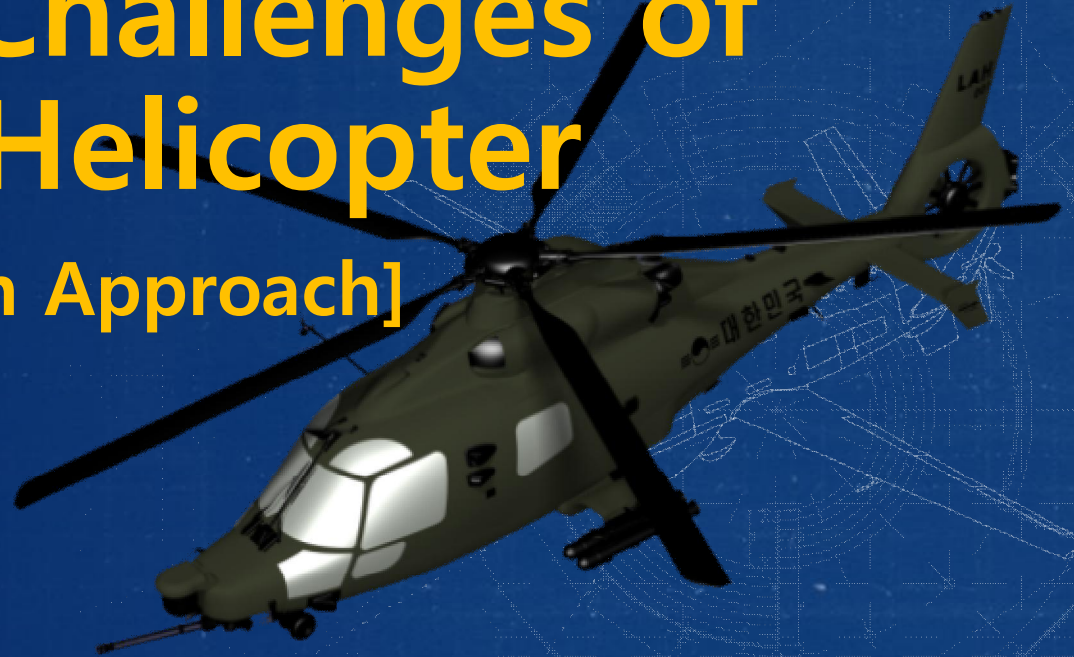


# Survivability Challenges of Light Armed Helicopter

## [Modular Open System Approach]



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2024. 10. 23

# DISCLAIMER :

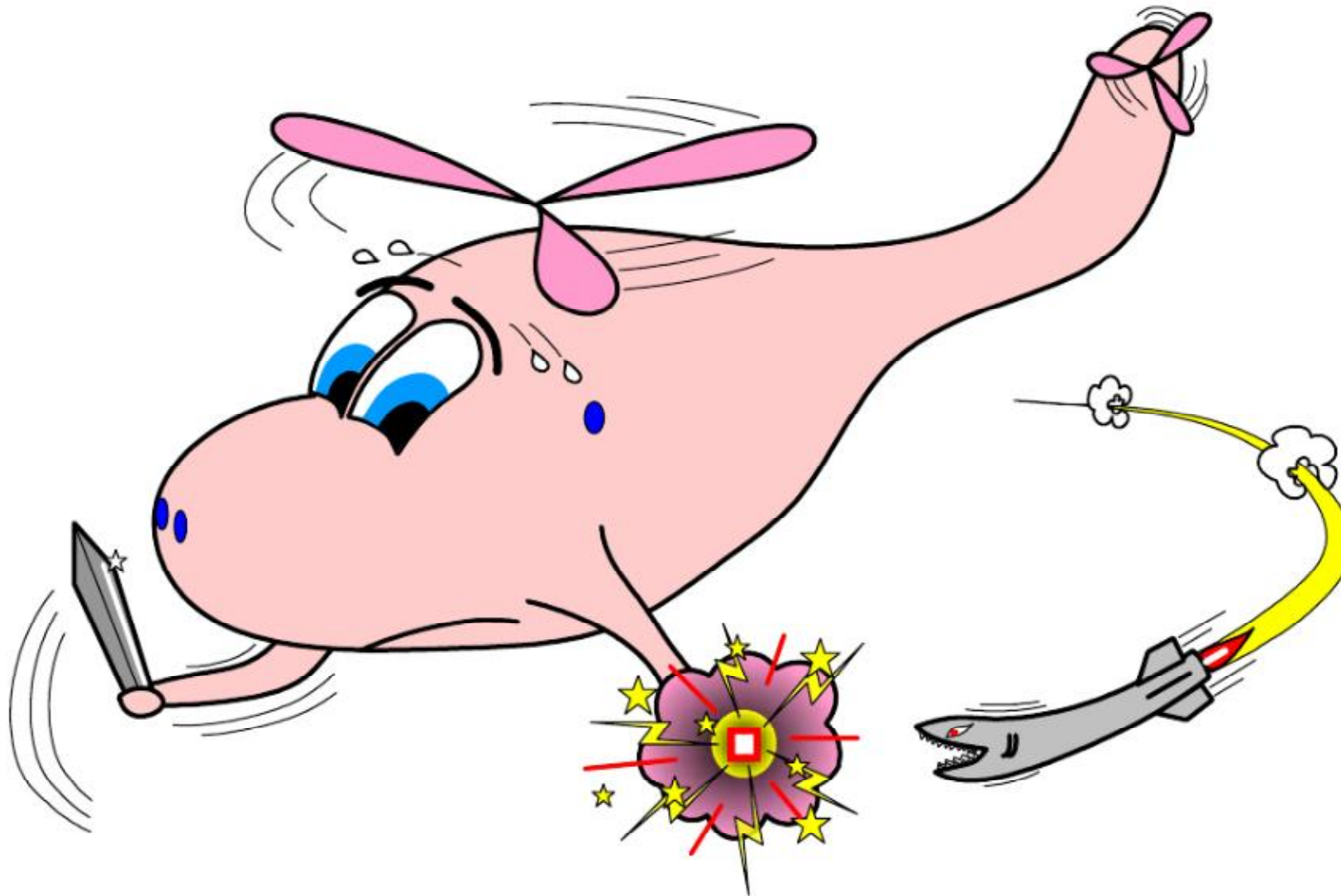
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# 1. Introduction

