



Safety Above All

SPECIAL WORKING GROUP RATING SCHEME CONCEPT

TOWARD A SAFETY RATING FOR HELICOPTERS

*EASA Rotorcraft and VTOL Safety
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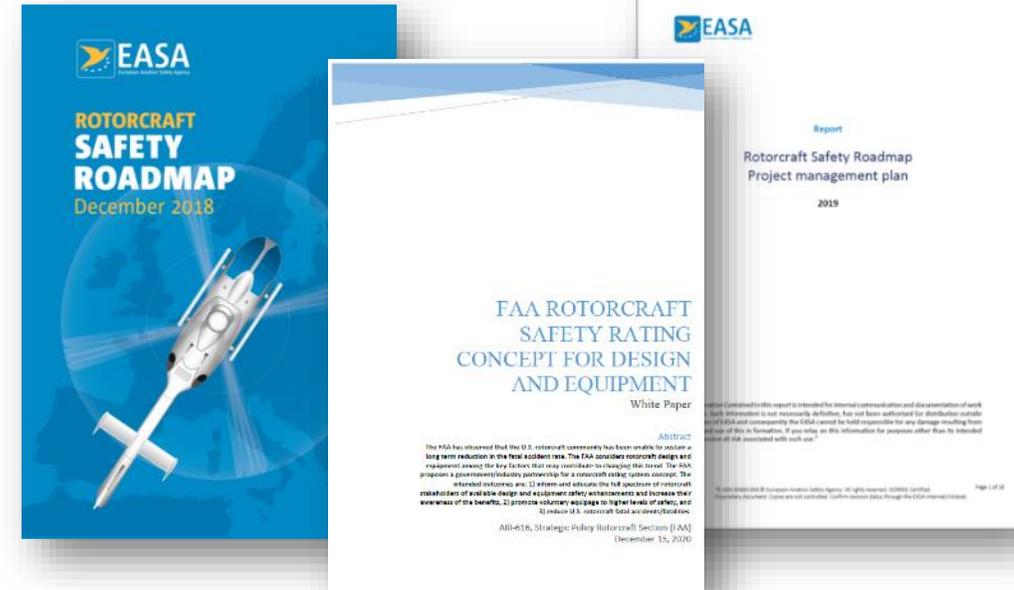
Agenda

- 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)



