



*Safety Above All*

# **SPECIAL WORKING GROUP RATING SCHEME CONCEPT**

***TOWARD A SAFETY RATING FOR HELICOPTERS***

**EASA Rotorcraft and VTOL Safety  
Symposium 2024**

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# Agenda



- Background
- Membership
- Terms of Reference
- Model overview
- Conclusions

# BACKGROUND

## Background (and input for this project)

- EASA Safety Roadmap (2018)
  - Safety rating system work stream (2019)
  - Rating system comparison study
- FAA white paper on potential helicopter rating systems (2020)
- International Oil and Gas Producers [Project Cassiopeia (2019/20)]
- Euro New Car Assessment Program (NCAP) interaction (2019 and 2022)



### PROJECT CASSIOPEIA

*"Exploring the opportunity for developing a 5\* rating system for offshore Oil & Gas Helicopters"*

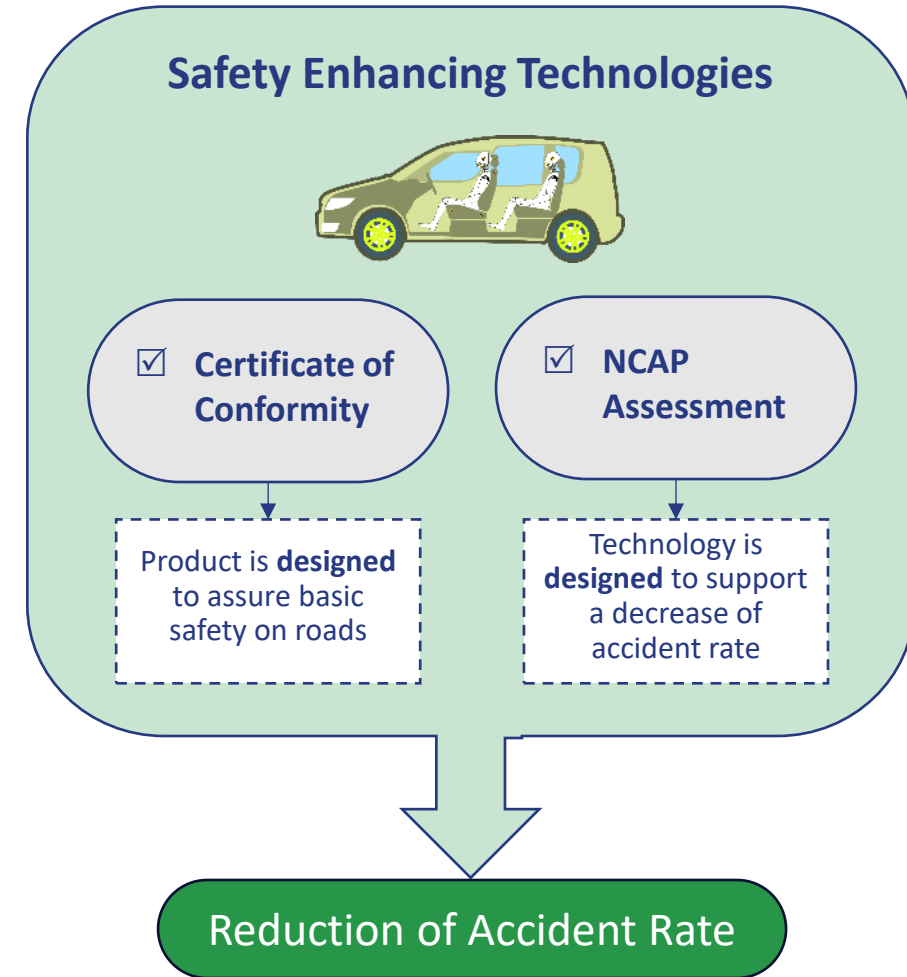




# EURO NCAP

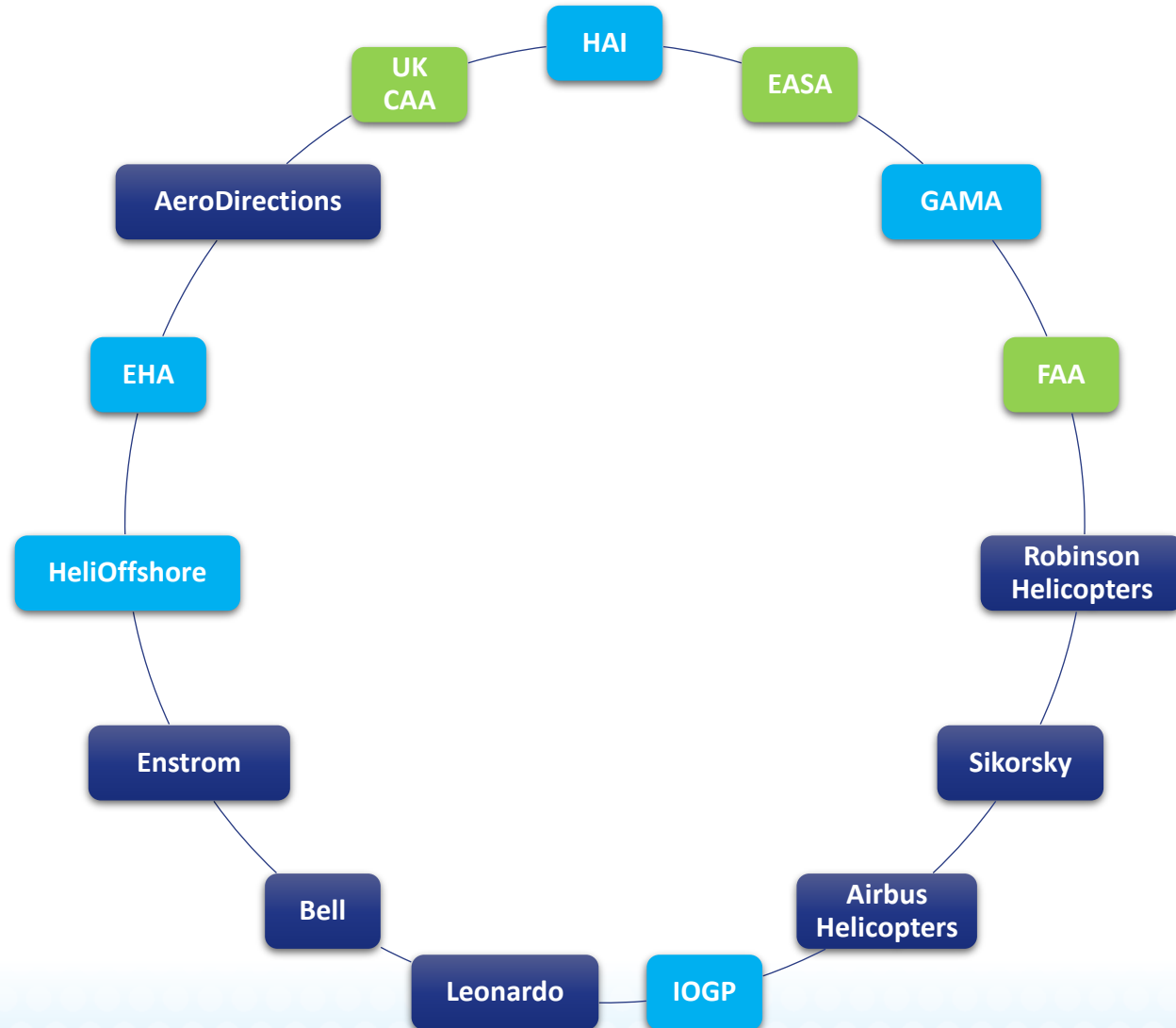
- Introduced in USA – 1979
- Started in Europe [Swedish Road Administration] in 1997
  - Increase Survivability → Crash Protection
  - Increase Prevention → Safety Assistance
- Testing is not mandatory

## Market Coverage [Data provided by Euro NCAP]



# Membership

Participants for the first phase of this project



Manufacturers

Associations

Regulators

# Terms of Reference

## *Objective*

Improve safety through incentivising innovation and implementation of enhancing technologies into the new and current fleet of helicopters.

## *Focus*

Develop a scheme and an implementation plan for a world-wide voluntary safety rating scheme that is reflective of the helicopter in its operational context.



