate position are the parameters to be controlled. The device may embody a COTS warning light or aural tone to indicate actual engine stoppage or FAIP system activation. The device is expected to function similar to COTS idle speed controls on automobiles, which have authority to maintain idle despite changing loads or driver inputs.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. USHST to coordinate formation of H-SE 75 team. 2. H-SE 75 team to meet with the FAA regarding certification pathways for FAIP devices.

	<p>3. H-SE 75 team to draft White Paper that identifies the need, technological options, and pathways to certification for FAIP devices.</p> <p>4. H-SE 75 team to promote White Paper to the FAA and industry.</p> <p>The following fatal accident prompted this safety enhancement: ERA10FA283</p>																								
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • Current FADEC controls on turbine engines, FADEC controls on the Porsche PFM piston aircraft engine, and current automotive technology. Each of these existing technologies provides active management of RPM that would be pertinent to throttle chop protection. • FAA and EASA have recently certified FADEC systems on turbo diesel engines with single power generation systems with 2 or more battery backups. • NORSEE is a reduced certification burden afforded to safety enhancing equipment that is not required by existing regulations. • Robinson Safety Notice (SN) 27, “Surprise Throttle Chops Can Be Deadly” https://robinsonheli.com/robinson-safety-notice/ • FAA Special Airworthiness Information Bulletin (SAIB) SW-12-12, Conducting Engine Failure Simulation in Helicopters with Reciprocating Engines. http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/0/8a901c9f99a4948c862579830058d9a8/\$FILE/SW-12-12.pdf 																								
Performance Goal Indicators:	<ul style="list-style-type: none"> • Meeting with the FAA concerning certification pathways. • Drafting for H-SE 75 White Paper. • Promotion of White Paper to the FAA. • Promotion of White Paper to industry. 																								
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>2</td> <td>June 1, 2018</td> <td>Aug. 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>3</td> <td>Aug. 1, 2018</td> <td>Nov. 1, 2018</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Nov. 1, 2018</td> <td>Nov. 1, 2019</td> </tr> <tr> <td>Output 4:</td> <td>6</td> <td>Nov. 1, 2019</td> <td>May 1, 2020</td> </tr> <tr> <td>Completion:</td> <td>23 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	2	June 1, 2018	Aug. 1, 2018	Output 2:	3	Aug. 1, 2018	Nov. 1, 2018	Output 3:	12	Nov. 1, 2018	Nov. 1, 2019	Output 4:	6	Nov. 1, 2019	May 1, 2020	Completion:	23 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																						
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Output 2:	3	Aug. 1, 2018	Nov. 1, 2018																						
Output 3:	12	Nov. 1, 2018	Nov. 1, 2019																						
Output 4:	6	Nov. 1, 2019	May 1, 2020																						
Completion:	23 months																								

Potential Obstacles:	Coordinating meetings with regulatory authorities.
Detailed Implementation Plan Notes:	
CICTT Code:	LOC-I
Output 1:	
Description:	USHST to coordinate formation of H-SE 75 team.
Lead Organization:	USHST
Supporting Organizations:	HAI – Technical Committee, OEMs (GAMA to coordinate)
Actions:	USHST to convene team of subject matter experts to support H-SE 75.
Output Notes:	
Time Line:	2 months
Target Completion Date:	Aug. 1, 2018
Output 2:	
Description:	Meet with the FAA regarding certification pathways for FAIP devices.
Lead Organization:	H-SE 75 team
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • HAI – Technical Committee • Electronics manufacturers (GAMA to coordinate) • Helicopter manufacturers (GAMA to coordinate)
Actions:	H-SE 75 team to coordinate meeting with FAA – Rotorcraft Standards Staff to: <ul style="list-style-type: none"> a. Describe the need for a FAIP in certain piston helicopters. b. Describe safety benefits. c. Discuss potential certification paths and availability of Non Required Safety Enhancing Equipment (NORSEE) path.
Output Notes:	
Time Line:	3 months
Target Completion Date:	Nov. 1, 2018
Output 3:	
Description:	Draft White Paper that identifies the need, technological options, and pathways to certification for FAIP devices.

Lead Organization:	H-SE 75 team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI – Technical Committee • Electronics manufacturers (GAMA to coordinate) • Helicopter manufacturers (GAMA to coordinate)
Actions:	<ol style="list-style-type: none"> 1. H-SE 75 team to draft White Paper that identifies the need and pathways to certification for FAIP technology for light helicopters. 2. H-SE 75 team to submit White Paper to USHST Steering Committee for review and approval.
Output Notes:	
Time Line:	12 months
Target Completion Date:	Nov. 1, 2019
Output 4:	
Description:	Promote White Paper to the FAA and industry.
Lead Organization:	H-SE 75 team
Supporting Organizations:	<ul style="list-style-type: none"> • USHST Outreach Team • FAA – AIR, Policy & Innovation Division, Rotorcraft Standards Staff • FAA – AIR, Compliance & Airworthiness Division • FAA/EASA part 27 Rewrite Committee
Actions:	<ol style="list-style-type: none"> 1. H-SE 75 team to promote White Paper to the FAA. 2. H-SE 75 team to promote White Paper to industry.
Output Notes:	Promotion should include electronic or in-person meetings.
Time Line:	6 months
Target Completion Date:	May 1, 2019

**Helicopter Safety Enhancement (H-SE) 81:
Improve Simulator Modeling for Outside-the-Envelope Flight Conditions**

<p>Safety Enhancement Action:</p>	<p>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),¹ and Level 4-7 Flight Training Devices (FTD) for outside-the-envelope flight conditions.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • FAA – AFS-200, AFS-800 • FAA – Tech Center, ANG-E2 • USHST – Special Emphasis Area (SEA) Training Team • Helicopter OEMs – General Aviation Manufacturers Association (GAMA) will coordinate • HAI – Training Committee • Simulation/Training Device Manufacturers
<p>Statement of Work:</p>	<p>The USHST’s working group analyzed 52 fatal accidents that occurred between 2009-2013 and found some cases where loss of control inflight (LOC-I) occurred during basic maneuvers (<i>e.g.</i>, hover, quick stop) and during unsuccessful attempted recovery from potentially unsafe conditions (<i>e.g.</i>, Loss of Tail Rotor Effectiveness, Settling with Insufficient Power). To address these issues, this H-SE seeks to improve the accuracy of full flight simulators (FFS)/flight training devices.</p> <p>The intent is to provide recommendations for developing better mathematical/physics-based models for helicopter flight dynamics in order to achieve more realistic, higher-fidelity simulations of outside-the-envelope flight conditions. Current models are not accurate at edge-of-the-envelope and outside-of-the-envelope flight regimes. This may lead to unrealistic training of maneuvers such as loss of tail rotor effectiveness, vortex ring state/settling with power, and autorotations and a negative transfer of training when similar situations are encountered during actual flight.</p> <p>There is the possibility of some overlap in the work between H-SE 81 and H-SE 127A. H-SE 127A addresses the possible use of</p>

¹ See, *e.g.*, FAA National Simulator Program, available at <https://www.faa.gov/about/initiatives/nsp/>.

	<p>simulation for purposes of preventing, recognizing, and recovering from spatial disorientation.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. USHST to coordinate formation of H-SE 81 team. 2. FAA, industry, and academia to review existing helicopter simulator/physics-based models and conduct research/testing to develop recommendations regarding improved helicopter mathematical/physics-based models. 3. FAA AFS-200/AFS-800 to update advisory circulars AC-120-45A and AC-61-136A (or create helicopter-specific variants) based on recommendations to facilitate use of improved fidelity helicopter flight dynamics models in helicopter simulators. 4. H-SE 81 team to conduct outreach to simulator and flight training device manufacturers regarding recommendations for higher-fidelity mathematical models. <p>The following 2 fatal accidents prompted this H-SE: WPR12GA106 CEN13FA205</p>																								
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • FAA Terminal Area Safety Stall Modelling Research • Rotorcraft ASIAs HFDM Research Helicopter Performance Based Models 																								
<p>Performance Goal Indicators:</p>	<ul style="list-style-type: none"> • Publication of recommendations for helicopter simulator mathematics/physics. • Revised FAA guidance to facilitate use of recommendations. • Recommendations promoted to industry. 																								
<p>Key Milestones:</p>	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%; text-align: center;"><u>Total Months</u></th> <th style="width: 20%; text-align: center;"><u>Start Date</u></th> <th style="width: 50%; text-align: center;"><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td style="text-align: center;">2</td> <td style="text-align: center;">Sept. 15, 2017</td> <td style="text-align: center;">Nov. 15, 2017</td> </tr> <tr> <td>Output 2:</td> <td style="text-align: center;">24</td> <td style="text-align: center;">Nov. 15, 2017</td> <td style="text-align: center;">Nov. 15, 2019</td> </tr> <tr> <td>Output 3:</td> <td style="text-align: center;">24–36</td> <td style="text-align: center;">Nov. 15, 2019</td> <td style="text-align: center;">Nov. 15, 2022</td> </tr> <tr> <td>Output 4:</td> <td style="text-align: center;">9</td> <td style="text-align: center;">Nov. 15, 2022</td> <td style="text-align: center;">Aug. 15, 2023</td> </tr> <tr> <td>Completion:</td> <td colspan="3" style="text-align: center;">59–71 months</td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	2	Sept. 15, 2017	Nov. 15, 2017	Output 2:	24	Nov. 15, 2017	Nov. 15, 2019	Output 3:	24–36	Nov. 15, 2019	Nov. 15, 2022	Output 4:	9	Nov. 15, 2022	Aug. 15, 2023	Completion:	59–71 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																						
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Output 4:	9	Nov. 15, 2022	Aug. 15, 2023																						
Completion:	59–71 months																								

Potential Obstacles:	<ul style="list-style-type: none"> • Cost • Lack of available data / proprietary limitations on data • Government procedures for updating guidelines/policy • Lack of government resources to undertake H-SE
Detailed Implementation Plan Notes:	<p>To be successful, this H-SE requires expertise in simulation design. The authors and reviewers of this H-SE noted that the description of the what it is supposed to accomplish may not be at a sufficient level of detail for those who work in simulation design, so further refinement may be needed after consultation with simulation experts.</p> <p>Data exists from helicopter original equipment manufacturers or could be obtained through flight tests, aerodynamic models, wind tunnel tests, etc., to quantify and refine the models developed for use in the simulators. To implement the recommendations, changes to simulation software for AATDs and simulators may be required.</p>
CICTT Code:	LOC-I
Output 1	
Description:	Form H-SE 81 team.
Lead Organization:	USHST
Supporting Organizations:	
Actions:	USHST to convene team of subject matter experts to support H-SE 81.
Output Notes:	
Time Line:	2 months
Target Completion Date:	Nov. 15, 2017
Output 2:	
Description:	Coordinate with the FAA, industry, and academia to review existing helicopter simulator/physics-based models and conduct research/testing to develop recommendations for improved helicopter mathematical/physics-based models.
Lead Organization:	H-SE 81 Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AFS-800 (General Aviation and Commercial Division) • FAA – AFS-200 (National Simulator Program Office) • FAA – Tech Center, ANG-E2 • Simulation/Flight Training Manufacturers • Helicopter OEMs (GAMA to coordinate)

	<ul style="list-style-type: none"> • Helicopter Operators (<i>e.g.</i>, Flight Training Schools) • Academia (<i>e.g.</i>, Embry Riddle)
Actions:	<ol style="list-style-type: none"> 1. H-SE 81 to lead review of current simulator/flight training device models for fidelity and gaps in model data for outside-of-the-envelope flight regimes (<i>e.g.</i>, Hover, Quick Stop, LTE, VRS, Autorotations). 2. Collect simulation data from various simulator/training devices, helicopter types, and operators (<i>e.g.</i>, Flight Safety, CAE, ELITE, FRASCA, X-Plane, Microsoft Flight Simulator, etc.) and flight test data from operators performing candidate maneuvers across various mission segments. 3. Use data to develop recommendations for improved mathematical/physics-based flight dynamics simulator models. Test improved mathematical/physics-based flight dynamics simulator models as applicable and feasible.
Output Notes:	Models need to capture non-linear behavior of rotorcraft flight dynamics, particularly, mapping rotor rpm within an allowable range within the simulation. Incorporate blade dynamics within the models. Blade dynamics are critical in defining model specific aerodynamic behavior of a disk and with it phenomena specific to that type. For example, for Robinson products, their blade dynamics differ greatly from other “semi-rigid” systems (as the case could be made they are “semi-articulated” systems). and as such give us Low-G and Rotor stall concerns (which need to be addressed within LTE phenomena). These considerations should be made for both “semi-rigid” and “rigid” rotor systems.
Time Line:	24 months
Target Completion Date:	Nov. 15, 2019
Output 3:	
Description:	Update advisory circulars AC-120-45A and AC-61-136A (or create helicopter-specific variants) based on recommendations to facilitate use of improved fidelity helicopter flight dynamics models in helicopter simulators.
Lead Organization:	FAA – AFS-200 (AC-120-45A) and AFS-800 (AC-61-136A)
Supporting Organizations:	H-SE 81 Team
Actions:	Develop changes to FAA advisory circulars governing fidelity of simulators/flight training devices.
Output Notes:	The FAA believes that this can be done with updates to advisory circulars, as well as any policy/guidance documents and not

	through rulemaking, however, if those routes prove unsuccessful, an update to Part 61 is always possible as an alternate path.
Time Line:	24–36 months
Target Completion Date:	Nov. 15, 2022 <i>(for 36 mos)</i>
Output 4:	
Description:	USHST Outreach Team to initially communicate with simulator and flight training device manufacturers regarding recommendations for higher-fidelity mathematical models. Following the initial meetings, outreach can go out to the broader helicopter community.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • H-SE 81 Team • HAI – Training Committee
Actions:	<ol style="list-style-type: none"> 1. H-SE 81 team to meet with simulator and training device OEMs and training providers to discuss recommendations for higher-fidelity models. 2. H-SE 81 team to present research and recommendations at helicopter community events.
Output Notes:	
Time Line:	9 months <i>(to organize and conduct initial outreach)</i>
Target Completion Date:	Aug. 15, 2023