# 1. Introduction



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# 1. Introduction

## Survivability

- Ability to complete a mission successfully in the face of a hostile environment
- ▶ **Susceptibility**
  - The degree to which a system is **open to effective attack** due to one or more inherent weakness.
  - The extent to which own forces are likely to **be found, targeted and hit** by a weapon system employed against them
- ▶ **Vulnerability**
  - Determines the **consequences of being hit**
  - **Degradation in its capability of performing the designed mission**
- ▶ **Recoverability**
  - Mission capability can be restored following damage.
  - **Battle Damage Repair**

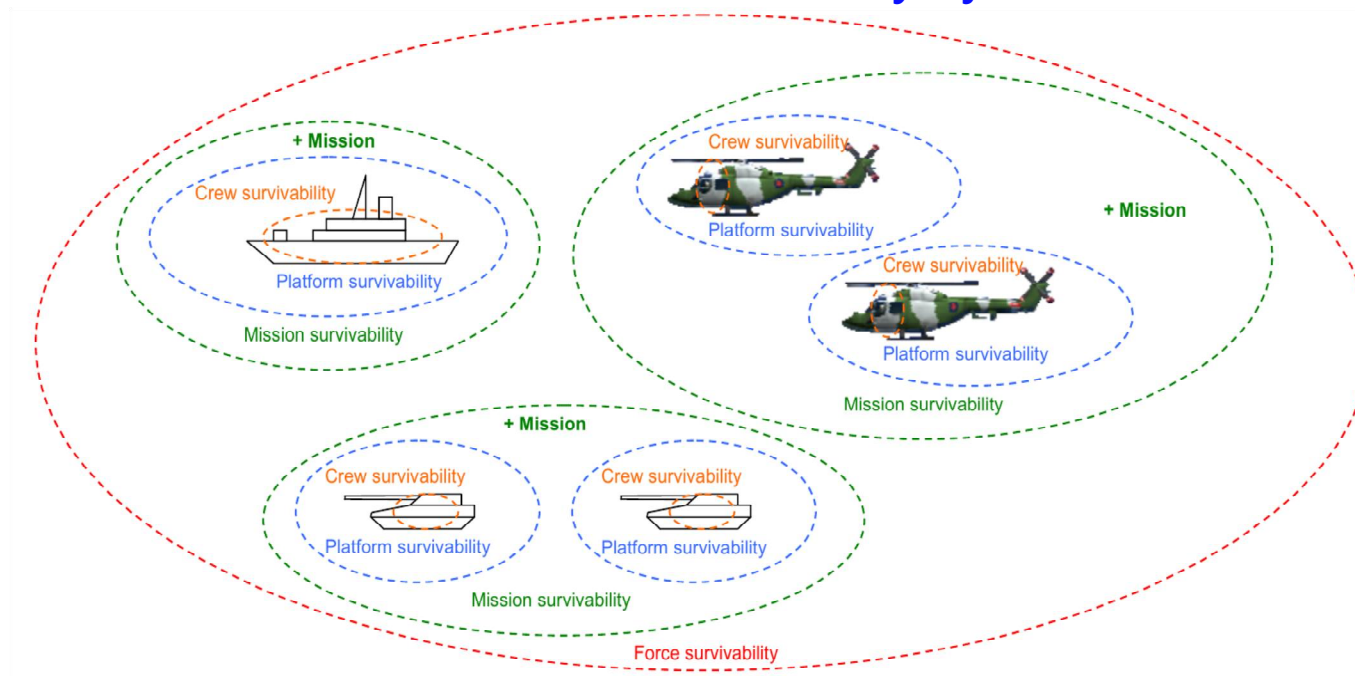