## *The Desired Outcomes*

- Influence Decision-makers buying rotorcraft (operators or individuals)
- Influence End users (passengers and operators )
- Influence rotorcraft buyers / operators to install safety enhancing technology
- Provide a transparent and objective differentiating factor based on safety considerations
- Incentivise fleet renewal and encourage the use of safer rotorcraft
- Raise awareness on rotorcraft safety performance
- Create a dynamic for OEMs to further improve helicopter safety performance beyond CS/FAR requirements and give operators credit for the installation of safety enhancing technology





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# Model Overview



# System Components

## **Prevention (60% weight)**

Collision Avoidance

Terrain Avoidance

AFCs

Data Collection

## **Survivability (40% weight)**

CRFS

CRSS/Crew

CRSS/Pax

Bird Strike

- Based on data.
- Overall weighting: Prevention deemed more impactful than Survivability.
- Each component has a component weighting factor based on the impact to accidents in the data set.
- Each component is broken down into individual items/systems scored based on impact.
- The model rates helicopters “as equipped”. Items/systems in the model need to be integrated into the air vehicle systems. i.e. traffic data displayed on the main display not on a carry-on display.
- We’ve run multiple aircraft through the model and it does provide differentiation between older/less equipped aircraft and newer designed aircraft with current technologies or those older aircraft that have been upgraded.
- This current model has a “light” helicopter focus.
  - Part 27, point-to-point mission

# Prevention – Scoring

UPDATE Sept 06, 2024

Terrain Avoidance		Collision Avoidance		Data Collection		AFCS <sup>(4)</sup>	
Wf calculation I,25 = 20 / (20-4)		Wf calculation I,25 = 15 / (15 -3)		Wf calculation I,17 = 14 / (14-2)		Wf calculation I,33 = 16 / (16-4)	
<u>Prevention<sup>(6)</sup></u>	4 pts	<u>Prevention<sup>(6)</sup></u>	3 pts	<u>Prevention<sup>(6)</sup></u>	2 pts	<u>Prevention<sup>(6)</sup></u>	4 pts
Wf I,25		Wf I,25		Wf I,17		Wf I,33	
<u>Safety Impact</u>		<u>Safety Impact</u>		<u>Safety Impact</u>		<u>Safety Impact</u>	
RadAlt	3 pts	High Vis Rotors	1 pt	Health package	3 pts	SAS only (not cumulative)	2 pts
DO-309 HTAWS	5 pts	High Vis Strobe Lts	1 pt	Usage package	1 pt	Basic attitude modes	4 pts
Classic TAWS(no M7) <sup>(8)</sup>	5 pts	XPDR / ADS-B out <sup>(5)</sup>	1 pt	Cockpit Camera	1 pts	Protection package	10 pts
ED285/DO376 Classic <sup>(8)</sup>	7 pts	Onboard ADS-B in	3 pts	HFDM (supported)	2 pts	Advanced package	12 pts
		TAS/TCAS	4 pts	Light FDR <sup>(7)</sup>	3 pts		
				CVFDR <sup>(7)</sup>	5 pts		
<u>Bonus Technology</u>		<u>Bonus Technology [integrated features]</u>		<u>Bonus Technology</u>		<u>Bonus Technology</u>	
Mode 7A or 7B	3 pts	Onboard ID detection <sup>(3)</sup>	2 pts	Auto download	2 pts	4-axis	3 pts
Operationally specific <sup>(1)</sup>	2 pt	Mobile Telephony TAS	2 pts			Guidance Manual/FCOM	1 pt
		Integrated traffic data <sup>(2)</sup>	2 pts				
<u>Maximum score</u>	20 pts	<u>Maximum score</u>	15 pts	<u>Maximum score</u>	14 pts	<u>Maximum score</u>	16 pts

Notes:

- (1) Selectable (or automatic) system adaptation based on offshore vs onshore operations.
- (2) Traffic data on main display. No extra screen or tablet on the side.
- (3) FLARM, Remote ID, Onboard Conspicuity
- (4) List of minimum features (SAS is not cumulative)
  - A. Basic package : Attitude hold only
  - B. Protection package : Attitude recovery button (« panic » button/wing level)
  - C. Advanced package: Approach modes & navigation/upper modes
    - Vortex protection not included – To be associated with HTAWS mode 7 or similar

- (5) Score not cumulative with Onboard ADS-B in and TAS/TCAS
- (6) Prevention pts are not included in the maximum score but are used in the calculation of Wf.
- (7) Light FDR and CVFDR are not cumulative with each other.
- (8) Either Classic TAWS or ED285/DO367 can be cumulative with RADALT and DO-309 HTAWS.