**Helicopter Safety Enhancement (H-SE) 82:
Helicopter Flight Data Monitoring**

<p>Safety Enhancement Action:</p>	<p>Technology/Equipment: FAA and industry promote installation and use of data recording devices (<i>e.g.</i>, 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.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • FAA – AVP-200, AFS-800 • FAA – AIR Policy & Innovation Division, Rotorcraft Standards Staff • FAA Safety Team (FAAST) • USHST Outreach Team • General Aviation Manufacturers Association (GAMA) • Helicopter Association International (HAI) Safety Committee • Helicopter Flight Data Monitoring (HFDM) Device Manufacturers
<p>Statement of Work:</p>	<p>To help prevent fatal rotorcraft accidents due to Loss of Control Inflight (LOC-I), Unintended Instrument Meteorological Conditions (UIMC), and Low Altitude (LALT), the rotorcraft community would benefit from increased use of flight data monitoring. Helicopter Flight Data Monitoring (HFDM) devices, including audio/video recording devices, offer the ability to collect data on normal and off-nominal operations and have been proven to improve safety in other types of aviation communities.</p> <p>A review of the 52 LOC-I, UIMC, and LALT fatal accidents from the 2009–2013 USHST dataset indicated that the majority of fatal accidents that occurred had insufficient data surrounding the details of the helicopter’s state (<i>i.e.</i>, flight data, audio/video from the cockpit, control positions, etc.) when the event occurred. This is in direct contrast to commercial aviation where flight data recorders and cockpit voice recorders provide investigators and operators with a multitude of parameters for accident/incident investigation and trend/anomaly detection. Although some of the helicopters in the dataset did have flight data monitoring devices installed, they were in the minority. This clearly indicated to the working group that more needs to be done.</p>

Perhaps more importantly, data recording devices enable proactive intervention before an event occurs. Based on some of the fatal accidents in the 2009-2013 dataset, the USHST working group thought flight data monitoring system could have made a difference if it was operated as part of a voluntary safety program (ASIAS and other comparable programs). Hazardous behavior could have been identified with the opportunity to break the accident chain before it resulted in a fatality.

With the benefits evident from the USHST working group's analysis, this H-SE seeks to conduct a promotional safety campaign to encourage the industry to equip as many helicopters within the rotorcraft community with helicopter flight data monitoring recording devices as possible.

Project:

1. The FAA and industry to develop an educational outreach campaign that addresses the following:
 - a. Fundamentals of why the use of data recording devices is valuable to an owner/operator (What is HFDM? How can it be used? How is it part of an effective SMS?).
 - b. Specific examples of the benefits to using HFDM as described by success stories of those who were early adopters.
 - c. How data recording can work side by side with participation in voluntary safety programs such as Aviation Safety Information Analysis and Sharing (ASIAS) and provide information back to the owner/operator on trends and higher risk areas.
2. To better promote installation and use of data recording devices, the FAA should clarify the following policy issues:
 - a. Participation in "approved" vs. "unapproved" FOQA/FDM programs
 - b. Interpretation of major vs. minor change/alteration
 - c. Ability to seek a Field Approval vs. Supplemental Type Certificate for installation of Flight Data Recorders

	<p>d. Details of the Helicopter Flight Data Monitoring System (HFDMS) per the 2018 Helicopter Air Ambulance rule and AC 135-14B.</p> <p>The following 15 fatal accidents prompted this SE:</p> <table> <tr> <td>CEN10FA424</td> <td>ERA14FA010</td> </tr> <tr> <td>CEN10FA509</td> <td>WPR09FA104</td> </tr> <tr> <td>CEN12FA621</td> <td>WPR11FA239</td> </tr> <tr> <td>CEN13FA357</td> <td>WPR11FA350</td> </tr> <tr> <td>ERA09FA417</td> <td>WPR12FA282</td> </tr> <tr> <td>ERA10FA283</td> <td>WPR12LA259</td> </tr> <tr> <td>ERA10LA348</td> <td>WPR13FA080</td> </tr> <tr> <td>ERA13FA273</td> <td></td> </tr> </table>	CEN10FA424	ERA14FA010	CEN10FA509	WPR09FA104	CEN12FA621	WPR11FA239	CEN13FA357	WPR11FA350	ERA09FA417	WPR12FA282	ERA10FA283	WPR12LA259	ERA10LA348	WPR13FA080	ERA13FA273	
CEN10FA424	ERA14FA010																
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ERA09FA417	WPR12FA282																
ERA10FA283	WPR12LA259																
ERA10LA348	WPR13FA080																
ERA13FA273																	
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • FAA Rotorcraft ASIAs HFDM Research • NTSB Goal – Expand Recorder Use to Enhance Safety • Previous IHST/USHST Safety Recommendation - Implement FDM Recorders in Helicopters 																
Performance Goal Indicators:	Effective outreach to rotorcraft community that clearly communicates the safety benefits of installing data recording devices.																
Key Milestones:	<table> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>30</td> <td>Feb. 1, 2018</td> <td>Aug. 1, 2020</td> </tr> <tr> <td>Output 2:</td> <td>18</td> <td>Aug. 1, 2020</td> <td>Feb. 1, 2022</td> </tr> <tr> <td>Completion:</td> <td>48 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	30	Feb. 1, 2018	Aug. 1, 2020	Output 2:	18	Aug. 1, 2020	Feb. 1, 2022	Completion:	48 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>														
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Output 2:	18	Aug. 1, 2020	Feb. 1, 2022														
Completion:	48 months																
Potential Obstacles:																	
Detailed Implementation Plan Notes:	<p>This H-SE relates to components of H-SE 100 (digital copilot). H-SE 100 also scored above the Mendoza Line. It involves some data collection although that device is more advisory/pilot-assist carry on equipment. More specifically, H-SE 100 states:</p> <p>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.</p> <p>H-SE 82 also relates to H-SEs 13, 80, 89, 98, and 110, which fell below the Mendoza line:</p>																

	<ul style="list-style-type: none"> a. IS 13, Outreach: FAA and industry establish an Infoshare for helicopter CFIs. b. IS 80, Technology/Equipment: Industry improve management of main rotor rpm during flight to include: 1) automated main rotor rpm management systems, 2) better annunciation/warning system for main rotor rpm. c. IS 89, Technology/Equipment: Industry develop smart cockpit technology that would assist in pilot decision making for landing guidance provided to the pilot color based (<i>e.g.</i>, HTAWS), pilot-worn (panel mount, EFB, or HWD), also aural alerting. d. IS 98, Technology/Equipment: Industry to work with owner of power and distribution line databases to fuse relevant and up to date wire data into pilot planning and enroute tools. e. IS 110: Training and Outreach. Improve education on the risks of operating in the low level environment. Education must address differences between flight in the low level environment for necessity of performing work (<i>e.g.</i>, aerial application spraying) as compared to unnecessary low-level transit flight when flight at a higher altitude is an option. <p>With reference to the work of the GAJSC, this H-SE relates to GAJSC SCF-PP SEs 39 and 43 and to LOC SEs 14 and 22.</p> <p>Messaging of the promotion effort will be essential to building a foundation for success.</p> <ul style="list-style-type: none"> a. Communication must avoid the “big brother” perception. The message should seek to educate operators on the benefit of being able to interpret their data and see how close they are to risks that perhaps they were previously unaware existed. b. If insurance companies supported this effort, they could be powerful advocates to helicopter owners. c. Find recommended practices (success stories) on the use of FDR and educate the helicopter community on them (as part of this, ask some of the operators already using HFDM). Dialogue this with manufacturers.
CICTT Code:	LOC, UIMC, LALT

Output 1:	
Description:	<p>Develop an educational outreach campaign that address the following:</p> <ol style="list-style-type: none"> a. Fundamentals of why the use of data recording devices is valuable to an owner/operator (What is HFDM? How can it be used? How is it part of an effective SMS?). b. Specific examples of the benefits to using HFDM as described by success stories of those who were early adopters. c. How data recording can work side by side with participation in voluntary safety programs such as Aviation Safety Information Analysis and Sharing (ASIAS) and provide information back to the owner/operator on trends and higher risk areas.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AVP-200 & ANG-E2 • FAAST • HAI Safety Committee • HFDM Device Manufacturers
Actions:	<ol style="list-style-type: none"> 1. USHST Outreach Team review current industry materials describing HFDM (<i>i.e.</i>, Fact Sheets, Toolkits, etc.) from USHST/IHST, Global HFDM Steering Group, Rotorcraft ASIAS HFDM research, etc. and develop modifications for new materials and media types (<i>i.e.</i>, audiovisual, mobile app, etc.) for the educational outreach campaign. 2. USHST Outreach team work with the FAA, ANG-E2 to conduct HFDM Knowledge Sessions and safety seminars and outreach sessions at targeted events (<i>i.e.</i>, HeliExpo, Sun ‘N Fun, Oshkosh, ALEA, AMTC, Airshows, FAAST Team events, HAI World Helicopter Day, etc.). 3. USHST Outreach Team and the FAA, ANG-E2 develop and implement a pilot program (<i>i.e.</i>, similar to the General Aviation Demo Project) for expanding recorder usage among targeted helicopter mission segments. 4. The FAA and ANG-E2 collect helicopter flight test data from multiple helicopter types and mission segments for incorporation into ASIAS to demonstrate practical ASIAS capabilities to audiences during outreach.
Output Notes:	The following is a summary of how data recording can work side by side with ASIAS.

	<p>ASIAS serves as a central conduit for the exchange of safety information between and among the Federal Aviation Administration (FAA) and others in the aviation community. ASIAS has become a national resource for the aggregation, analysis, and dissemination of aviation safety data and products. It serves as the central repository for data and analytical tools used to establish a shared service that enables the FAA to enhance its safety decision making with greater access to relevant data and powerful analytical tools.</p> <p>The aggregation and fusion of data from multiple sources in ASIAS will enrich the SMS process by enabling comprehensive analyses that provide a more complete understanding of contributing factors that extends beyond single root causes. Aggregation and fusion will also support the development of mitigation strategies and the measurement of their effectiveness. ASIAS provides risk assessment capabilities that can identify emerging safety issues that may otherwise be undetectable through individual data sources or unnoticed by operators who lack insight into hazards that are occurring across the NAS.</p>
Time Line:	30 months
Target Completion Date:	Aug. 1, 2020
Output 2:	
Description:	<p>To better promote installation and use of data recording devices, the FAA should clarify the following policy issues:</p> <ol style="list-style-type: none"> a. Participation in “approved” vs. “unapproved” FOQA/FDM programs (<i>i.e.</i>, Advisory Circulars) b. Interpretation of major vs. minor change/alteration c. Ability to seek a Field Approval vs. Supplemental Type Certificate for installation of Flight Data Recorders d. Details of the Helicopter Flight Data Monitoring System (HFDMS) per the 2018 Helicopter Air Ambulance rule
Lead Organization:	FAA – AFS-230/300
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – FSDOs • FAA – AIR Policy & Innovation Division, Rotorcraft Standards Staff • GAMA

Actions:	<ol style="list-style-type: none"> 1. FAA, AFS-230/300 clarify policy on “approved” vs/ “unapproved” HFOQA/HFDM programs to apply to helicopters. 2. FAA, AFS-230/300 develop bulletin to FSDOs outlining the FAA policy for consistent application of Field Approval vs. STC decision path for installation of safety-enhancing equipment such as HFDM devices. 3. FAA, AFS-230/300 consider necessity for any further guidance (Advisory Circular, Order, etc.) that would remove perceived barriers and increase operators voluntary installing data recording devices.
Output Notes:	The FAA believes that this can be done with updates to advisory circulars, as well as any policy/guidance documents and not through rulemaking.
Time Line:	18 months
Target Completion Date:	Feb. 1, 2022