## Integrated survivability

- ▶ “is the systems engineering methodology to achieve **optimum survivability at an affordable cost**, enabling a mission to be completed successfully in the face of a hostile environment” (Ministry of Defense 2006).

# 1. Introduction

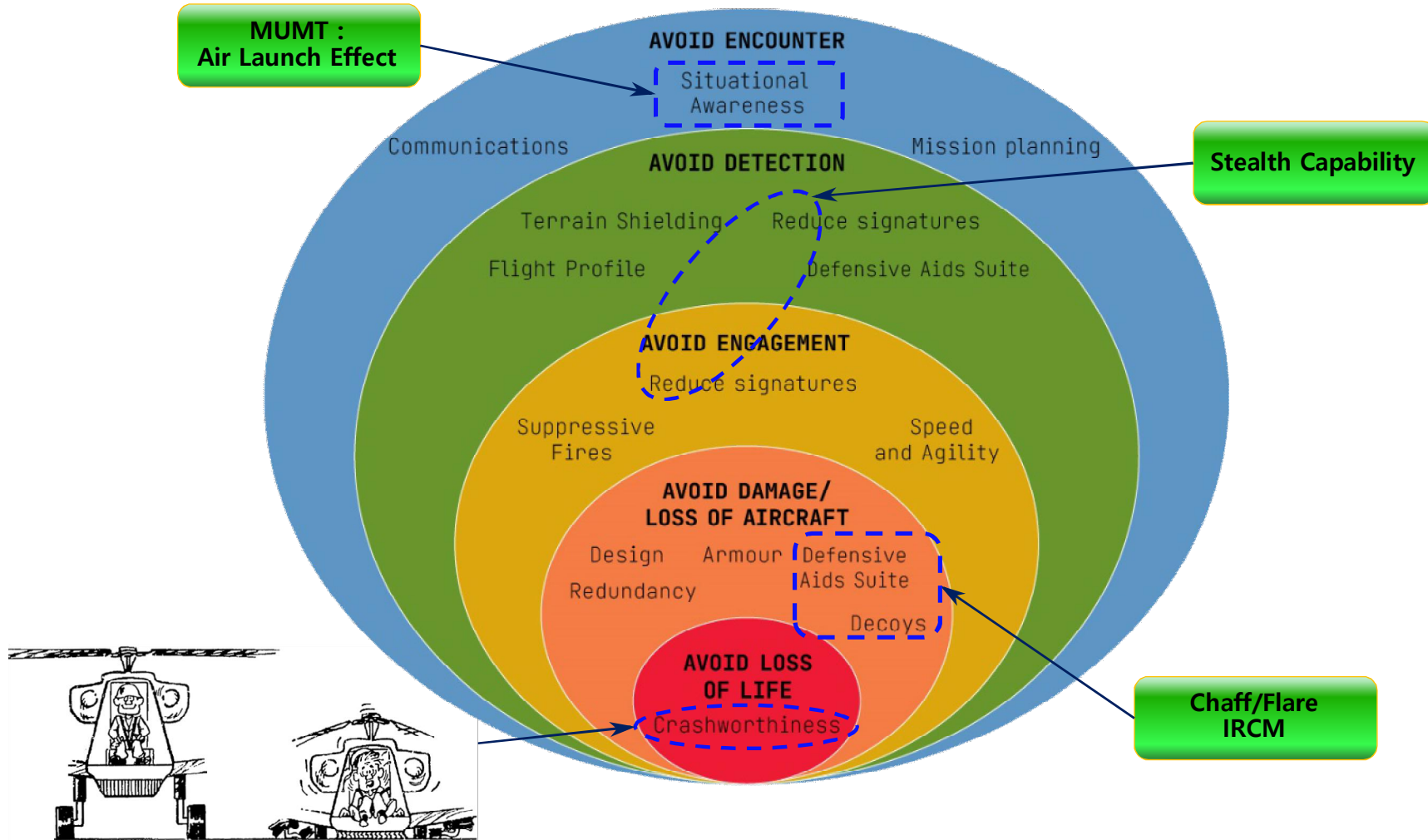
## Level of Survivability

- Force Level :
  - Survivability of the force to a level that it can carry out the overall campaign objectives.
- Mission Level :
  - Survivability required by the platform to carry out its mission and return to base.
- Platform Level :
  - The platform returns to base and no crew member is killed in action (KIA) or critically injured.
- Crew Level : No crew member is KIA or critically injured.