# Survivability – Scoring

UPDATE Sept 06, 2024

<b>CRFS</b>		<b>CRSS/Crew</b>		<b>CRSS/Pax (Cabin)</b>		<b>Bird Strike</b>	
Wf calculation 1,43 = 10 / (10-3)		Wf calculation 1,5 = 12 / (12-4)		Wf calculation 1,5 = 12 / (12-4)		Wf calculation 1,5 = 12 / (12-4)	
<u>Survivability<sup>(10)</sup></u>	3 pts	<u>Survivability<sup>(10)</sup></u>	4 pts	<u>Survivability<sup>(10)</sup></u>	4 pts	<u>Survivability<sup>(10)</sup></u>	4 pts
Wf 1,43		Wf 1,5		Wf 1,5		Wf 1,5	
<u>Safety Impact</u> (items not cumulative)		<u>Safety Impact</u>		<u>Safety Impact</u>		<u>Safety Impact</u> (items not cumulative)	
Old compliance date	2 pts	EA Seats only <sup>(5)</sup>	5 pts	EA Seats only <sup>(5)</sup>	5 pts	Bird-resistant windscreen <sup>(7)</sup>	4 pts
Basic upgrade kit <sup>(1)</sup>	4 pts	EA Seat + Structure <sup>(6)</sup>	9 pts	EA Seat + Structure <sup>(6)</sup>	9 pts	Bird-proof windscreen <sup>(8)</sup>	6 pts
Bag upgrade kit <sup>(2)</sup>	4 pts					Full bird strike compliance <sup>(9)</sup>	10pts
Perlmutter <sup>(3)</sup>	8 pts	<u>Bonus Technology</u>		<u>Bonus Technology</u>			
Current compliance <sup>(4)</sup>	10 pts	3 point restraint	1 pts	3 point restraint	1 pts	<u>Bonus Technology</u>	
		4 point restraint	2 pts	4 point restraint	2 pts	Bird deterrent system	2 pts
		5 point restraint	3 pts	5 point restraint	3 pts	(flashing light)	
<u>Maximum score</u>	10 pt	<u>Maximum score</u>	12 pts	<u>Maximum score</u>	12 pts	<u>Maximum score</u>	12 pts

## Notes:

- (1) Flex hose, breakaway fittings, frangible (deformable) structural attachments.
- (2) Puncture resistant bag (250 vs 370)
- (3) Perlmutter / EASA NPA
- (4) CS/Part 27 / 29 full compliance
- (5) EA TSO'd seat

- (6) Full compliance to CS/Part27/29.561, 562 & 785

- (7) Not compliant to CS 27.631 or CS/Part 29.631

- (8) Compliant to CS 27.631 or CS/Part 29.631

- (9) Compliant to CS/Part 29.631

- (10) Survivability points are not included in the maximum score but are used in

# Survivability – Example of Offshore Helicopter Component

## Ditching / Underwater Egress

Wf calculation I,29 = 18 / (18-4)