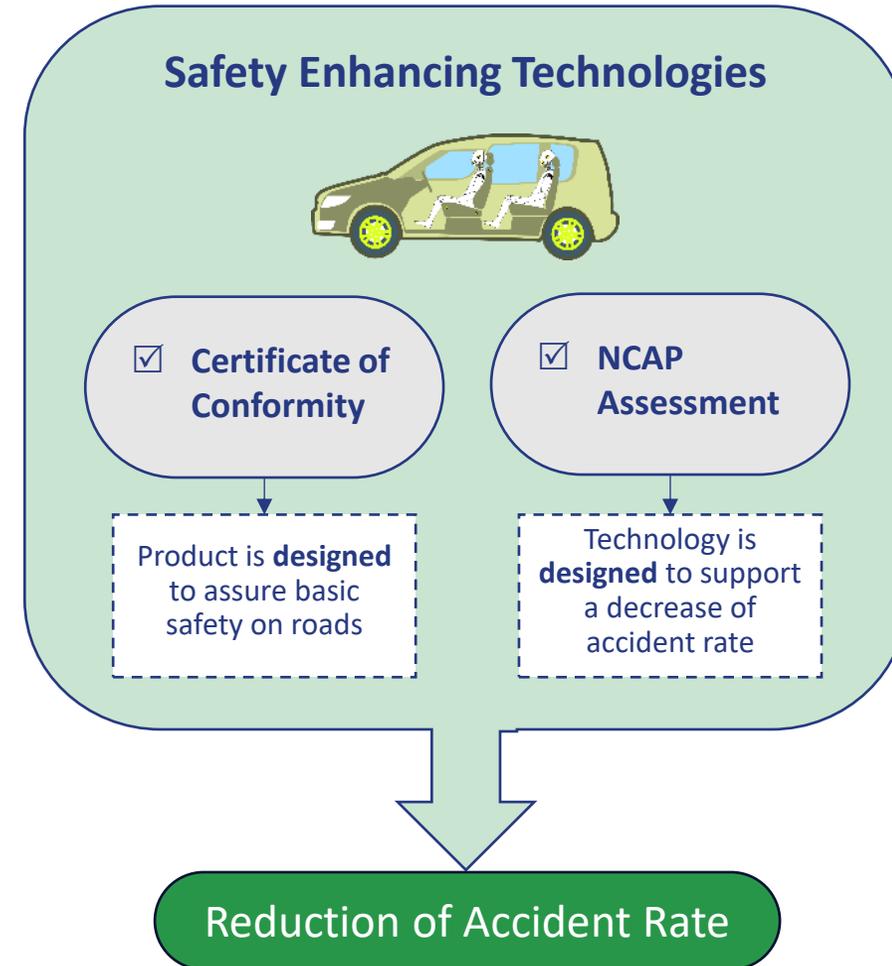
EURO NCAP

- 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*]



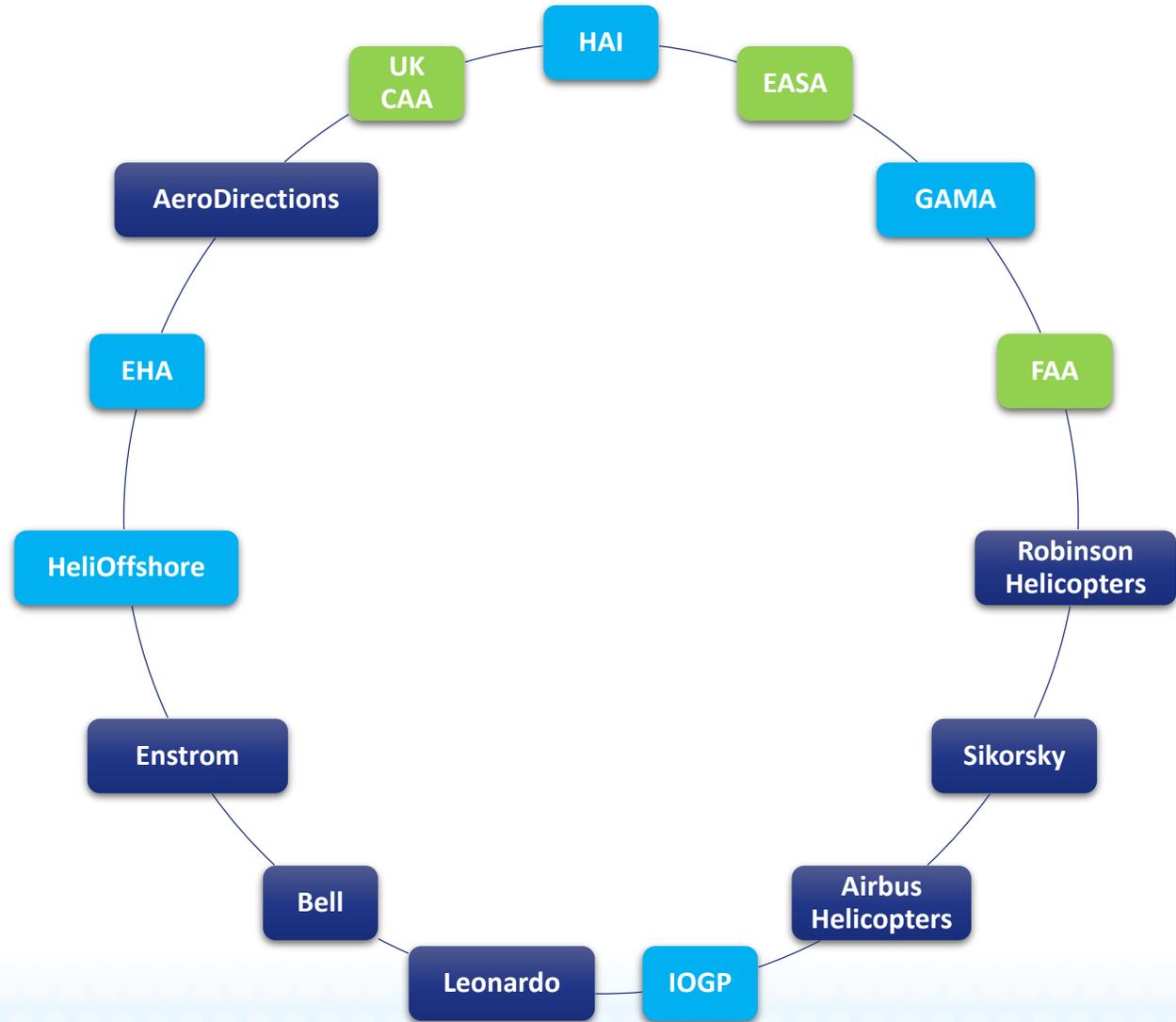
EU-28 passenger car and SUV sales, 2021. Total 9.7 million units.