**Helicopter Safety Enhancement (H-SE) 91:
Enhanced Helicopter Vision Systems**

<p>Safety Enhancement Action:</p>	<p>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.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • FAA – AFS-250, 400, 800 • FAA – AIR, Policy & Innovation Div, Rotorcraft Standards Staff • FAA – Civil Aerospace Medical Institute (CAMI) • Helicopter Association International (HAI) • Association of Air Medical Services (AAMS) • Air Medical Operators Association (AMOA) • National EMS Pilots Association (NEMSPA) • HeliOffshore • Helicopter Safety Advisory Conference (HSAC) • Industry Vision Systems Manufacturers • Airborne Law Enforcement Association (ALEA) • Helicopter manufacturers (GAMA to coordinate)
<p>Statement of Work:</p>	<p>In the analysis of the 52 fatal accidents from 2009–2013, the USHST working group observed cases where either night conditions or deteriorating weather influenced the fatal outcome. These cases led to the recommendation for increased use of vision-enhancing technologies. The technology would have particular usefulness during night flight and during situations where unexpected degraded visibility from adverse weather is encountered.</p> <p>This H-SE has the potential to be misapplied and the result could be a decrease rather than an increase in safety. In development of this H-SE, the intent of the USHST working group was <u>NOT</u> to equip pilots to fly in worse weather. Instead, the intent was to provide pilots with</p>

	<p>better tools that can contribute to more informed and proactive decision making as related to visibility.</p> <p>An underlying assumption in this H-SE is that low-visibility conditions are more hazardous than high-visibility conditions. Use of NVGs has become more common among helicopter operators as one way to address the hazards of low visibility at night. Full enhanced/synthetic vision systems could follow a similar path for night operations and also for better avoiding low visibility conditions either during the night or the day.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. FAA to research and evaluate helicopter vision-enhancing technologies and operational concepts for advanced vision systems. This will require communication with existing industry vision system manufacturers to get a well-informed perspective of currently available technology. 2. FAA to develop policy changes to allow for the use of vision-enhancing technologies (Update FAA Order 8260.42B Advisory Circulars 90-80B, 90-106A, and FSIMS 8900.1). Review 14 C.F.R. § 91.175/176 and decide whether a regulatory revision through rulemaking would be necessary for the H-SE to be implemented. 3. Industry and FAA to develop and conduct outreach program to promote use of vision-enhancing technologies. <p>The following fatal accidents prompted this safety enhancement: WPR10FA055 CEN13FA096</p>
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • FAA Helicopter Advanced Vision Systems Research • EUROCAE Working Group 79 • RTCA Special Committee 213 • HAI Land & Live • SAE G-10/A-4 Committee on Enhanced/Synthetic Vision • 14 C.F.R. § 91.175/91.176
<p>Performance Goal Indicators:</p>	<ul style="list-style-type: none"> • List of current vision systems enhancing technologies available and their compatibility with rotorcraft. • If necessary due to lack of compatible vision systems enhancing technologies currently available, a report on

	<p>operational concepts for utilization of helicopter vision-enhancing systems.</p> <ul style="list-style-type: none"> • Policy/guidance changed to encourage installation/use of vision systems enhancing technologies. • Effective promotion, including education on the use, of vision systems enhancing technologies to industry. 																				
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>12</td> <td>Feb. 1, 2018</td> <td>Feb. 1, 2019</td> </tr> <tr> <td>Output 2:</td> <td>24 – 36</td> <td>Feb. 1, 2019</td> <td>Feb. 1, 2022</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Feb. 1, 2022</td> <td>Feb. 1, 2023</td> </tr> <tr> <td>Completion:</td> <td colspan="3">48–60 months</td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	12	Feb. 1, 2018	Feb. 1, 2019	Output 2:	24 – 36	Feb. 1, 2019	Feb. 1, 2022	Output 3:	12	Feb. 1, 2022	Feb. 1, 2023	Completion:	48–60 months		
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Completion:	48–60 months																				
Potential Obstacles:	Regulatory Obstacles (Operational Approval and Certification), technology obstacles, cost versus benefit.																				
Detailed Implementation Plan Notes:	<p>Significant dates to consider related to outreach would be 2018 HELI-EXPO (Feb 26 – Mar 01). Other mass industry conventions and gatherings should also be considered.</p> <p>This H-SE also relates to components of the following intervention strategies developed by the USHST working group that scored below the Mendoza Line:</p> <ol style="list-style-type: none"> IS 88, Technology/Equipment: Industry to develop a means to provide pilots with horizontal warning indication to maintain a safe distance from obstacles. The intent is to alert pilots of reduced horizontal separation in order to avoid a collision with obstacles. (Brainstorming ideas: geofencing ideas) IS 89, Technology/Equipment: Industry develop smart cockpit technology that would assist in pilot decision making for landing guidance provided to the pilot color-based (i.e. like HTAWS), pilot-worn (panel-mount, EFB, or HWD), also aural alerting. IS 96, Technology/Equipment: Industry continue to develop more accurate, low cost, lightweight wire detection systems for installation on the aircraft. IS 151, Research: FAA and Industry partner to examine use of vision system technologies to display and alert for air borne hazards; <i>i.e.</i>, wires, sensors, or data base. 																				

	This H-SE also has some relation to the GA-JSC’s SCF-PP working group SE 49 Outreach-Topic Eight: Enhanced Vision Systems. CAST SE-113 is also related to this effort.
CICTT Code:	LOC-I, UIMC
Output 1:	
Description:	Research and evaluate helicopter vision-enhancing technologies and operational concepts for advanced vision systems.
Lead Organization:	FAA –ANG-E2 (Aviation Research Division)
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AFS-400 (Flight Technologies and Procedures Division), AFS-800; AIR – Policy & Innovation Division, Rotorcraft Standards Staff; CAMI • Industry Vision Systems Manufacturers • Avionics Manufacturers • Helicopter OEMs
Actions:	<ol style="list-style-type: none"> 1. FAA – ANG-E2 should engage with industry to review the current vision systems enhancing technologies available and how compatible they may be with rotorcraft. A survey of industry vision systems manufacturers may be necessary as part of this effort. FAA – ANG-E2 should compile the results of this review in support of the FAA internal discussion described in Step 2. 2. FAA – ANG-E2, AFS-400, AFS-800, and AIR-Rotorcraft Standards Staff should meet to discuss any existing operational and certification barriers (regulation, policy, guidance) that may have either discouraged or prohibited use of already available advanced vision technologies. These will be issues the FAA should resolve in Output 2. 3. Following the FAA discussion from Step 2, if there are currently available vision systems enhancing technologies that could be accepted and installed by the rotorcraft community without significant action necessary by the FAA, this type of technology should be promoted immediately and not delayed by further study (skip to Output 3, “promotion”). However, if options are limited and further study is required, FAA – ANG-E2 should do the following: <ol style="list-style-type: none"> a. Conduct a study on pilot performance and human factors aspects of vision-enhancing system displays via flight testing.

	<ul style="list-style-type: none"> b. Conduct a study on vision systems' sensor technologies and performance via flight and ground testing. c. Examine obstacle-detection capabilities with vision systems technologies (<i>i.e.</i>, wire detection with FLIR, LIDAR, MMWIR, etc.). <p>4. At the conclusion of this output, FAA- ANG-E2 should develop a report on operational concepts for utilization of helicopter vision-enhancing systems in low-visibility operations (<i>i.e.</i>, night, IMC, etc.) and enhanced VFR.</p>
Output Notes:	This will require communication with existing industry vision system manufacturers to get a well-informed perspective of currently available technology.
Time Line:	12 months
Target Completion Date:	Feb. 1, 2019
Output 2:	
Description:	Develop policy and operational changes to allow for the use of vision-enhancing technologies (Update FAA Order 8260.42B Advisory Circulars 90-80B, 90-106A, and FSIMS 8900.1). Review 14 C.F.R. § 91.175/176 and decide whether a regulatory revision through rulemaking would be necessary for the H-SE to be implemented.
Lead Organization:	FAA AFS-400
Supporting Organizations:	<ul style="list-style-type: none"> • FAA – AIR – Policy & Innovation Division • Rotorcraft Standards Staff • CAMI
Actions:	<p>The recommended approach is for the FAA to pursue the least arduous path to allow availability of some level of vision-enhancing technologies. Preferably, this approach would be no more complex than a revision to policy or guidance. The following represents a potential list of policy and guidance that would require either development or update. There is also one regulatory reference listed also included. Given that rulemaking is a slow, time consuming process, pursuing regulatory change could jeopardize implementation of this H-SE ever occurring and should be pursued only as a last resort, and certainly only if absolutely necessary.</p> <ol style="list-style-type: none"> 1. Update FAA Order 8260.42B. 2. Update FAA Advisory Circular 9080-C. 3. Revise FSIMS 8900.1. 4. Update FAA Advisory Circular 90-106A (or create a new Advisory Circular specific to helicopters).

	<p>5. Review § 91.175/176. Consider whether rulemaking is necessary and pursue this path only if necessary for successful implementation of the H-SE.</p> <p>6. Implement resolution to any issues identified as FAA barriers in Step 2 of Output 1.</p>
Output Notes:	Stay true to the intent of the H-SE. Do not allow “add-on” revisions to policy and/or guidance to delay this H-SE progressing.
Time Line:	24 – 36 months (several years longer if rulemaking is needed).
Target Completion Date:	Feb. 1, 2022
Output 3:	
Description:	Develop and conduct outreach program to promote training on and use of vision-enhancing technologies.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAAST • HAI – Safety Committee • AMOA • AAMS • HSAC • HeliOffshore • NEMSPA
Actions:	<ol style="list-style-type: none"> 1. Develop outreach program (includes materials such as videos, mobile applications, trifolds, brochures, slogans/messaging, etc.). 2. Conduct outreach with industry trade associations, at industry forums/conferences, and through other targeted methods for specific mission segments. 3. Measure progress by how many operators were equipped with Vision Systems technology before and after outreach.
Output Notes:	
Time Line:	12 months (<i>for initial outreach effort; would be ongoing even after 12 months</i>)
Target Completion Date:	Feb. 1, 2023

**Helicopter Safety Enhancement (H-SE) Number 115/128:
Threat and Error Management for Initial and Recurrent Pilot Training**

Safety Enhancement Action:	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.
Expected Implementers:	<ul style="list-style-type: none"> • FAA AFS-800, AFS-630 • FAA Safety Team (FAAST) • Helicopter Association International (HAI) Training Committee (TC) • USHST Special Emphasis Area (SEA) Training Team
Statement of Work:	<p>Within the USHST’s LOC-I, UIMC, and LALT dataset from 2009-2013, fourteen (14) out of fifty-two (52) fatal accidents had a recommendation to improve aeronautical decision making (H-SE 115) as the result of pilot decision errors that either caused or contributed to the fatal accident. Another three (3) fatal accidents in the data set recommended increased teaching of TEM (H-SE 128) for the same reason.</p> <p>Whereby traditional decision-making paradigms focus largely on reactive and proactive means of flight crew situation management, TEM focuses on a predictive process to eliminate threats and errors before, during, and after each flight. Since its inception and introduction to airline operations, TEM has, as part of larger safety efforts, drastically reduced total accidents within the world-wide airline community. TEM has evolved since its initial testing during Line Operational Safety Audits between Delta Airlines and the University of Texas Human Factors Research School in 1994. Although TEM generally is taught in conjunction with Cockpit Resources Management (CRM), TEM is actually the latest evolution/iteration of the CRM concept: It is defined as “the process of detecting and responding to threats and errors to ensure that the ensuing outcome is inconsequential, <i>i.e.</i>, the outcome is not an error, further error or an undesired aircraft state.”</p> <p>Although introduced by the airlines into initial and recurrent pilot training, the General Aviation community and regulatory training requirements lack a structured system for teaching TEM. 14 C.F.R. Part 61 has not been updated in accordance with the ICAO requirement to introduced TEM in initial flight training programs (such as the PPL).</p> <p>Project:</p>

	<ol style="list-style-type: none"> 1. FAA, in conjunction with USHST SEA Training Team and HAI TC, to develop recommended practices for incorporating TEM into initial and recurrent helicopter training. 2. FAA to revise Advisory Circular (AC) 60-22, <i>Aeronautical Decision Making</i> (or issue new AC, as appropriate) to incorporate TEM recommendations. 3. FAA to incorporate TEM principles in the Helicopter Flying Handbook (FAA-H-8083-21A), Helicopter Instructor’s Handbook (FAA-H-8083-4), the Aviation Instructor’s Handbook (FAA-H-8083-9A), and Pilot’s Handbook of Aeronautical Knowledge (FAA-H-8083-25B) 4. FAA to incorporate TEM as a recommended component in flight training syllabi under 14 CFR Part 141, <i>Pilot School</i>, through revision of Advisory Circular (AC) 141-1A, <i>Pilot Certification</i>. 5. FAASTeam, HAI TC, and USHST SEA Training Team to provide outreach and guidance to training community for aligning training curricula with recommended practices. <p>The following fatal accidents prompted this safety enhancement:</p> <p>ANC13GA036 ERA09FA417 CEN09PA348 ERA09FA537 CEN10FA019 ERA10FA403 CEN10FA509 ERA12MA122 CEN12FA621 ERA13FA014 CEN13FA003 ERA13FA336 CEN13FA205 ERA13GA046 CEN13FA295 WPR10GA097 WPR12FA282</p>
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • ICAO Annex 1, Chapter 2, Section 2.3 - Private Pilot License “Human performance” • ICAO Doc 9683 - Human Factors Training Manual • ICAO Doc 9868 - PANS-TRG (guidance material on the application of Threat and Error Management) • Lufthansa MPL Fixed Wing Training Program • Australian Transport Safety Bureau GAPAN TEM “Train the Trainer” (implementing TEM in basic flying training) • Other USHST H-SEs (37 and 124) also plan to recommend revisions to some of the same FAA Handbooks referenced in H-SE 115_128. Submission of revisions from each H-SE must be