Survivability<sup>(1)</sup> 4 pts

Wf I,29

### Safety Impact

Flotation systems (SS4) 2 pts

Structural Ditching Cert. 1 pt

HEELS 2 pts

Direct board life rafts 1 pt

Auto life raft deployment 1 pt

Push out cabin windows 2 pts

Internal Exit Markings 1 pt

External Markings 1 pt

Auto float deployment 1 pt

Auto-arming floats 1 pt

Handholds 1 pt

Air pockets 2 pts

### Bonus Technology

Flotation systems (SS5)\*\* 1 pt

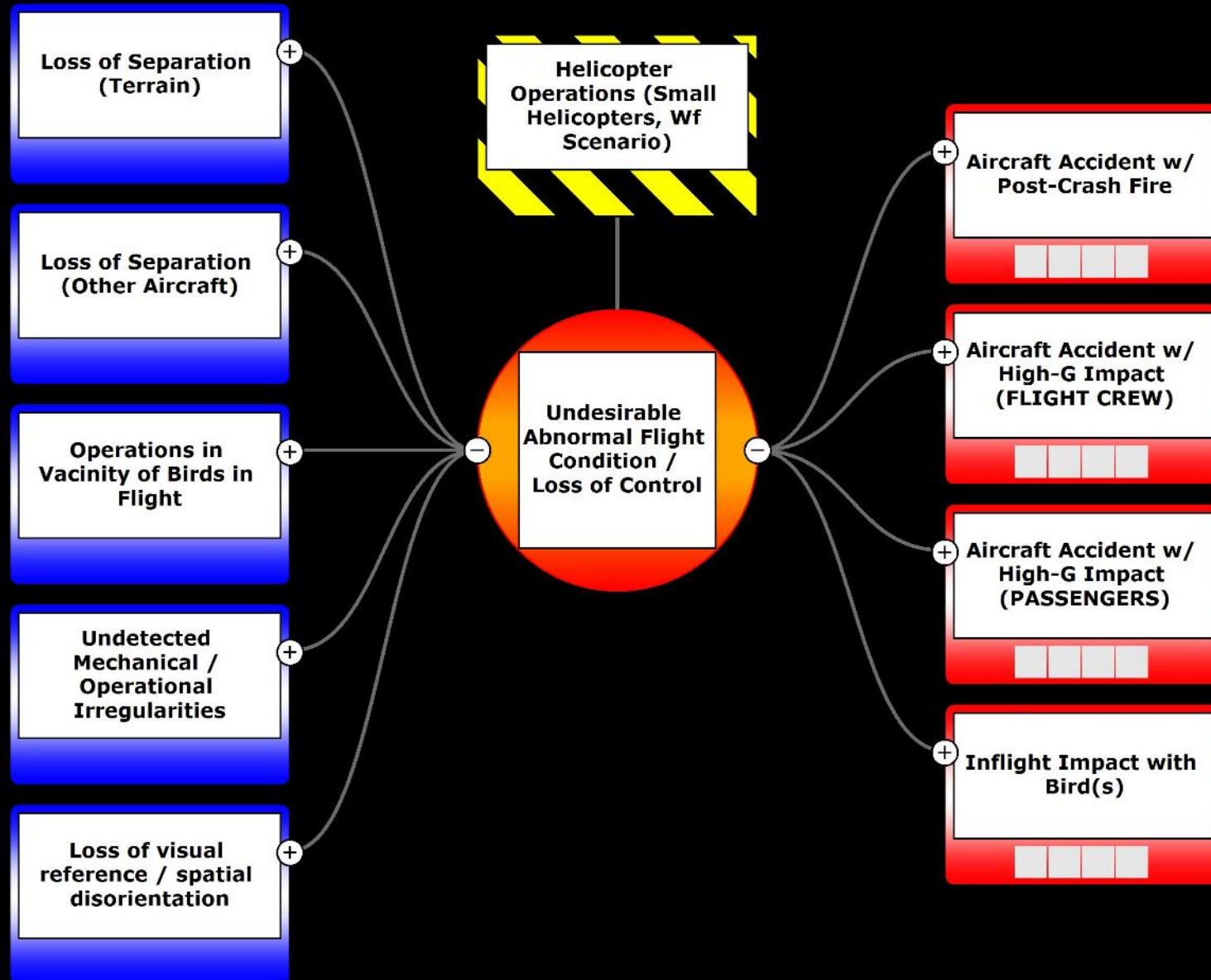
Flotation systems (SS6)\*\* 2 pts

Maximum score 18 pts

\*\*SS5 or SS6 Cumulative with SS4

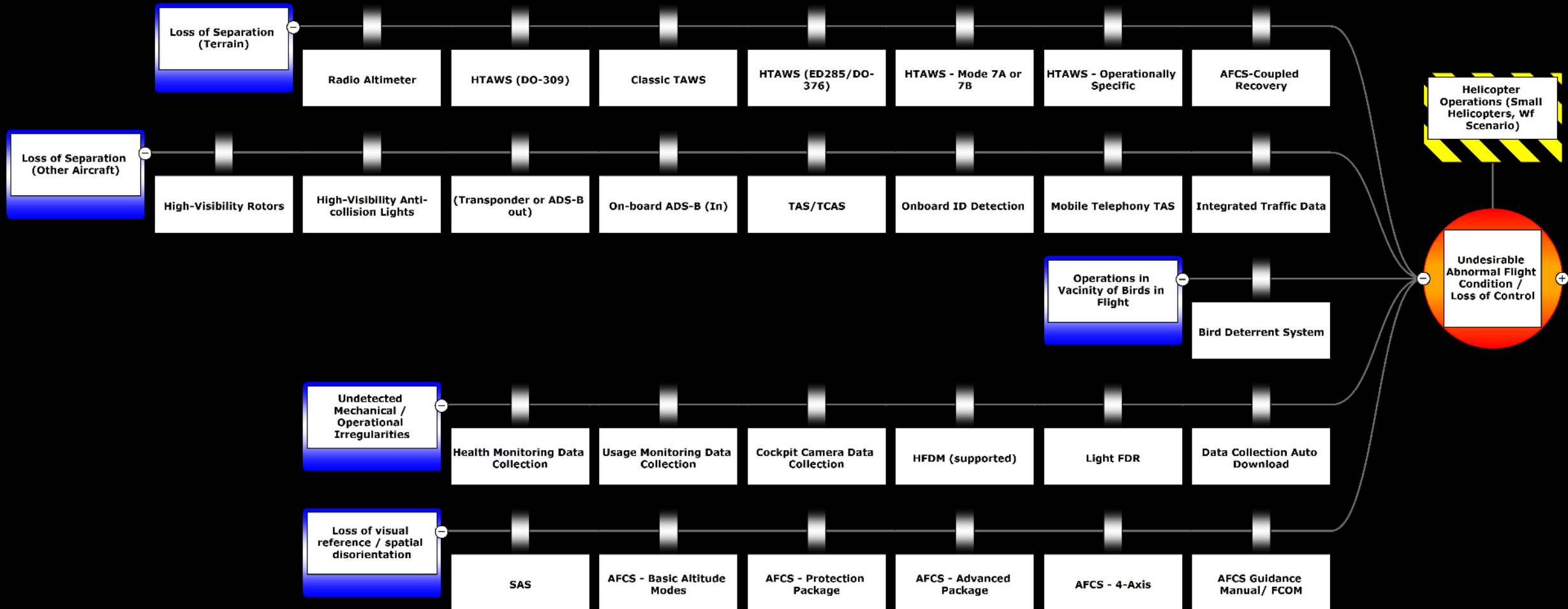
Notes:

1. Survivability points are not included in the maximum score but are used in the calculation of Wf.

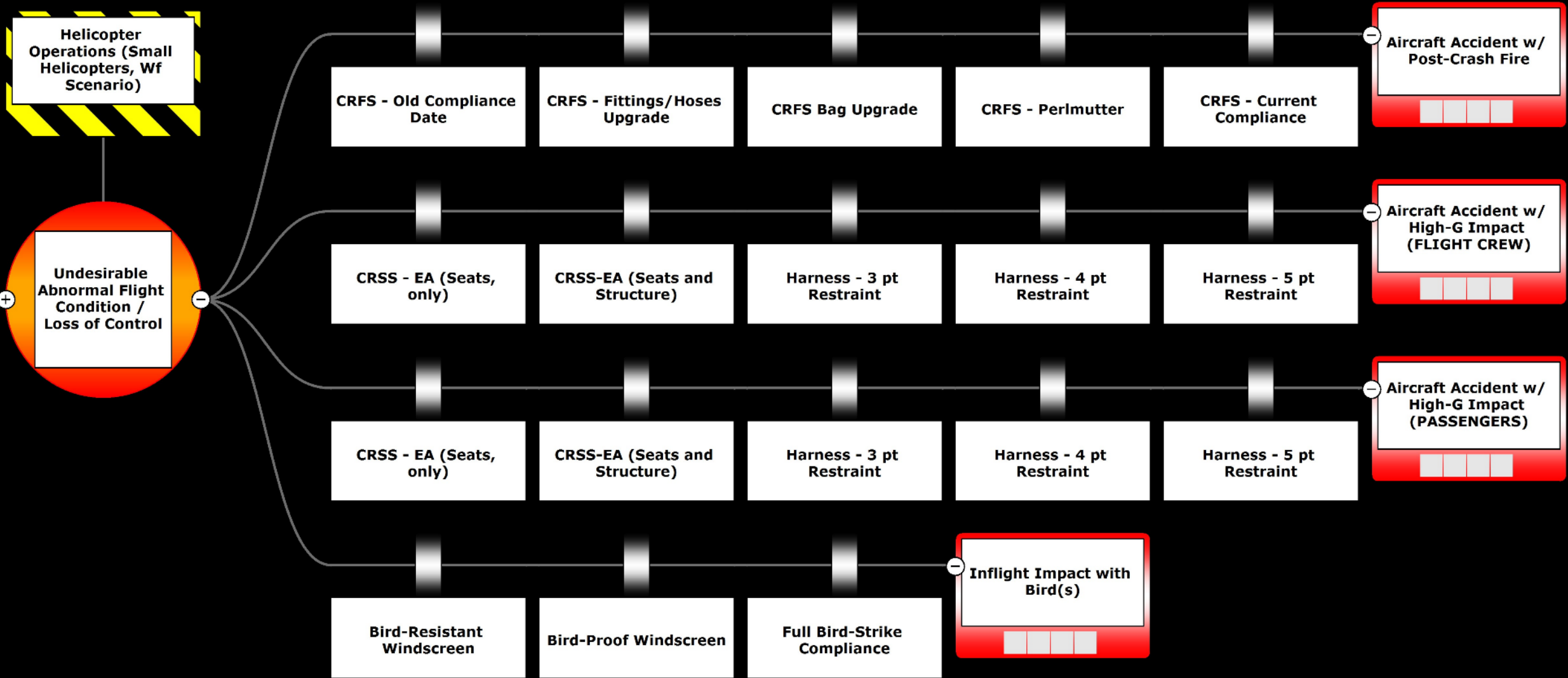




# BowTie – Prevention



# BowTie – Survivability



# Table for Category Application by Mission

Category Applicability by Mission Set							
Mission	Onshore					Offshore	
	CAT (Urban)	CAT (Hostile)	EMS	Public Services	Aerial Work	CAT (Overwater)	Offshore (Energy)
<b><i>Rating Category - Prevention</i></b>							
Terrain Avoidance		✓	✓	✓		✓	✓
Collision Avoidance	✓	✓	✓	✓	✓	✓	✓
Data Collection	✓	✓	✓	✓	✓	✓	✓
AFCS	✓	✓	✓	✓	✓	✓	✓
<b><i>Rating Category - Survivability</i></b>							
Crash Resistant Fuel System	✓	✓	✓	✓		✓	✓
Crash Resistant Seating System (Crew)	✓	✓	✓	✓	✓	✓	✓
Crash Resistant Seating System (Pax)	✓	✓	✓	✓	✓	✓	✓
Bird Strike		✓	✓	✓	✓	✓	✓
Ditching						✓	✓
Underwater Egress						✓	✓

- Raise customer awareness
  - Create differentiation and initiate change
- Single, worldwide system
- Incentivizes innovation and the implementation of safety enhancing technologies into the new and current fleet of helicopters\*\*
- Voluntary and not regulatory
- Others...?



Potential

\*\*NOTE: All helicopters are certified in accordance with regulations. This initiative is intended to incentivize the implementation of safety enhancements beyond that of the helicopter's certification basis.

# Challenges

- Would a rating system be universally adopted by helicopter OEMs and operators? **Issues:** Economy of scale; fleet turnover; potential legal issues; voluntary
- Messaging to consumers of rating system intent / meaning
- Potential unintended consequences
  - Reduced consumer demand based on low rating of existing older fleets
  - Economic impact to operators and consumers
  - Others...?
- Ratings will need constant updates with technology advances
- Complexity with helicopters performing multiple missions





# Conclusions

## Current Phase

- Closure
  - Brief to industry at Heli Expo and European Rotors
  - Release a white paper as a report out of this phase of the project.



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## OUR VISION

A worldwide vertical aviation community with **zero fatal accidents** achieved through cooperation and collaboration.



Global safety analyses, accident statistics, risk mitigations, and recommended practices.



Aviation safety promotion and educational videos, courses, and presentations



Proven helicopter and uncrewed vertical aviation safety tools, tips, and tactics.



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# Thank You