



**ALEX KNIGHT**

**Managing Director**

# Risks & Mitigations

# OBJECTIVE

To stimulate discussion around  
some of the risks associated with  
Helicopter Landing Sites

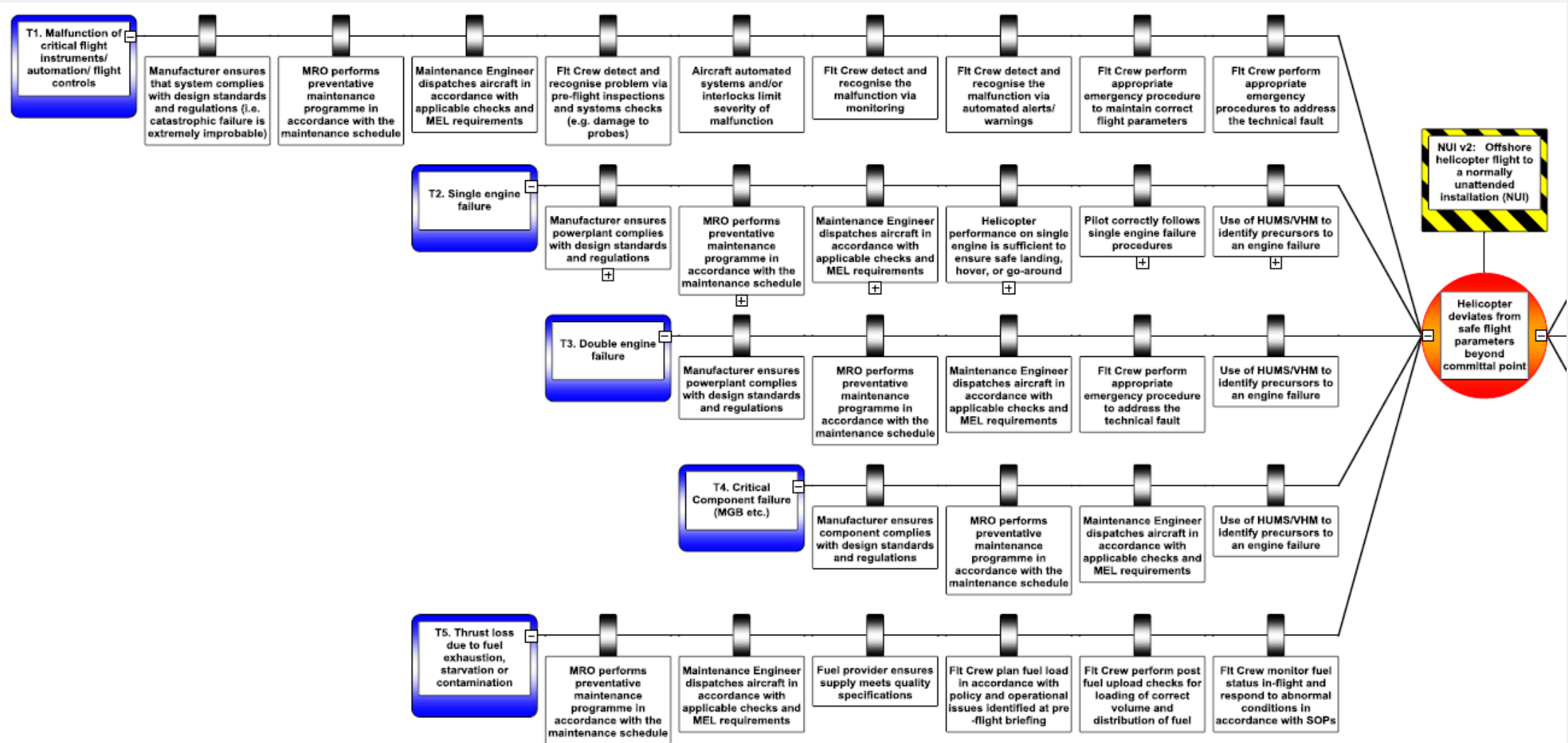
# Identifying the Risk

**First we need to define what are the “Foreseeable Risks”?  
Once we know these then we can start to look at  
some of the ways we can mitigate them.**