	<p>closely coordinated together to ensure consistency of recommendations. There is a benefit to aligning all of them for a single, collective submission with the goal to have all recommendations incorporated during a single revision cycle of the handbooks.</p>																								
Performance Goal Indicators:	<ul style="list-style-type: none"> • Publication of revised Advisory Circular AC 60-22 (or new AC as applicable) to include mention of TEM and how to introduce in pilot training curricula. • Revision to FAA-8083-4 and FAA-8083-9A Handbooks to include TEM references and implementation guidelines. • Revision of AC 141-1A, as amended, to incorporate TEM in Part 141 training courses. 																								
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Output 5:	6	Jan. 1, 2022	July 1, 2022																						
Potential Obstacles:	<ul style="list-style-type: none"> • Subject matter expert agreement on TEM best practices • FAA approval process for revised ACs and handbooks. 																								
Detailed Implementation Plan Notes:	<p>The focus should be on syllabi related to Flight Instructor courses (“train the trainer”). Information should remain general so current certificated pilots can start to be exposed to the concept. Consider coordination with companies that provide market-ready commercial training course outlines.</p> <p>Although this H-SE does not consider rulemaking, if the project’s scope changes during implementation and measurable outcomes prove validity of the concept, rulemaking perhaps should be considered in the future.</p>																								
CICTT Code:	LALT / LOC-I / UIMC																								

Output 1:

Description:	Develop recommended practices for incorporating TEM into initial and recurrent helicopter training.
Lead Organization:	FAA AFS-800
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team
Actions:	<ol style="list-style-type: none"> 1. FAA, USHST SEA Training Team, and HAI TC to review existing materials on teaching TEM. 2. FAA, USHST SEA Training Team, and HAI TC to develop recommendations for implementing TEM in initial and recurrent helicopter pilot training. In completing this work, the group should examine TEM within the context of the LOC-I, UIMC, and LALT fatal accidents analyzed by the USHST working group to guide their recommendations. 3. FAA, USHST SEA Training Team, and HAI TC to issue recommendations.
Output Notes:	<p>Recommendations should be issued in a form that facilitates use in subsequent outputs.</p> <p>The task of H-SE 30 is to develop and publish ACS for Rotorcraft-Helicopter series to replace the current PTS. Recommendations from Output 1 of H-SE 115_28 should be shared with the individuals engaged in the implementation of H-SE 30 so that TEM is appropriately considered in the ACS for Rotorcraft-Helicopter development.</p>
Time Line:	12 months
Target Completion Date:	Jan. 1, 2019
Output 2:	
Description:	Revise Advisory Circular (AC) 60-22, <i>Aeronautical Decision Making</i> (or issue new AC, as appropriate) to incorporate TEM recommendations.
Lead Organization:	FAA AFS-820
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team
Actions:	FAA to incorporate TEM recommendations in AC 60-22, as appropriate, or issue a new AC.
Output Notes:	FAA should request drafting suggestions from USHST SEA Training Team and HAI TC.

	The priority action for Output 2 is revision to AC 60-22. If there is a parallel opportunity to update the FAA’s Risk Management Handbook (FAA-H-8083-2, as amended) with the TEM recommendations, however, it should be considered.
Time Line:	24–36 months (potentially in parallel with Outputs 3 &4)
Target Completion Date:	January 1, 2022
Output 3:	
Description:	Incorporate TEM principles in the Helicopter Flying Handbook (FAA-H-8083-21A), Helicopter Instructor’s Handbook (FAA-H-8083-4), the Aviation Instructor’s Handbook (FAA-H-8083-9A), and Pilot’s Handbook of Aeronautical Knowledge (FAA-H-8083-25B)
Lead Organization:	FAA AFS-630
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team
Actions:	FAA to incorporate TEM into the Helicopter Flying Handbook, Helicopter Instructor’s Handbook, Aviation Instructor’s Handbook, and Pilot’s Handbook of Aeronautical Knowledge.
Output Notes:	<ol style="list-style-type: none"> 1. FAA should request drafting suggestions from USHST SEA Training Team and HAI TC. 2. The typical revision cycle for the FAA handbooks is 3 to 5 years. Optimally, submission of the TEM principles for inclusion in the handbooks will line up with the revision cycles. If not, there will need to be discussions with the FAA about whether an out of cycle revision is possible. 3. There are other USHST H-SEs that also suggested revisions to the handbooks. For purposes of efficiency and to emphasize the collective urgency associated with these revisions, they should be submitted to the FAA together.
Time Line:	24–36 months (potentially in parallel with Outputs 2 & 4)
Target Completion Date:	Jan. 1, 2022
Output 4:	
Description:	Incorporate TEM as a recommended component in flight training syllabi under 14 C.F.R. Part 141, <i>Pilot School</i> , through revision of Advisory Circular (AC) 141-1A, <i>Pilot Certification</i> .
Lead Organization:	FAA AFS-840
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC, • USHST SEA Training Team

Actions:	FAA to revise AC 141-1A to incorporate TEM as a recommended component in flight training under Part 141.
Output Notes:	FAA should request drafting suggestions from USHST SEA Training Team and HAI TC. Similar incorporations/revisions should be considered for guidance material related to 14 C.F.R. Part 61, <i>Certification: Pilots, Flight Instructors, and Ground Instructors</i> , as well as 14 C.F.R. Part 142, <i>Training Centers</i> .
Time Line:	24–36 months (potentially in parallel with Outputs 2 & 3)
Target Completion Date:	Jan. 1, 2022
Output 5:	
Description:	Provide outreach and guidance to the training community for aligning training curricula with recommended practices.
Lead Organization:	FAAST
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team
Actions:	<ol style="list-style-type: none"> 1. FAAST to conduct print/video/web outreach regarding TEM recommendations. 2. HAI TC and USHST SEA Training Team to present on recommendations at key helicopter community events, focusing on training-related/CFI events.
Output Notes:	
Time Line:	6 months (for initial outreach; will be ongoing after 6 months).
Target Completion Date:	July 1, 2022

**Helicopter Safety Enhancement (H-SE) 116:
Improve Make/Model Transition Training**

<p>Safety Enhancement Action:</p>	<p>Training: FAA and industry improve make/model transition by ensuring familiarity and understanding of new “model specific” equipment.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • USHST – Special Emphasis Area (SEA) Training Team • FAA – AFS-630, AFS-810, FAA Safety Team (FAAST) • Helicopter Association International (HAI) Training Committee (TC) • Helicopter Association International (HAI) Safety Committee (SC) • General Aviation Manufacturers Association (GAMA) • Helicopter OEMs • Flight training providers • Flight simulation companies • Aircraft Owners and Pilots Association (AOPA) • Experimental Aircraft Association (EAA) • General Aviation Joint Steering Committee (GAJSC) • Airborne Law Enforcement Association (ALEA) • Instructional design companies (e.g. ASA/ KING/ etc.) • National Business Aviation Association (NBAA) • Utilities Patrol and Construction (UPAC) • Air Medical Operators Association (AMOA) • Tour Operators Program of Safety (TOPS) • Helicopter Safety Advisory Conference (HSAC) • Society of Aviation and Flight Educators (SAFE) • National Association of Flight Instructors (NAFI) • Existing aircraft type clubs
<p>Statement of Work:</p>	<p>Transition training in the helicopter community is not uniformly applied, leading to accidents resulting from unfamiliarity with airframe and/or equipment.</p> <p>The USHST will initiate an update to existing documentation related to helicopter transition training. This effort will review existing guidance related to transition training from organizations such as AOPA, EAA, FAA, GAJSC, and HAI. USHST can combine these recommended practices into a</p>

new, unified guide of recommendations and create a toolkit to support standardized use.

Once materials related to transition training are constructed, the USHST should work with the FAA and industry to conduct an outreach campaign to communicate the need for transition training, including Aeronautical Decision Making (ADM) considerations. The outreach to pilots of these aircraft will encourage use of standardized recommendations and toolkits for providing safe and essential training on model specific requirements. One of the effective conduits for this form of outreach is aircraft type clubs.

Aircraft type clubs are groups of owners and operators centered around particular aircraft. The nature of type clubs gives them the potential for serving as great advocates in the promotion and education of the actions of this safety enhancement. To reduce loss of control accidents, the USHST will promote development and use of type clubs to capture and disseminate critical safety-related information. The members of type clubs are owners/operators most familiar with the operating characteristics, procedures, and maintenance issues specific to a particular aircraft. They are in an excellent position to develop, communicate, and promote safety mitigation strategies that target loss of control accidents. Large fleet aircraft operators such as large flight schools are also very familiar with the operating characteristics and procedures specific to particular aircraft. The USHST also will leverage these organizations for safety strategies and info sharing that target improving make/model transition as a means of reducing loss of control accidents.

Following successful outreach to aircraft type clubs and associations, the USHST recommends the development of web-based tools that will aid in standardization of transitioning to unfamiliar helicopter models. As previously noted, it is essential that these tools include consideration of ADM.

Project:

1. USHST will review best practices and recommendations related to transition training developed and published by other organizations (*e.g.*, AOPA, EAA, GAJSC). USHST will use these materials to create updated and unified recommendations regarding transition training in helicopters.

	<ol style="list-style-type: none"> 2. USHST will work with the FAA and industry to promote and educate on the new unified recommendations for transition training in helicopters. 3. USHST will work with industry to increase implementation of transition training toolkit by expanding capability for ease of day-to-day operational use. 4. USHST will promote creation of helicopter type-specific groups (e.g., type clubs) to establish a more formalized network for ongoing information sharing regarding transition training. <p>The following fatal accidents prompted this safety enhancement: ERA10FA283 ERA09FA497 CEN10FA424</p>
Relation to Current Aviation Community Initiatives:	<p>GA-JSC Efforts:</p> <ul style="list-style-type: none"> • SE-5, Transition Training. Development of Web-based tools that will aid in all aspects of transition to unfamiliar aircraft across GA, to include Aeronautical Decision Making (ADM) (see ADM Detailed Implementation Plan), to identify the risk of inadequate training when operating unfamiliar equipment. Public education campaign on the importance of transition training. • SE-7, Type clubs and operator groups will review the airplane's existing procedures, if any, and develop simplified procedures and checklists for missed approach, go-around, and other critical phases of flight to reduce the likelihood of fatal loss-of-control accidents caused by high pilot workload. <p>USHST H-SEs:</p> <ul style="list-style-type: none"> • H-SE 70. Technology/Equipment: Industry adapt or install stability augmentation system (SAS) and/or simple autopilot. • H-SE 123. Training: Industry to increase the use of relevant simulation to rehearse at risk scenarios to develop safe decision making and educate. <p>USHST Intervention Strategies, below the Mendoza Line:</p> <ul style="list-style-type: none"> • IS 92. Technology/Equipment: Industry to research "red button" system to recover the aircraft to a safe flight configuration following pilot disorientation. • IS 119. Training: Special emphasis on preflight performance planning calculations, the potential consequences of poor preflight performance planning, and using performance planning in risk assessment and mitigation.

Performance Goal Indicators:	<ul style="list-style-type: none"> • Creation of transition training toolkit. • Effective outreach to industry on transition training toolkit. • Advancing transition training toolkit technology to allow practical day-to-day use. • Establish info share groups for ongoing communication on transition training issues. 																								
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>18</td> <td>Dec. 1, 2017</td> <td>June 1, 2019</td> </tr> <tr> <td>Output 2: (in parallel with Output 3)</td> <td>6</td> <td>June 1, 2019</td> <td>Dec. 1, 2019</td> </tr> <tr> <td>Output 3: (in parallel with Output 2)</td> <td>12</td> <td>June 1, 2019</td> <td>June 1, 2020</td> </tr> <tr> <td>Output 4:</td> <td>18</td> <td>June 1, 2020</td> <td>Dec. 1, 2020</td> </tr> <tr> <td>Completion:</td> <td>48 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	18	Dec. 1, 2017	June 1, 2019	Output 2: (in parallel with Output 3)	6	June 1, 2019	Dec. 1, 2019	Output 3: (in parallel with Output 2)	12	June 1, 2019	June 1, 2020	Output 4:	18	June 1, 2020	Dec. 1, 2020	Completion:	48 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																						
Output 1:	18	Dec. 1, 2017	June 1, 2019																						
Output 2: (in parallel with Output 3)	6	June 1, 2019	Dec. 1, 2019																						
Output 3: (in parallel with Output 2)	12	June 1, 2019	June 1, 2020																						
Output 4:	18	June 1, 2020	Dec. 1, 2020																						
Completion:	48 months																								
Potential Obstacles:	<ul style="list-style-type: none"> • Lack of existing aircraft type clubs • Lack of info share from large operators • Pushback or lack of participation from industry 																								
Detailed Implementation Plan Notes:																									
CICTT Code:	LOC-I, LALT																								
Output 1:																									
Description:	Review best practices and recommendations related to transition training developed and published by other organizations (<i>e.g.</i> , AOPA, EAA, GAJSC) and use these materials to create updated and unified recommendations regarding transition training in helicopters.																								
Lead Organization:	USHST SEA Training Team																								
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • AOPA • EAA • GAJSC • NBAA (as conduit to insurance providers) 																								

Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team will review existing best practices and recommendations related to transition training. They should request assistance as needed from HAI TC, AOPA, EAA, GAJSC, or any other industry organizations that may have experience developing transition training. 2. USHST SEA Training Team will draft standardized guidelines for transition training to include a gap analysis template for CFIs. The gap analysis template will allow CFIs to identify highest risk areas for pilots of various experience levels transitioning to a different helicopter type. 3. USHST SEA Training Team will review their draft proposal with insurance underwriters for final edits (consider using NBAA to establish connection, if needed). 4. USHST SEA Training Team will publish the transition training toolkit.
Output Notes:	
Time Line:	18 months
Target Completion Date:	June 1, 2019
Output 2:	
Description:	USHST will work with the FAA and industry to promote and educate on the new unified recommendations for transition training in helicopters.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • HAI SC • FAA – AFS-630, AFS-810, FAAST • GAMA • Helicopter OEMs • SAFE • NAFI • AOPA
Actions:	USHST Outreach Team will promote use of the transition training toolkit to the rotorcraft community. Approaches may vary from publications on the USHST website and social media, to promotion in magazines/news, to public presentations at regional events such as FAAST seminars or large gathering events such as HAI’s annual Heli Expo.
Output Notes:	
Time Line:	6 months (<i>for initial outreach</i>)

Target Completion Date:	Dec. 1, 2019
Output 3:	
Description:	Work with industry to increase implementation of transition training toolkit by expanding capability for ease of day-to-day operational use.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • HAI SC • Instructional design companies (<i>e.g.</i>, ASA, King, Sporty's)
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team will work with instructional design companies in industry to create new methods of delivery for transition training toolkit (web based/ iPad/etc.). 2. Recommend instructional design companies create an assessment app (equivalent of a digital matrix) for the CFI to know the risk areas for a particular student.
Output Notes:	
Time Line:	12 months
Target Completion Date:	June 1, 2020
Output 4:	
Description:	Promote creation of helicopter type-specific groups (<i>e.g.</i> , type clubs) to establish a more formalized network for ongoing information sharing regarding transition training.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • HAI SC • Flight training providers • AOPA • EAA • GAMA • UPAC • AMOA • ALEA • TOPS • HSAC • OEMs

	<ul style="list-style-type: none"> • Existing aircraft type clubs
Actions:	<ol style="list-style-type: none"> 1. USHST Outreach Team will work with HAI TC and existing helicopter industry groups to identify a list of the largest groups requiring info share by make/model. 2. USHST Outreach Team will suggest creation of specific info share groups based on work from Action 1. The info share model suggested may include use of existing helicopter type clubs or may suggest creation of new type clubs based on groups with the highest density of aircraft. Individuals or organizations within industry are necessary to lead and maintain the groups suggested by this model, so USHST will work with GAMA and HAI to find parties willing to lead and maintain the info share groups. 3. USHST Outreach Team will use the new info share groups (to include helicopter type clubs) for ongoing education on use of new recommendations, toolkits, and web-based tools related to transition training, as well as other critical safety issues.
Output Notes:	As groups are created, leaders of info share groups should work with GAMA and HAI to establish an info share access channel to OEMS for use by CFIs in the info share groups. This will allow feedback related to new or emerging transition training issues.
Time Line:	18 months
Target Completion Date:	Dec. 1, 2020

**Helicopter Safety Enhancement (H-SE) Number 117:
Competency-based Training and Assessments in Initial Pilot Training**

<p>Safety Enhancement Action:</p>	<p>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.</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • USHST Special Emphasis Area (SEA) Training Team • Helicopter Association International (HAI) Training Committee (TC) • FAA AFS-800 • FAA Safety Team (FAAST)
<p>Statement of Work:</p>	<p>Within the USHST datasets for LOC-I, UIMC, and LALT occurring 2009-2013, nine (9) out of fifty-two (52) fatal accidents involved pilot decision errors that were directly attributable to poor knowledge pertaining to: (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. Accordingly, the USHST recommended this H-SE to include the concept of “competence” in training, as traditional assessment methods may not train to that level. The focus of this H-SE shall remain competence and its associated implementation, defined as the “knowledge, skill and attitudes.” The definition of airmanship is the “operational, technical and non-technical knowledge, skill and attitudes (competence) aircrew employ to operate an aircraft safely, effectively and efficiently.”</p> <p>Further elaboration on a few of the terms used in this H-SE may be helpful to eliminate possible confusion.</p> <p>a. The second item listed in this H-SE includes the phrase “recovery from settling with insufficient power”. The word choice is quite deliberate and does <u>not</u> refer to vortex ring state. Instead, the phrase refers to a situation where insufficient power available resulted in the aircraft settling. This H-SE seeks first and foremost to better</p>

prevent pilots from putting the helicopter in such a situation, but secondarily to improve education on recovery should a pilot find himself or herself in the situation.

- b. The third item listed in this H-SE addresses “basic maneuvers.” This is not in reference to the basic maneuvers described by the existing Practical Test Standards (PTS) or as listed in the Helicopter Flying Handbook. Such items are already defined and addressed sufficiently and there is no intent in this H-SE to expand upon those existing lists. Instead, the H-SE seeks to address those basic concepts where the fatal accident analysis suggested that both a depth of pilot knowledge and understanding was lacking, yet the current availability of literature to remedy this problem through education is scarce. Two prominent examples would be: 1) Effects of Controls and 2) Attitude and Power.

Project:

- 1. USHST SEA Training Team, in conjunction with the FAA, to convene a group of subject matter experts (H-SE 117 SME team) to define pilot competence for the following subjects:
 - a. aircraft performance and limitations;
 - b. in-flight power and energy management training, to include prevention and recovery, if required, from settling with insufficient power;
 - c. basic maneuvers not defined in current guidance but essential to positive aircraft control;
 - d. threat and error management (see H-SE# 115-128);
 - e. mission planning;
 - f. aircraft systems; and
 - g. familiarity with Pilot Operating Handbook
- 2. H-SE 117 SME team to provide guidance (*e.g.*, guidelines, recommended practices) regarding how to train initial helicopter pilot applicants on demonstrating competence as defined above.
- 3. H-SE 117 SME team to brief Airman Certification Systems (ACS) Working Group on guidance and recommendations that were developed.

The following fatal accidents prompted this safety enhancement:

CEN11FA507	ERA10FA283
CEN12FA139	ERA13FA336
CEN13FA009	ERA10LA348

	CEN13FA205 WPR12GA106 ERA09FA497																				
Relation to Current Aviation Community Initiatives:	<ul style="list-style-type: none"> • FAA ACS • ICAO PANS-TRG Doc 9868 • USHST H-SEs, including #30, 122, 115, 128, 124 																				
Performance Goal Indicators:	<ul style="list-style-type: none"> • Competency defined for specified subjects. • ACS Working Group briefed on competency definitions. • Guidelines for training to competency created. 																				
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>12</td> <td>Dec 1, 2017</td> <td>Dec 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>12</td> <td>Dec 1, 2018</td> <td>Dec 1, 2019</td> </tr> <tr> <td>Output 3:</td> <td>12</td> <td>Dec 1, 2019</td> <td>Dec 1, 2020</td> </tr> <tr> <td>Completion:</td> <td>36 months</td> <td></td> <td></td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	12	Dec 1, 2017	Dec 1, 2018	Output 2:	12	Dec 1, 2018	Dec 1, 2019	Output 3:	12	Dec 1, 2019	Dec 1, 2020	Completion:	36 months		
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																		
Output 1:	12	Dec 1, 2017	Dec 1, 2018																		
Output 2:	12	Dec 1, 2018	Dec 1, 2019																		
Output 3:	12	Dec 1, 2019	Dec 1, 2020																		
Completion:	36 months																				
Potential Obstacles:	Consensus defining competency within existing rules. No rule change is sought through this H-SE.																				
Detailed Implementation Plan Notes:																					
CICTT Code:	LATL / LOC-I / UIMC																				

Output 1:	
Description:	Convene H-SE 117 Subject Matter Expert (SME) team to define pilot competence for the list of subject areas noted in this H-SE.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAA AFS-800 • HAI Training Committee
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team and the FAA to conduct outreach to convene a team of SMEs to define competency in list of subject areas noted in this H-SE. 2. H-SE 117 SME team to establish a team lead, define roles, and establish a meeting schedule.
Output Notes:	
Time Line:	12 months
Target Completion Date:	December 1, 2018

Output 2:	
Description:	Provide guidance (<i>e.g.</i> , guidelines, recommended practices) regarding how to train initial helicopter pilot applicants on demonstrating competence for the list of subject areas noted in this H-SE.
Lead Organization:	H-SE 117 SME Team (identified through Output 1)
Supporting Organizations:	<ul style="list-style-type: none"> • USHST SEA Training Team • FAA AFS-800 • HAI Training Committee
Actions:	<ol style="list-style-type: none"> 1. H-SE 117 SME Team to review existing regulations, standards (PTS), and guidance on knowledge, skills, and risk management that pilots must know regarding: <ol style="list-style-type: none"> a. aircraft performance and limitations; b. in-flight power and energy management training, to include prevention and recovery, if required, from settling with insufficient power; c. basic maneuvers not defined in current guidance but essential to positive aircraft control; d. threat and error management (see H-SE# 115-128); e. mission planning; f. aircraft systems; and g. familiarity with Pilot Operating Handbook. 2. H-SE 117 SME Team to define what competence level required for completion of the training for the subjects above. 3. H-SE 117 SME Team to develop guidance materials for using the competency definitions in training.
Output Notes:	<p>Definitions should be complete, but practical and useful in training. Definitions should not exceed existing requirements; however, any significant issues with existing requirements should be noted.</p> <p>Materials may be targeted at training providers as well as trainees.</p>
Time Line:	12 months
Target Completion Date:	December 1, 2019
Output 3:	
Description:	Brief the ACS working group on competency definitions.
Lead Organization:	H-SE 117 SME Team

Supporting Organizations:	FAA AFS-800
Actions:	H-SE 117 SME team to meet with ACS working group as early as possible after the development of the competency definitions and brief them on the outputs of this H-SE.
Output Notes:	H-SE 117 SME team may consider meeting with the ACS working group prior to the development of the competencies to coordinate work between the team and the ACS working group.
Time Line:	12 months
Target Completion Date:	December 1, 2020

**Helicopter Safety Enhancement (H-SE) Number 122:
Recommended Practices for Standardization of Autorotation and Emergency Aircraft
Handling Training**

Safety Enhancement Action:	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.
Expected Implementers:	<ul style="list-style-type: none"> • Helicopter Association International (HAI) Training Committee (TC) • USHST Special Emphasis Area (SEA) Training Team • FAA Safety Team (FAAST) • FAA AFS-810
Statement of Work:	<p>Although only one of the 52 fatal accidents within the LOC-I, UIMC, and LALT dataset from 2009-2013 spurred creation of this H-SE, its final score was the highest of all the interventions proposed.</p> <p>This H-SE is closely related to the work on H-SE 37. For consistency and standardization purposes, there is benefit to information being shared and closely coordinated between both efforts.</p> <p>Autorotation training occupies a significant portion of any flight training curriculum. The USHST identified an apparent disconnect between autorotation training conducted at flight schools, guidance provided in official FAA publications, and the practical application of the maneuver in flight during either a real or simulated engine failure. Therefore, the USHST proposes that a team of training industry experts (H-SE 122 Subject Matter Expert (SME) Team) develop a consensus on how autorotation training should be conducted for the Certified Flight Instructor-Rotorcraft/Helicopter. This guidance should be general in nature and center around principles of Energy Management to account for aircraft-specific differences. This single-source reference should be created to facilitate flight schools incorporating the recommendations into their existing Flight Instructor training programs.</p> <p>Additionally, emergency aircraft handling (abnormal operations) training is confined to guidance provided by Operator Handbooks or localized (tribal) knowledge and no standardized reference exists in current training publications.¹ The H-SE 122 SME Team also should generate standard reference(s) for emergency and abnormal operations to augment available materials.</p>

¹ The Rotorcraft Flying Handbook had a small standardized foot-note reference regarding landings from in-flight emergencies on page 12-18, but these references were eliminated in the Helicopter Flying Handbook.