Membership

Participants for the first phase of this project

- Manufacturers
- Associations
- Regulators



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





Safety Above All

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 ⁽⁴⁾	
Wf calculation 1,25 = 20 / (20-4)		Wf calculation 1,25 = 15 / (15 -3)		Wf calculation 1,17 = 14 / (14-2)		Wf calculation 1,33 = 16 / (16-4)	
<u>Prevention⁽⁶⁾</u>	4 pts	<u>Prevention⁽⁶⁾</u>	3 pts	<u>Prevention⁽⁶⁾</u>	2 pts	<u>Prevention⁽⁶⁾</u>	4 pts
Wf 1,25		Wf 1,25		Wf 1,17		Wf 1,33	
<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) ⁽⁸⁾	5 pts	XPDR / ADS-B out ⁽⁵⁾	1 pt	Cockpit Camera	1 pts	Protection package	10 pts
ED285/DO376 Classic ⁽⁸⁾	7 pts	Onboard ADS-B in	3 pts	HFDM (supported)	2 pts	Advanced package	12 pts
		TAS/TCAS	4 pts	Light FDR ⁽⁷⁾	3 pts		
				CVFDR ⁽⁷⁾	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 ⁽³⁾	2 pts	Auto download	2 pts	4-axis	3 pts
Operationally specific ⁽¹⁾	2 pt	Mobile Telephony TAS	2 pts			Guidance Manual/FCOM	1 pt
		Integrated traffic data ⁽²⁾	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

CRFS	CRSS/Crew	CRSS/Pax (Cabin)	Bird Strike
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⁽¹⁰⁾</u> 3 pts	<u>Survivability⁽¹⁰⁾</u> 4 pts	<u>Survivability⁽¹⁰⁾</u> 4 pts	<u>Survivability⁽¹⁰⁾</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 ⁽⁵⁾ 5 pts	EA Seats only ⁽⁵⁾ 5 pts	Bird-resistant windscreen ⁽⁷⁾ 4 pts
Basic upgrade kit ⁽¹⁾ 4 pts	EA Seat + Structure ⁽⁶⁾ 9 pts	EA Seat + Structure ⁽⁶⁾ 9 pts	Bird-proof windscreen ⁽⁸⁾ 6 pts
Bag upgrade kit ⁽²⁾ 4 pts			Full bird strike compliance ⁽⁹⁾ 10pts
Perlmutter ⁽³⁾ 8 pts	<u>Bonus Technology</u>	<u>Bonus Technology</u>	
Current compliance ⁽⁴⁾ 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