**For example: Lets take an ‘Unmanned’ helideck or Helipad  
and consider a crash on a deck situation?**

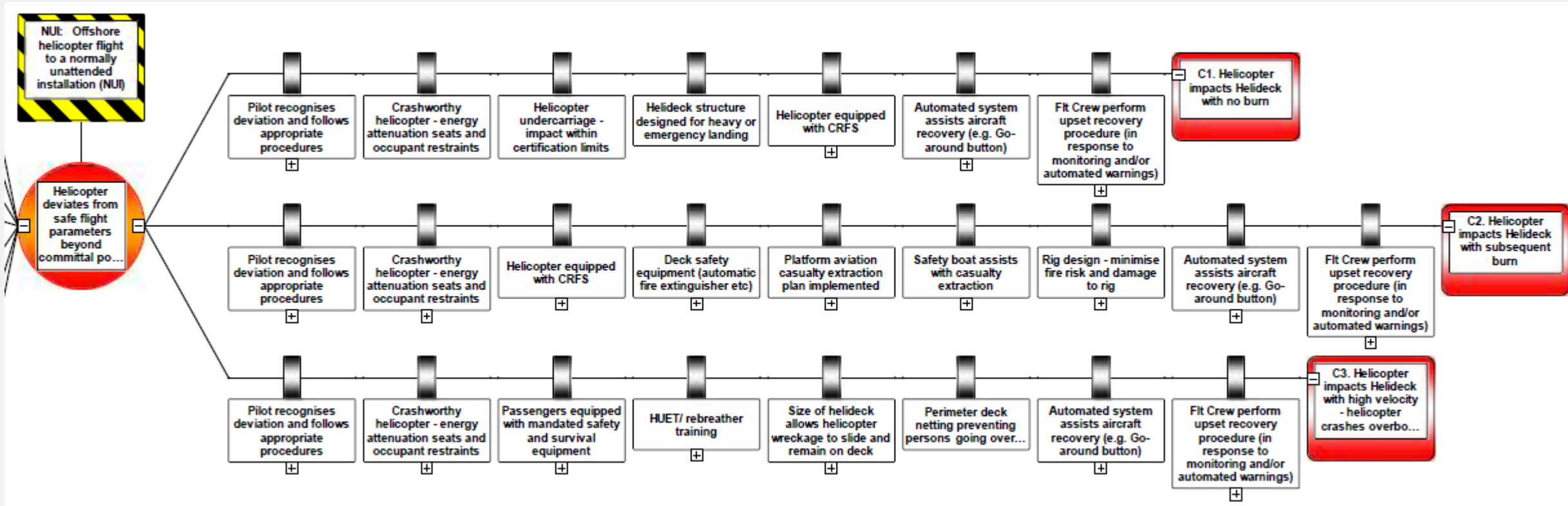
# Bowtie – Technical

(reproduced with the kind permission of the UK CAA)



# Bowtie – Outcomes

(reproduced with the kind permission of the UK CAA)



# Risk Matrix

TOLERABLE	TOLERABLE WITH MITIGATION	INTOLERABLE	INTOLERABLE	INTOLERABLE	DESIRABLE
TOLERABLE	TOLERABLE	TOLERABLE WITH MITIGATION	INTOLERABLE	INTOLERABLE	DESIRABLE
TOLERABLE	TOLERABLE	TOLERABLE	TOLERABLE WITH MITIGATION	INTOLERABLE	DESIRABLE

# Risk Mitigation Implementation Plan

Desirable	Implementation when/if possible following normal improvements in platform design and revised target levels of safety over time.
Tolerable	Operation provides level of protection which is acceptable to the CAA.
Tolerable with mitigation	Tolerable subject to establishing a mitigation plan to migrate to a 'tolerable' or 'desirable' condition within a reasonable timeframe and no later than by mid 2017.
Intolerable	Operations shall be suspended by an agreed (short) deadline and remain suspended until mitigation measures are put in place to migrate to the 'tolerable with mitigation', 'tolerable' or 'desirable' conditions, in which case the corresponding rules above shall apply.



# Mitigations

The bow tie model shows that the possibility of a crash on the helideck or helipad is realistic and therefore foreseeable!

So the DESIRABLE condition might include a full Emergency Response Capability including Fire Fighting.

Install an Emergency Response system design to cope with a crash, including a fire, on the deck



# Alternative Mitigations

- Limit the number of movements and/or passengers to the site
- Require the helicopter to operate to a Performance Class that fully terminates exposure to a crash (platform-design dependent)
- Require a combination of Performance Class and an additional Emergency Response system (e.g., helicopter crash resistant system, helideck CAP437-compliant fire fighting system) where exposure remains

Effective barriers in place

		None	A	A+B	A+C+D	A+C+E	Without a LOS: A+D, A+E, A+D+E With a LOS: A+B+D, A+B+E, A+B+D+E, A+C+D+E
Frequency of movements*	Low $f \leq 10$	Tolerable**	Tolerable	Tolerable	Tolerable	Tolerable	Desirable
	Standard $10 < f \leq 120$	Tolerable with mitigation	Tolerable	Tolerable	Tolerable	Tolerable	Desirable
	High $f > 120$	Intolerable	Tolerable	Tolerable	Tolerable	Tolerable	Desirable
Platform without a Limited Obstacle Sector (LOS)			Platform with a LOS				

- A** PC1/PC2e procedure/mass with deck-edge miss, drop-down and unobstructed fly-away into the Obstacle Free Sector (OFS), i.e., engine-failure accountability.
- B** PC1/PC2e mass with the deck-edge miss and drop-down, with nil wind accountability, where engine failure accountability may not be possible, i.e., when the wind is above 20kt and from within the Limited Obstacle Sector (LOS).
- C** PC1/PC2e mass with the deck-edge miss and drop-down, with wind accountability, where engine failure accountability may not be possible.
- D** Helicopter fitted with appropriate (i.e., latest standard) crash resistant system.
- E** Helideck automatic or manned CAP 437-compliant fire fighting systems.

The bow-tie & matrix exercise would be repeated for each foreseeable risk. I've only shown the 'Technical' reasons why a crash might result, but of course there are other reasons e.g. Human factors, Environmental (weather, turbulence), etc.

**THOUGHTS**

**QUESTIONS**

**COMMENTS**