	<p>Project:</p> <ol style="list-style-type: none"> 1. Define an H-SE 122 SME team, composed of subject matter experts from the helicopter training industry and led by the USHST SEA Training Team. 2. H-SE 122 SME team to draft White Paper documenting the consensus on recommended training practices for Certified Flight Instructor-Rotorcraft/Helicopter, focusing on: <ol style="list-style-type: none"> a. Basic Autorotation to Advanced Autorotation development as skill maneuver only (progressive approach). b. Autorotation as an emergency maneuver building competency within realistic scenario (Engine Failure Training) and associated complex decision making elements. c. Additional autorotation techniques to be generated, in-line with licensing standards of other ICAO member states (recommended practice), other than straight-in auto and 180 degree autorotation as the current Practical Test Standards require. d. Standardized Emergency Aircraft Handling in-line with recommended practices from sources such as POHs, RFMs, ICAO guidance, SME experience, and other source materials. <p>The team will develop an online database of resources when the draft is complete.</p> 3. H-SE 122 SME team lead to submit White Paper and associated media to USHST, FAA, and other stakeholders, as appropriate. 4. H-SE 122 SME team lead to submit endorsed White Paper to FAA to support revision of current Advisory Circular (AC) 61-140, as amended (Autorotation Training) . 5. H-SE 122 SME team to support revisions of Helicopter Flying Handbook, Helicopter Instructor’s Handbook to include information from endorsed White Paper. <p>The following fatal accident prompted this safety enhancement: ERA10FA283</p>
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • ICAO Doc 9868, PANS-TRG; Guidance on Instructional Design used for development of competency based programs • EHEST Helicopter Flight Instructor Manual • FAA AC 61-140A (Autorotation Training), http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/B8C6BE172F015A3586258020006AEA40?OpenDocument&Highlight=61-140a

	<ul style="list-style-type: none"> • IHST Helicopter Training ToolKit • USHST/IHST Autorotation and Energy Management Publications • H-SEs 37 and 124 																												
Performance Goal Indicators:	<ul style="list-style-type: none"> • H-SE team formed and meeting schedule established. • White Paper drafted and supporting materials generated (as applicable), including online database of resources. • White Paper endorsed by the USHST. • AC 61-140A and Handbooks updated. 																												
Key Milestones:	<table border="1"> <thead> <tr> <th></th> <th><u>Total Months</u></th> <th><u>Start Date</u></th> <th><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td>2</td> <td>Jan. 1, 2018</td> <td>Mar. 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td>12</td> <td>Mar. 1, 2018</td> <td>Mar. 1, 2019</td> </tr> <tr> <td>Output 3:</td> <td>3</td> <td>Mar. 1, 2019</td> <td>June 1, 2019</td> </tr> <tr> <td>Output 4:</td> <td>12</td> <td>June 1, 2019</td> <td>June 1, 2020</td> </tr> <tr> <td>Output 5:</td> <td>24</td> <td>June 1, 2020</td> <td>June 1, 2022</td> </tr> <tr> <td colspan="4">Completion: 53 months</td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	2	Jan. 1, 2018	Mar. 1, 2018	Output 2:	12	Mar. 1, 2018	Mar. 1, 2019	Output 3:	3	Mar. 1, 2019	June 1, 2019	Output 4:	12	June 1, 2019	June 1, 2020	Output 5:	24	June 1, 2020	June 1, 2022	Completion: 53 months			
	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>																										
Output 1:	2	Jan. 1, 2018	Mar. 1, 2018																										
Output 2:	12	Mar. 1, 2018	Mar. 1, 2019																										
Output 3:	3	Mar. 1, 2019	June 1, 2019																										
Output 4:	12	June 1, 2019	June 1, 2020																										
Output 5:	24	June 1, 2020	June 1, 2022																										
Completion: 53 months																													
Potential Obstacles:	<ul style="list-style-type: none"> • Financial resources to support meetings and development of materials. • Obtaining USHST endorsement for White Paper. • FAA procedural hurdles to updating AC and Handbooks. 																												
Detailed Implementation Plan Notes:	<p>Endorsement from either the IHST (if HAI is lead)—or HAI (if the USHST is lead)—is crucial in establishing validity in the eyes of the target audience. Efforts for AC and handbook revisions provide FAA endorsement in the long-term.</p> <p>This SE should be coordinated with efforts under H-SEs 37 and 124, which also calls for AC and Handbook updates.</p>																												
CICTT Code:	LOC-I																												
Output 1:																													
Description:	Define an H-SE 122 SME team, composed of subject matter experts from Training Industry and led by the USHST SEA Training Team.																												
Lead Organization:	USHST SEA Training Team																												
Supporting Organizations:	<ul style="list-style-type: none"> • AFS-820 • IHST 																												

Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team to connect with HAI TC to formulate team participants. 2. Establish ownership of efforts and roles within team. 3. Establish initial meeting with participants to outline further objectives and meeting schedule.
Output Notes:	Ideally, the HAI TC will lead the team. Complete once team defined, roles established, and meeting schedule set.
Time Line:	2 months
Target Completion Date:	Mar. 1, 2018
Output 2:	
Description:	Draft a White Paper documenting the consensus on recommended training practices for Certified Flight Instructor-Rotorcraft/Helicopter with focus on areas defined in the Statement of Work and develop an online database of resources when the draft is complete.
Lead Organization:	H-SE 122 SME team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team • FAA AFS-820 • IHST
Actions:	<ol style="list-style-type: none"> 1. Compile and review existing resources. 2. Define structure of White Paper: <ol style="list-style-type: none"> a. Consider: Energy Management Discussion; Basic Autorotation maneuver and progression; Advanced Autorotations; Engine Failure Autorotation Scenario Exercises and Abnormal (Emergency) aircraft handling and procedures (general) 3. Draft a White Paper based on the structure defined in Action number 2. Distribute this initial, non-endorsed draft White Paper to the CFI Focus Group for feedback. Incorporate appropriate edits and revisions based on feedback from the CFI Focus Group. 4. Build any associated materials as appropriate/necessary, such as videos, slides, etc. 5. Build an online public database of resources regarding recommended training practices.
Output Notes:	For tracking purposes, this Output will be considered complete once Action number 3 is complete. The intent is to keep the White Paper moving through endorsement and to submission to the FAA. Completion of

	Actions 4 and 5 of Output 2 will be worked in parallel with subsequent Outputs.
Time Line:	12 months
Target Completion Date:	Mar. 1, 2019
Output 3:	
Description:	Submit White Paper and associated media to USHST, FAA, and other stakeholders, as appropriate.
Lead Organization:	H-SE 122 SME Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team • FAA AFS-820 • IHST
Actions:	<ol style="list-style-type: none"> 1. Submit White Paper (and associated materials) to USHST and the FAA for consideration and endorsement. 2. Determine whether endorsement should be sought from other stakeholders, and if so, submit for consideration. 3. If necessary, incorporate comments and revisions from USHST, FAA, and other stakeholders to finalize the endorsement of the White Paper.
Output Notes:	The output is considered complete once endorsement is received.
Time Line:	3 months
Target Completion Date:	June 1, 2019
Output 4:	
Description:	Submit endorsed White Paper to the FAA to support revision of current Advisory Circular (AC) 61-140 (Autorotation Training).
Lead Organization:	H-SE 122 SME Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team • FAA AFS-820 • IHST
Actions:	<ol style="list-style-type: none"> 1. Coordinate with the FAA on preferred process for revising Advisory Circular (AC) (Autorotation Training), including HAI TC drafting suggested revisions. 2. FAA to reissue AC 61-140, as amended.
Output Notes:	Complete once AC reissued.
Time Line:	12 months after submission of White Paper to the FAA.

Target Completion Date:	June 1, 2020
Output 5:	
Description:	Support revisions of Helicopter Flying Handbook, Helicopter Instructor's Handbook to include information from endorsed White Paper.
Lead Organization:	H-SE 122 SME Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • USHST SEA Training Team • FAASTeam • IHST
Actions:	<ol style="list-style-type: none"> 1. HAI TC to coordinate with the FAA regarding preferred process for revising handbooks. <ol style="list-style-type: none"> a. Recommended that the FAA include changes in next revision cycle or develop amendment if revision cycle is farther away than anticipated target date. b. Should consider timeline for updates under H-SEs 37 and 124.
Output Notes:	Revisions to both handbooks complete.
Time Line:	24 months
Target Completion Date:	June 1, 2022

**Helicopter Safety Enhancement (H-SE) 123:
Increased Simulation/Education to Develop Safe Decision Making**

Helicopter Safety Enhancement Action:	Training: FAA and industry to increase the use of relevant simulation to rehearse at risk scenarios to develop safe decision making and educate.
Expected Implementers:	<ul style="list-style-type: none"> • FAA – AFS-205, National Simulator Program (NSP) • FAA Safety Team (FAAST) • USHST Special Emphasis Area (SEA) Training Team • Flight Simulation Organizations (e.g., FRASCA, Redbird, Elite, Flight Safety, CAE, L3) • Flight Training Organizations (e.g., Bristow Academy, Colorado Heli Ops, Hillsboro Aero Academy, ERAU Embry-Riddle Aeronautical University (ERAU))
Statement of Work:	<p>This H-SE seeks to prevent fatal helicopter accidents resulting from at risk scenarios. The helicopter community should promote the wider use of all available simulation to create increased awareness and educate all pilots during both ab initio training and front line operational recurrent training regarding the at risk situations identified by the USHST’s data driven analysis. This promotion effort applies to the full spectrum of simulation, to include both high and low fidelity as well as full motion and non-motion devices. A facet of the promotion should consider increasing training credits to further incentivize simulation use.</p> <p>The phrase “at risk” used in this H-SE is vague. Without further explanation, there is the potential that “at risk” could be misapplied and this H-SE could wander in directions far beyond the original intent of the USHST’s working group. For this reason, the definition of “at risk” will be limited to only the specific scenarios observed in the twenty-one (21) fatal accidents where H-SE 123 was assigned during the USHST’s analysis of fifty-two (52) LOC-I, UIMC, and LALT fatal accidents from 2009–2013.</p> <p>The twenty-one (21) fatal accidents involving H-SE 123 were distributed as follows: 8 LOC-I, 12 UIMC, and 1 LALT. In each of these cases, the working group determined H-SE 123 could have changed the outcome. All involved some aspect of pilot’s poor judgement or lack of aeronautical decision making (ADM) that placed the aircraft in an at risk situation. The at risk situation either caused or was a contributing factor to the fatal accident. This H-SE targets greater use of simulation at all levels of fidelity (BATD to Level D) in both</p>

initial professional helicopter training and during recurrent training sessions. This will allow pilots to learn from their mistakes in a safe environment and will make them less likely to repeat the error during actual flight.

Project:

1. USHST SEA Training Team will form an H-SE 123 Subject Matter Expert (SME) team composed of simulation subject matter experts from FAA and industry.
2. H-SE 123 SME team will work to eliminate any barriers in existing guidance and oversight that may currently inhibit or discourage increased use of helicopter simulation devices. The specific intent is to prevent future fatal accidents by enabling a greater number of pilots to be safely educated on at risk scenarios at all levels of simulator training.
3. In parallel with Output 1, the USHST SEA Training Team will work with industry to identify specific at risk scenarios, address the feasibility of their inclusion or further emphasis in simulator training for both ab initio and recurrency sessions, promote their inclusion, and recommend how the most recently identified at risk scenarios can continue to be routed to the simulation training providers.

The following 21 accidents prompted this H-SE and these accidents should drive the initial scenarios:

- LOC-I:
 - ERA12MA005
 - ERA11FA272
 - WPR13FA343
 - WPR09FA459
 - WPR10FA277
 - CEN12FA621
 - WPR10FA055
 - CEN13FA010
- UIMC:
 - CEN09PA348
 - ERA09FA537
 - CEN10FA019
 - ERA10FA403
 - CEN10FA509
 - CEN11FA468
 - ERA12MA122
 - ERA13FA014

	<p>CEN13FA096 ANC13GA036 ERA13FA273 ERA13FA336</p> <ul style="list-style-type: none"> • LALT: ERA13LA057 <p>If the opportunity arises, consider inclusion of Technology/Equipment H-SE 81 in conjunction with this H-SE to specifically address LOC-I fatal accident WPR12GA106. H-SE 81 states “Industry improve simulator mathematical physics models for quick stop and Loss of Tail Rotor Effectiveness (LTE). Level A-D FFS and Level 4-7 ATD's, AATDs and BATDs.</p>
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • USHST Training Working Group Position Paper 12 July 2016, Safety Through Helicopter Simulation; Recommendations by the Training Working Group for actions to improve the use of helicopter simulators and enhance safety. Submitted to the FAA AFS 800, Aug 2016. http://www.ihst.org/portals/54/repository/Simulation%20Position%20Paper%20July%202016%20Final.pdf • NTSB Safety Alert: Safety Through Helicopter Simulators - Use of simulators can prepare helicopter pilots for emergencies and prevent accidents: <ul style="list-style-type: none"> ○ https://www.nts.gov/safety/safety-alerts/Documents/SA_031.pdf ○ https://www.youtube.com/watch?v=r8TgM3oP98U • Airmanship Education Research Initiative (AERI) Study – Dr. Bill Rhodes PhD. DoD, DARPA, USAF Academy: 108 participants (Pvt-ATP), 2 Scenarios (VFR into IMC, Fuel Leak), 2 FTDs, 2 Groups, FAA ADM & Trustworthy Pilot on-line courses in between. Pilots with good ADM skills performed well in both scenarios. Pilots who made ADM errors in first scenario were significantly reduced in second scenario and they learned from their mistakes. • Use additional research available to validate changes of in-flight behavior (e.g., LOSA initiative: AC 120-90).
<p>Performance Goal Indicators:</p>	