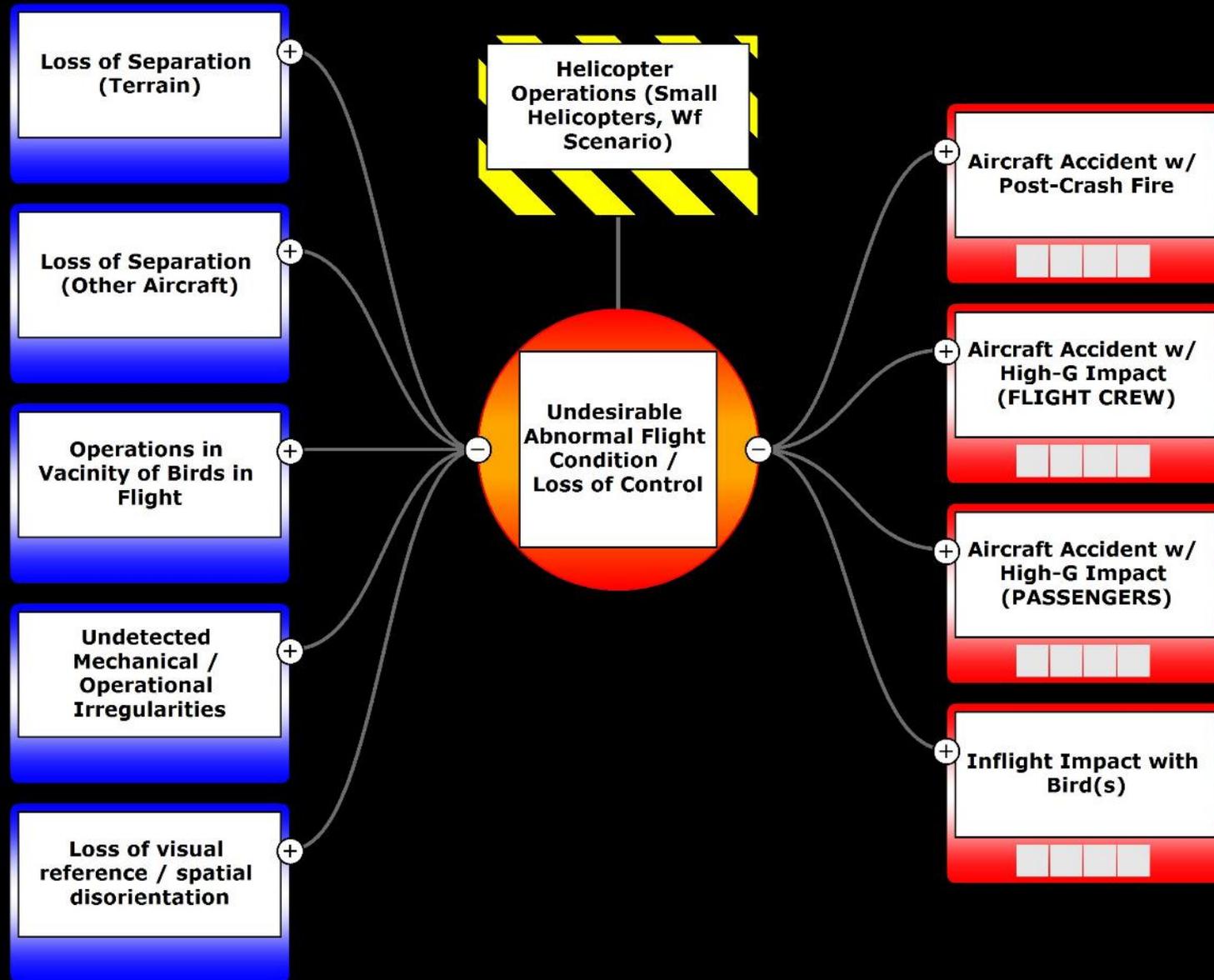
Notes:

- (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

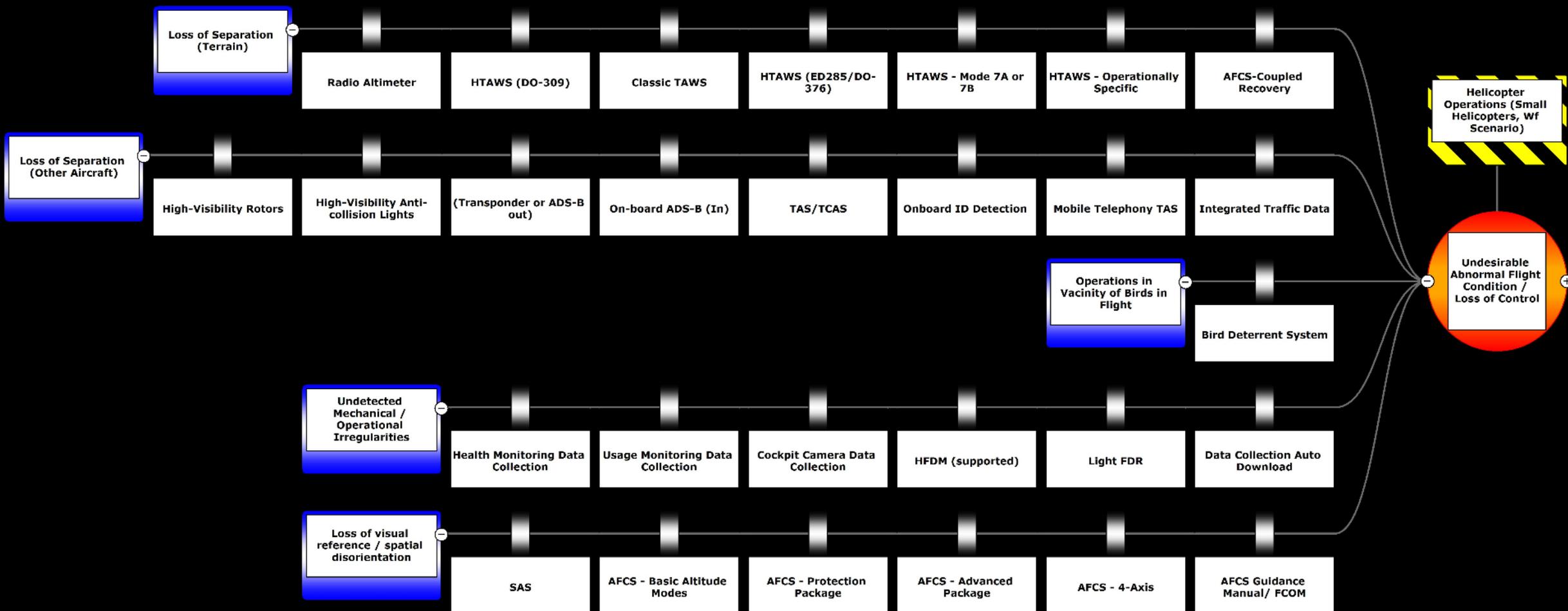
Survivability – Example of Offshore Helicopter Component

Ditching / Underwater Egress	
Wf calculation 1,29 = 18 / (18-4)	
<u>Survivability</u> ⁽¹⁾	4 pts
Wf 1,29	
<u>Safety Impact</u>	
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
<u>Bonus Technology</u>	
Flotation systems (SS5)**	1 pt
Flotation systems (SS6)**	2 pts
<u>Maximum score</u>	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 W _f .	