Key Milestones:	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>
	Output 1: 2	Mar 1, 2018	May 1, 2018
	Output 2: 36	May 1, 2018	May 1, 2021
	Output 3: 36 Concurrent with Output 2	May 1, 2018	May 1, 2021
Completion:	38 Months		
Potential Obstacles:	The FAA will require authorization and funding to conduct a full review of helicopter simulation usage in the U.S. Any substantial delay will impact the potentially significant safety benefits of this H-SE as well as the preference of the USHST to initiate implementation as soon as possible.		
Detailed Implementation Plan Notes:			
CICTT Code:	LOC-I/UIMC/LALT		
Output 1:			
Description:	Form H-SE 123 Subject Matter Expert (SME) team composed of simulation subject matter experts from FAA and industry.		
Lead Organization:	USHST SEA Training Team		
Supporting Organizations:	<ul style="list-style-type: none"> • FAA AFS-800 • HAI Training Committee 		
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team and the FAA to conduct outreach to convene a team of SMEs to define competency in list of subject areas noted in this H-SE. 2. H-SE 123 SME team to establish a team lead, define roles, and establish a meeting schedule. 		
Output Notes:			
Time Line:	2 months		
Target Completion Date:	May 1, 2018		
Output 2:			
Description:	H-SE 123 SME team will work to eliminate any barriers in existing guidance and oversight that may currently inhibit or discourage increased use of helicopter simulation devices. The specific intent is to prevent future fatal		

	accidents by enabling a greater number of pilots to be safely educated on at risk scenarios at all levels of simulator training.
Lead Organization:	H-SE 123 SME Team (identified through Output 1)
Supporting Organizations:	<ul style="list-style-type: none"> • FAA AFS-205 • USHST SAT • USHST SEA Training Team • HAI Training Committee • FAA – National Simulator Program (NSP) • flight simulator manufacturers
Actions:	<ol style="list-style-type: none"> 1. The H-SE 123 SME team will conduct a full review of guidance and oversight for all helicopter simulation in the U.S. The team should provide recommendations to the FAA on the necessary revisions to guidance and oversight that would allow as much simulator training and checking credit as possible. If the recommendations are implemented, they would serve to promote increased use of simulation for at risk scenarios. 2. If necessary, the USHST SAT can brief the H-SE 123 SME team on the LOC-I, UIMC, LALT analysis and scoring process that led to the prioritization of this particular H-SE. 3. The USHST SEA Training Team can provide assistance in Output 1 through either direct participation on the team, or through connection, networking, and promotion of the effort in the simulation/training communities. 4. Considerations in the H-SE 123 SME team review should include the scenario of avoiding the cost of additional sim training being transferred to the paying student without credit. In addition, USHST data notes that the personal/private sector is of particular high interest for reduction of fatal accidents. With this in mind, some discussion in the review should include allowance for more credits for simulator flight time (VFR and IFR) for within the Private Pilot License (PPL) curriculum. 5. Once complete, the recommendations of the H-SE 123 SME team should be captured in a formal document and provided to the FAA as justification for the necessary revisions.
Output Notes:	
Time Line:	3 years (<i>AC change, minimum 24–36 months</i>)
Target Completion Date:	May 1, 2021
Output 2:	

Description:	Work with industry to identify specific at risk scenarios, address the feasibility of their inclusion or further emphasis in simulator training for both ab initio and recurrency sessions, promote their inclusion, and recommend how the most recently identified at risk scenarios can continue to be routed to the simulator training providers.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	FAA – AFS 205, FAA – National Simulator Program (NSP), HAI Training Committee, flight training organizations, flight simulator manufacturers, USHST Outreach Team
Actions:	<ol style="list-style-type: none"> 1. In parallel with Output 1, the USHST SEA Training Team will define specific at risk scenarios using the results of analysis from the 21 fatal accidents that recommended H-SE 123 as an intervention. Flight training organizations, flight simulator manufacturers, and HAI Training Committee should partner in this effort to ensure its success. 2. Once specific at risk scenarios are defined, the USHST SEA Training Team will then determine the feasibility of introducing these scenarios into the simulator training environment, or use insight from the USHST’s 2009–2013 fatal accident analysis to expand on existing at risk scenarios. 3. USHST Outreach Team should promote the findings of Actions 1 and 2 to the broader flight training and flight simulation industry. 4. The USHST SEA Training Team will recommend a real-time mechanism for feedback such that at risk scenarios identified by front line helicopter operators can be considered for an Evidence Base Training (EBT) approach that would feed these scenarios back into the simulator training environment.
Output Notes:	
Time Line:	36 months
Target Completion Date	May 1, 2021

**Helicopter Safety Enhancement (H-SE) Number 124:
Improve Understanding of Basic Helicopter Aerodynamics**

Safety Enhancement Action:	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.
Expected Implementers:	<ul style="list-style-type: none"> • USHST Special Emphasis Area (SEA) Training Team • Helicopter Association International (HAI) Training Committee (TC) • FAA AFS-800 • FAA Safety Team (FAAST)
Statement of Work:	<p>Within the LOC-I, UIMC, and LALT dataset of 52 fatal accidents from 2009–2013, the USHST reviewed two (2) fatal accidents that resulted from pilots failing to recognize and appropriately recover from unsafe aerodynamic situations, including vortex ring states, low RPM rotor stalls, and low G mast bumping.</p> <p>The USHST identified that all three of these situations are either incorrectly or inadequately discussed in the Helicopter Flying Handbook (FAA-H-8083-21A), the Helicopter Instructor’s Handbook (FAA-H-8083-4), and FAA advisory circulars. Accordingly, the USHST recommends a thorough review of existing FAA materials, followed by a revision and promotional campaign, including seminars, advisory circulars, and airmanship bulletins.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. FAA and industry to review the Helicopter Flying Handbook (FAA-H-8083-21A) and Helicopter Instructor’s Handbook (FAA-H-8083-4) and pertinent Advisory Circulars to assess explanations of unsafe aerodynamic situations and provide recommendations for revisions. 2. FAA to revise the Helicopter Flying Handbook and Helicopter Instructor’s Handbook and pertinent Advisory Circulars concerning unsafe aerodynamic situations, to include vortex ring state, low G mast bumping, and low RPM rotor stall guidance. 3. FAA to issue advisory circular on the Vuichard Recovery Technique from vortex ring state. 4. FAA to revise AC 61-83, as amended (Nationally Scheduled, FAA-Approved, Industry-Conducted Flight Instructor Refresher

	<p>Course) to add critical helicopter aerodynamics to the core topic list.</p> <p>5. USHST SEA Training Team to develop presentations/promotional materials regarding identification of and response to vortex ring state, low RPM rotor stall, and low G mast bumping for use by the training community.</p> <p>The following fatal accidents prompted this safety enhancement. ERA11FA272 ERA09FA497</p>
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • Rotorcraft Airman Certification System (ACS) (pending at time of H-SE drafting). • Special Federal Aviation Regulation (SFAR) 73 (Robinson R-22/R-44 special training) to 14 C.F.R. Part 61. • H-SEs 122 and 37. • Other USHST H-SEs (37 and 115_128) also plan to recommend revisions to some of the same FAA Handbooks referenced in H-SE 124. Submission of revisions from each H-SE must be closely coordinated together to ensure consistency of recommendations. There is a benefit to aligning all of them for a single, collective submission with the goal to have all recommendations incorporated during a single revision cycle of the handbooks.
<p>Performance Goal Indicators:</p>	<ul style="list-style-type: none"> • Advisory Circular on Vuichard Recovery Technique from vortex ring state published. • FAA-H-8083-21A and FAA-H-8083-4 revised. • Promotional materials for improved training of aerodynamic factors generated.

Key Milestones:	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>
	Output 1: 24	Oct. 1, 2017	Oct. 1, 2019
	Output 2: 24*	Oct. 1, 2019	Oct. 1, 2021
	Output 3: 12*	Oct. 1, 2021	Oct. 1, 2022
	Output 4: 6*	Oct. 1, 2022	Apr. 1, 2023
	Output 5: 12	Apr. 1, 2023	Apr. 1, 2024
	Completion: 78 months		
	<i>*If Outputs 2, 3, and 4 can be done in parallel, completion is possible in 60 months.</i>		
Potential Obstacles:	<ul style="list-style-type: none"> • FAA procedural delays, including coordinating Handbook updates with other H-SEs recommending Handbook revisions. • Financial resources to create materials. 		
Detailed Implementation Plan Notes:			
CICTT Code:	LOC-I		
Output 1:			
Description:	Review the Helicopter Flying Handbook (FAA-H-8083-21A), Helicopter Instructor's Handbook (FAA-H-8083-4) and pertinent ACs to assess explanations of unsafe aerodynamic situations and provide recommendations for revisions.		
Lead Organization:	FAA AFS-800		
Supporting Organizations:	<ul style="list-style-type: none"> • USHST SEA Training Team • HAI Training Committee 		
Actions:	The FAA, USHST SEA Training Team, and HAI Training Committee to collaborate on recommendations for revising the content in the Helicopter Flying Handbook and Helicopter Instructor's Handbook concerning unsafe aerodynamic situations.		
Output Notes:	The FAA, USHST, and HAI should consult selected DPEs, flight schools, and instructors for input on the suggested revisions to the Handbooks.		
Time Line:	24 months		

Target Completion Date:	October 1, 2019
Output 2:	
Description:	Revise to the Helicopter Flying Handbook, Helicopter Instructor's Handbook and pertinent ACs concerning unsafe aerodynamic situations, to include vortex ring state, low G mast bumping, and low RPM rotor stall guidance.
Lead Organization:	FAA AFS-800
Supporting Organizations:	USHST SEA Training Team
Actions:	The FAA should use the recommendations from Output 1 to initiate and complete revisions to the Helicopter Flying Handbook, Helicopter Instructor's Handbook and pertinent ACs.
Time Line:	24 months
Target Completion Date:	Oct. 1, 2021
Output 3:	
Description:	Publish advisory circular on the Vuichard Recovery from the vortex ring state.
Lead Organization:	FAA AFS-800
Supporting Organizations:	USHST SEA Training Team
Actions:	The FAA to coordinate with the USHST SEA Training Team to adapt the USHST's Airmanship Bulletin on the Vuichard Recovery into an advisory circular.
Time Line:	12 months
Target Completion Date:	Oct. 1, 2022
Output 4:	
Description:	Revise AC 61-83 (Nationally Scheduled, FAA-Approved, Industry-Conducted Flight Instructor Refresher Course) to add critical helicopter aerodynamics to the core topic list.
Lead Organization:	FAA AFS-800
Supporting Organizations:	USHST SEA Training Team

Actions:	<ol style="list-style-type: none"> 1. The FAA to coordinate with the USHST SEA Training Team to revise AC 61-83 to include helicopter critical aerodynamic state recognition and recovery information. 2. The FAA to release an updated advisory circular.
Time Line:	6 months
Target Completion Date:	Apr. 1, 2023
Output 5:	
Description:	Develop presentations/promotional materials regarding identification of and response to vortex ring state, low RPM rotor stall, and low G mast bumping for use by the training community.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	FAAST
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team to develop materials for the training of industry on identification of and response to vortex ring state, low RPM rotor stall, and low G mast bumping, including PowerPoint presentations. 2. USHST SEA Training Team to conduct outreach to distribute materials to training community.
Output Notes:	USHST SEA Training Team should consult selected DPEs, flight schools, and instructors for input on content and most useful format.
Time Line:	12 months
Target Completion Date:	Apr. 1, 2024

**Helicopter Safety Enhancement (H-SE) 125:
Pre-flight risk assessment for student flights.**

Helicopter Safety Enhancement Action:	Training: FAA and industry to provide recommended practices to instructors for pre-flight risk assessment of student flights.
Expected Implementers:	<ul style="list-style-type: none"> • FAA – AFS-810 • FAA Safety Team (FAAST) • USHST Special Emphasis Area (SEA) Training Team • Helicopter Association International (HAI) – Training Committee (TC) • Training-related industry organizations (<i>e.g.</i>, University Aviation Association (UAA), Society of Aviation and Flight Educators (SAFE), National Association of Flight Instructors (NAFI), Aircraft Owners and Pilots Association (AOPA)) • USHST Outreach Team
Statement of Work:	<p>To help prevent fatal helicopter training accidents resulting from inadequate pre-flight risk assessments, this H-SE should provide recommended practices for pre-flight risk assessment guidance and advisory information specific to the training environment.</p> <p>In the USHST’s 2009–2013 dataset of 52 fatal accidents involving LOC-I, UIMC, or LALT, one fatal accident involved inadequate or lack of pre-flight risk assessments as a contributing factor. Analysis and scoring of the event led to high prioritization of this issue and the working group concluded that pre-flight assessments could be improved across the helicopter training industry. This H-SE is intended to provide both flight instructors and new pilots alike with guidance on the accepted best practices to conduct a full and comprehensive risk assessment prior to a training flight, identifying inherent risks and therefore allowing mitigation to be implemented to reduce the risk as low as reasonably possible (ALARP) prior to and during the training flight.</p> <p>Project:</p> <ol style="list-style-type: none"> 1. Review existing flight training pre-flight risk assessment material. Identify gaps between recommended practices and findings from USHST fatal accident analysis. Consolidate recommended practices. 2. Develop guidance for the inherent risks associated with the flight training environment, thereby allowing mitigation to be implemented to

	<p>reduce the risk as low as reasonable possible (ALARP) prior to and during the training flight.</p> <ol style="list-style-type: none"> 3. USHST SEA Training Team deliver suggested pre-flight risk assessment guidance to the FAA for possible development into an Advisory Circular to support establishing a standard for pre-flight risk assessments on training flights. 4. If an AC is developed, then promote the contents of the AC to flight instruction organizations. <p>The following fatal accident prompted development of this H-SE: WPR10FA277</p>
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • There are many sources that provide general guidance on pre-flight risk assessments on the IHST and USHST websites: http://www.ihst.org/Default.aspx?tabid=3251&language=en-USS • The Flight Risk Assessment Tool (FRAT) available from HAI is one of the many risk assessment tools and guidance available to the industry. www.rotor.org/FRA; https://www.rotor.org/fox/mission/overview.htm • FAA and other FRAT sources: https://www.faa.gov/news/safety_briefing/2015/media/SE_Topic_15-08.pdf; https://www.faa.gov/news/safety_briefing/2016/media/SE_Topic_16-12.pdf; https://www.faasafety.gov/gslac/alc/lib_categoryview.aspx?categoryId=31 https://flightsafety.org/asw-article/thats-frat/. https://play.google.com/store/apps/details?id=com.techperspect.application.pfrat&hl=en.
<p>Performance Goal Indicators:</p>	<ul style="list-style-type: none"> • Consolidation of recommended practices for pre-flight risk assessment on training flights for use in student training. • Guidance developed. • The FAA accepts for incorporation into an Advisory Circular (AC). • AC successfully promoted to the training industry of helicopter community.

Key Milestones:	<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>
	Output 1: 6	Jan. 1, 2018	July 1, 2018
	Output 2: 12	July 1, 2018	July 1, 2019
	Output 3: 18	July 1, 2019	Jan. 1, 2021
	Output 4: 6	Jan. 1, 2021	July 1, 2021
Completion:	42 months		
Potential Obstacles:	Funding related to all aspects of H-SE development; FAA resources and prioritization to incorporate industry’s recommended practices on pre-flight risk assessments into an Advisory Circular.		
Detailed Implementation Plan Notes:			
CICTT Code:	LOC-I		
Output 1:			
Description:	Review existing flight training pre-flight risk assessment material, identify gaps between recommended practices and findings from USHST fatal accident analysis, and consolidate recommended practices.		
Lead Organization:	USHST SEA Training Team		
Supporting Organizations:	<ul style="list-style-type: none"> • HAI TC • UAA • Flight training organizations 		
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team to review existing material from sources listed in the “Relation to Current Aviation Community Initiatives”, for Pre-Flight Risk Assessments. 2. Identify gaps between reviewed material and findings from USHST fatal accident analysis. 3. Identify inherent risks associated with the flight training environment. 4. Consolidate findings and recommendations into a format conducive to developing guidance. 		
Output Notes:			
Time Line:	6 months		

Target Completion Date:	July 1, 2018
Output 2:	
Description:	Develop guidance for the inherent risks associated with the flight training environment, thereby allowing mitigation to be implemented to reduce the risk as low as reasonable possible (ALARP) prior to and during the training flight.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	FAA AFS-810, HAI TC
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team is to develop and issue guidance based on the information obtained from Output 1. 2. USHST SEA Training Team to promote the pre-flight risk assessment guidance to flight training organizations.
Output Notes:	
Time Line:	12 months
Target Completion Date:	July 1, 2019
Output 3:	
Description:	Deliver suggested pre-flight risk assessment guidance to the FAA for possible development into an Advisory Circular to support establishing a standard for pre-flight risk assessments on training flights.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAA (AFS-800) • HAI TC
Actions:	<ol style="list-style-type: none"> 1. USHST SEA Training Team to meet with FAA (AFS-800) to review results of the recommended practices consolidated by industry and discuss development of an Advisory Circular (AC) supporting pre-flight risk assessment guidance for training. 2. AFS-800 should consider AC development using the results of the USHST's work.
Output Notes:	<p>Key items of the AC would be to include suggested mitigation strategies to reduce training risks to as low as reasonably practical (ALARP).</p> <p>The actions are intended to result in future flight instructor (FI) courses incorporating the recommended practices for pre-flight risk assessment for use during primary phase training. Optimally, this will invoke primacy for student pilots when they see their FI using a risk assessment tool.</p>

Time Line:	18 months
Target Completion Date	January 1, 2020
Output 4:	
Description:	If an AC is developed, then promote the contents of the AC to flight instruction organizations.
Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAAST • USHST SEA Training Team • HAI TC • FAA AFS-600 • FAA AFS-800
Actions:	<ol style="list-style-type: none"> 1. FAA to use FAAST and other outreach to brief AC to all Parts 61 and 141 Flight Schools. 2. FAA, through DPEs, to put special emphasis on AC during CFI checkrides. 3. USHST SEA Training Team and industry organizations involved with previous Outputs should assist the USHST Outreach Team's with development of an outreach plan and attempt to highlight the new AC at every opportunity (<i>e.g.</i>, Heli-Expo, AMTC, Heli Offshore, regional FAAST conferences, other safety conferences). 4. If there are principles from the AC that extend beyond the instruction community, USHST Outreach Team should ensure their dissemination to the the broader helicopter community. 5. Document progress of outreach effort (who contacted, number of attendees, etc).
Output Notes:	
Time Line:	6 months (<i>for initial outreach; would be ongoing effort after initial outreach</i>)
Target Completion Date:	July 1, 2020

**Helicopter Safety Enhancement (H-SE) 127A
Training for Recognition/Recovery of Spatial Disorientation**

<p>Safety Enhancement Action:</p>	<p>Industry develop training for recognition of spatial disorientation and recovery to controlled flight. The training developed should emphasize the use of all available resources installed on the aircraft (to include automation, such as increased use of autopilot).</p>
<p>Expected Implementers:</p>	<ul style="list-style-type: none"> • USHST Special Emphasis Area (SEA) Training Team • FAA – Civil Aerospace Medical Institute (CAMI) • FAA – AFS-800, AFS-600, AFS-200 • Helicopter Association International (HAI) • General Aviation Manufacturers Association (GAMA) • flight simulation providers • flight training providers • Flight Safety Foundation • Aircraft Owners and Pilots Association (AOPA) • University Aviation Association (UAA) • Redbird • Embry-Riddle Aeronautical University (ERAU)
<p>Statement of Work:</p>	<p>To help prevent fatal helicopter accidents resulting from spatial disorientation (SD), the helicopter community should promote the wider use of available SD simulation technology and training scenarios to create further awareness of impairment from SD and how to recover from such an event.</p> <p>Within the UIMC dataset, there were five accidents where a pilot’s incapacitation by spatial disorientation was either the cause or a contributing factor to the accident. This H-SE proposes education initiatives and use of SD simulation as part of the helicopter simulator training sessions.</p> <p>Intervention Strategy (IS) 132 was merged into H-SE 127A. IS 32 recommended training by industry to emphasize the use of all available resources installed on the aircraft (to include automation, such as as increased use of autopilot).</p> <p>Project:</p> <ol style="list-style-type: none"> 1. Review existing SD training products for inclusion in helicopter specific SD training. 2. Create helicopter unique SD training products to include simulation technology.

	<p>3. Distribute SD training products to flight training providers and owners/operators and track use of SD training products.</p> <p>The following five fatal accidents prompted this SE: CEN10FA509 ERA13FA273 CEN13FA096 ERA13FA336 ANC13GA036</p>																				
<p>Relation to Current Aviation Community Initiatives:</p>	<ul style="list-style-type: none"> • FAA and GA Community <i>Fly Safe</i> campaign: https://www.faa.gov/news/updates/?newsId=83106 • FAA Safety Team: Spatial Disorientation awareness training: <ul style="list-style-type: none"> ○ Part 1: https://www.faa.gov/tv/?mediaId=462 ○ Part 2: https://www.faa.gov/tv/?mediaId=463 • NBAA Top Safety Focus Areas: https://www.nbaa.org/ops/safety/top-safety-focus-areas/2015/ 																				
<p>Performance Goal Indicators:</p>																					
<p>Key Milestones:</p>	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%; text-align: center;"><u>Total Months</u></th> <th style="width: 25%; text-align: center;"><u>Start Date</u></th> <th style="width: 45%; text-align: center;"><u>End Date</u></th> </tr> </thead> <tbody> <tr> <td>Output 1:</td> <td style="text-align: center;">6</td> <td style="text-align: center;">Dec. 1, 2017</td> <td style="text-align: center;">June 1, 2018</td> </tr> <tr> <td>Output 2:</td> <td style="text-align: center;">24</td> <td style="text-align: center;">June 1, 2018</td> <td style="text-align: center;">June 1, 2020</td> </tr> <tr> <td>Output 3:</td> <td style="text-align: center;">4</td> <td style="text-align: center;">June 1, 2020</td> <td style="text-align: center;">Oct. 1, 2020</td> </tr> <tr> <td colspan="4" style="padding-top: 10px;">Completion: 34 months</td> </tr> </tbody> </table>		<u>Total Months</u>	<u>Start Date</u>	<u>End Date</u>	Output 1:	6	Dec. 1, 2017	June 1, 2018	Output 2:	24	June 1, 2018	June 1, 2020	Output 3:	4	June 1, 2020	Oct. 1, 2020	Completion: 34 months			
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Completion: 34 months																					
<p>Potential Obstacles:</p>	<p>Availability and cost pose two potential obstacles.</p> <p>Commercially available non-transportable SD training products are limited in number and location making it difficult for a large segment of the pilot population to experience and benefit from practical such demonstrations. The FAA has two small transportable SD simulation products available for limited public use at large aviation meetings or at the Civil Aerospace Medical Institute. Other Federal agencies, such as NASA and DOD, have SD training product capabilities but these are not available to the general public, and are used for research or military aircrew and astronaut training.</p> <p>There is one company in the U.S. and one in Europe that design, manufacture and market SD training products – they also provide on-site training services. Costs to purchase or train can vary depending on the capabilities of the training</p>																				

	<p>product. Some of the available devices offer very realistic simulation of linear and angular acceleration illusions and visual illusions. In addition, some of these simulators are rotorcraft specific.</p> <p>Although devices exist that demonstrate SD events, they are not widely used in aviation training curricula. SD is mentioned in most simulation training sessions; however, it is frequently an information event with little or no practical demonstrations. The practical demonstration of SD incapacitation and the recovery techniques for such an event are the key components to help reduce accidents resulting from this deadly physiological impairment. This type of practical training should be done on an initial and recurring basis. Ways to overcome the potential obstacles of availability and cost must be found.</p>
Detailed Implementation Plan Notes:	<p>Additional review is needed to assess the current availability of commercial SD simulators and/or training. The feasibility of making this training widely available is the primary consideration. In addition, more effective communication on the dangers of SD must be developed.</p> <p>Current providers of helicopter simulator training would have to validate the introduction of such additional simulation into their initial and recurrent training curricula. Furthermore, FAA would need to determine if such practical training should be recommended or mandated as part of recurrent airman certification.</p> <p>Examples of currently available SD training products can be found at:</p> <ul style="list-style-type: none"> • www.etcaircrewtraining.com • http://www.amst.co.at/en/aerospace-medicine/training-simulation-products/airfox/airfox-asd/ • http://www.amst.co.at/en/aerospace-medicine/training-simulation-products/airfox/airfox-diso/
CICTT Code:	UIMC
Output 1:	
Description:	Review existing SD training products for inclusion in helicopter specific SD training.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	<ul style="list-style-type: none"> • HAI • CAMI • GAMA • Flight simulation providers • UAA • Flight Safety Foundation

	<ul style="list-style-type: none"> • AOPA • Redbird • ERAU
Actions:	<ol style="list-style-type: none"> 1. Research and review current SD products available (GAMA facilitate via survey). 2. USHST SEA Training Team will review GAMA survey results to determine if current materials meet needs. 3. If USHST Special Areas Training Team finds current materials are inadequate, they will create a requirements document to define unmet needs. This may involve outreach to simulator providers or other research entities.
Output Notes:	
Time Line:	6 months
Target Completion Date:	June 1, 2018
CICTT Code:	UIMC
Output 2:	
Description:	Create helicopter unique SD training products to include simulation technology.
Lead Organization:	USHST SEA Training Team
Supporting Organizations:	<ul style="list-style-type: none"> • Flight training providers • Flight simulator providers
Actions:	<ol style="list-style-type: none"> 1. Define SD scenarios for emphasis in training products (use the 52 fatal accidents analyzed by the USHST LOC-I/UIMC/LALT working group as starting point). 2. Coordinate education materials to defined simulation technology. 3. Create educational materials (fact sheets, articles, videos, lesson plans, scenarios, etc). 4. Report completion to USHST SAT.
Output Notes:	
Time Line:	24 months
Target Completion Date:	June 1, 2020
CICTT Code:	UIMC
Output 3:	
Description:	Distribute SD training products to flight training providers and owners/operators.

Lead Organization:	USHST Outreach Team
Supporting Organizations:	<ul style="list-style-type: none"> • FAAST • HAI
Actions:	<ol style="list-style-type: none"> 1. Use all available media outlets (Rotor Safety Challenge at Heli Expo, regional FAAST conferences, other safety conferences) to promote and distribute SD training products and technology. 2. USHST Outreach Team will track use of SD training products. <ol style="list-style-type: none"> a. Track purchase, usage, and installation of SD training products and simulation technologies. b. Survey whether end users find the new products effective.
Output Notes:	
Time Line:	4 months (<i>to release initial training products</i>)
Target Completion Date:	Oct. 1, 2020
CICTT Code:	UIMC