BowTie



BowTie – Prevention



BowTie – Survivability

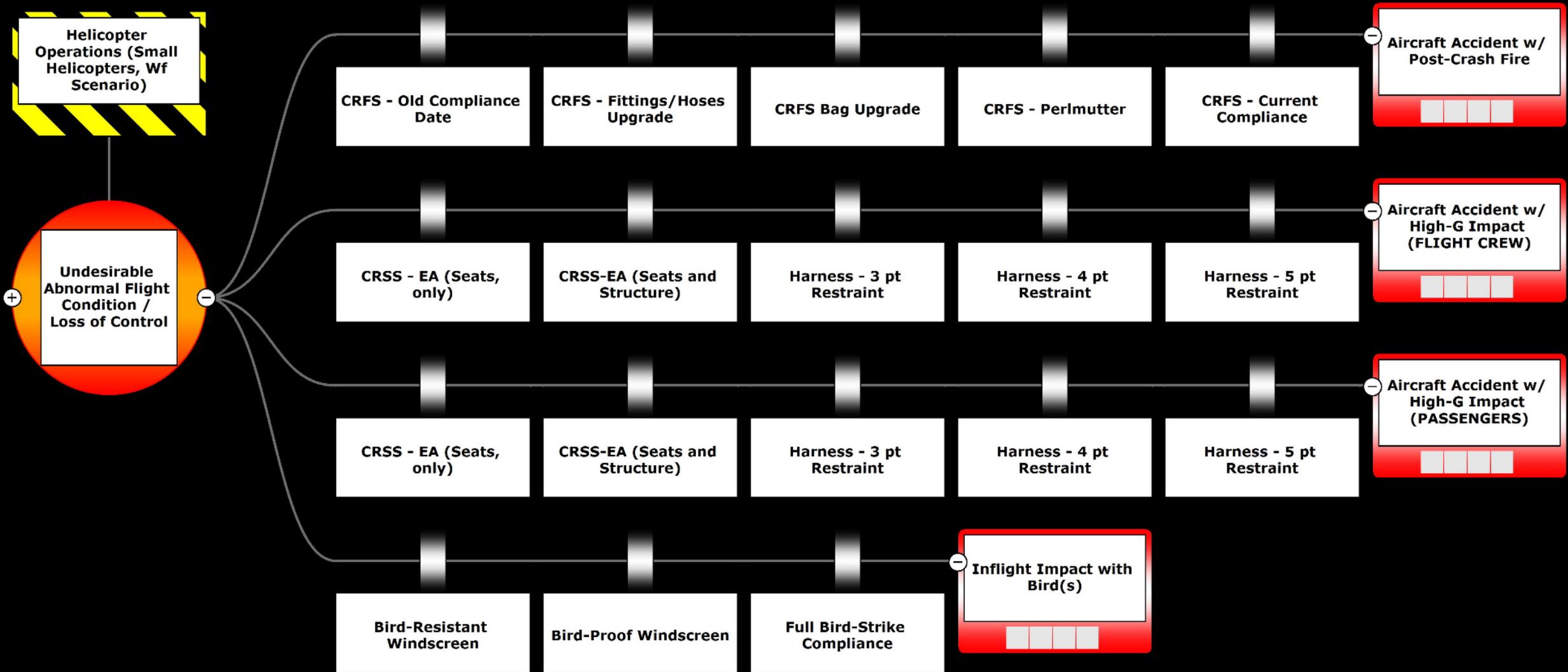


Table for Category Application by Mission

Category Applicability by Mission Set							
Mission	Onshore					Offshore	
	CAT (Urban)	CAT (Hostile)	EMS	Public Services	Aerial Work	CAT (Overwater)	Offshore (Energy)
<i>Rating Category - Prevention</i>							
Terrain Avoidance		✓	✓	✓		✓	✓
Collision Avoidance	✓	✓	✓	✓	✓	✓	✓
Data Collection	✓	✓	✓	✓	✓	✓	✓
AFCs	✓	✓	✓	✓	✓	✓	✓
<i>Rating Category - Survivability</i>							
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



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.



OUR VISION

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

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



Aviation safety promotion and educational videos, courses, and presentations



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Thank You