# 1. Introduction

## Onion Skin

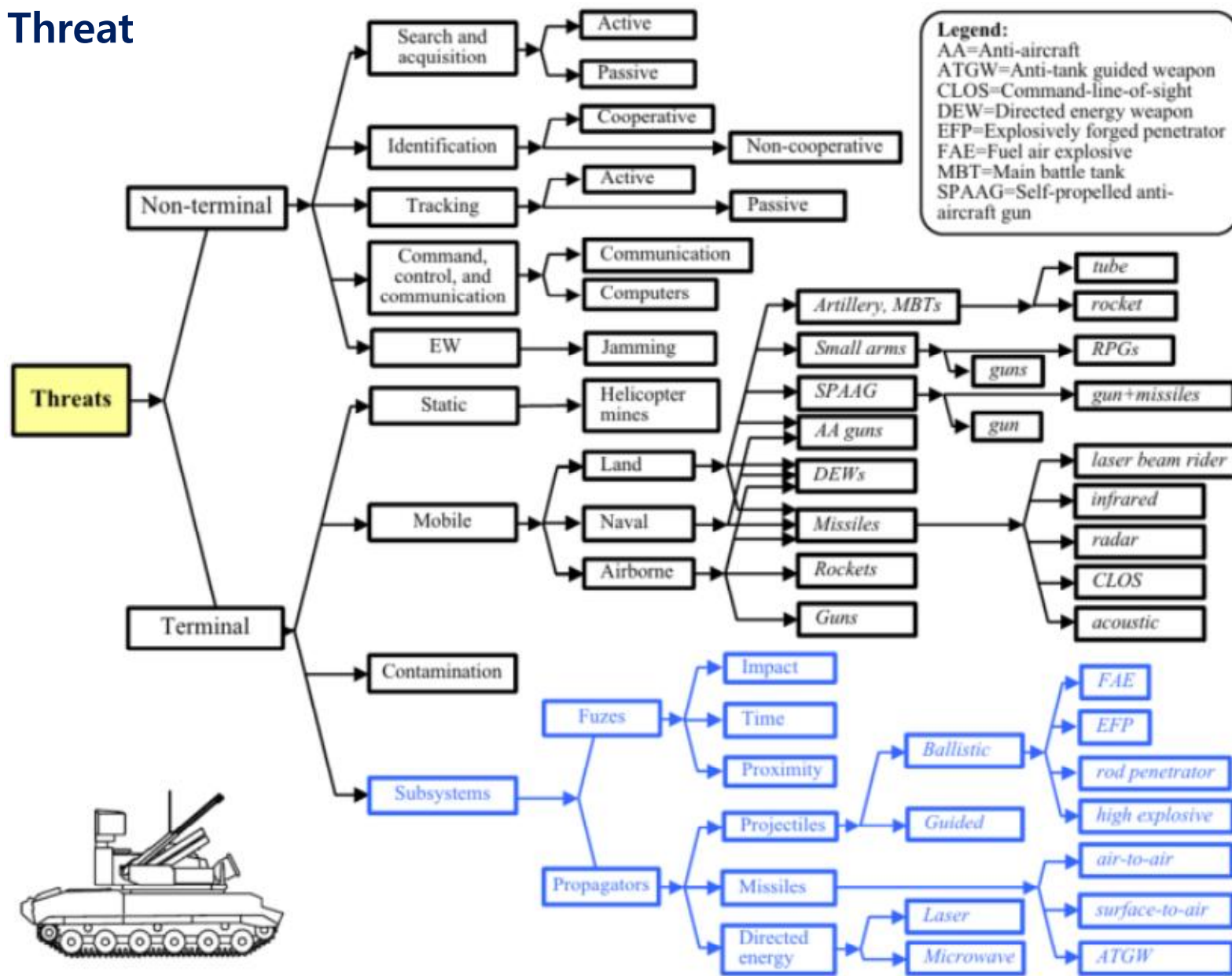


- JSSG-2010-7-19981030-Crash Protection Handbook
- LEONARDO Co., AW149 : Designed to Survive on the Modern Battle Field-Part I, 2022, 11



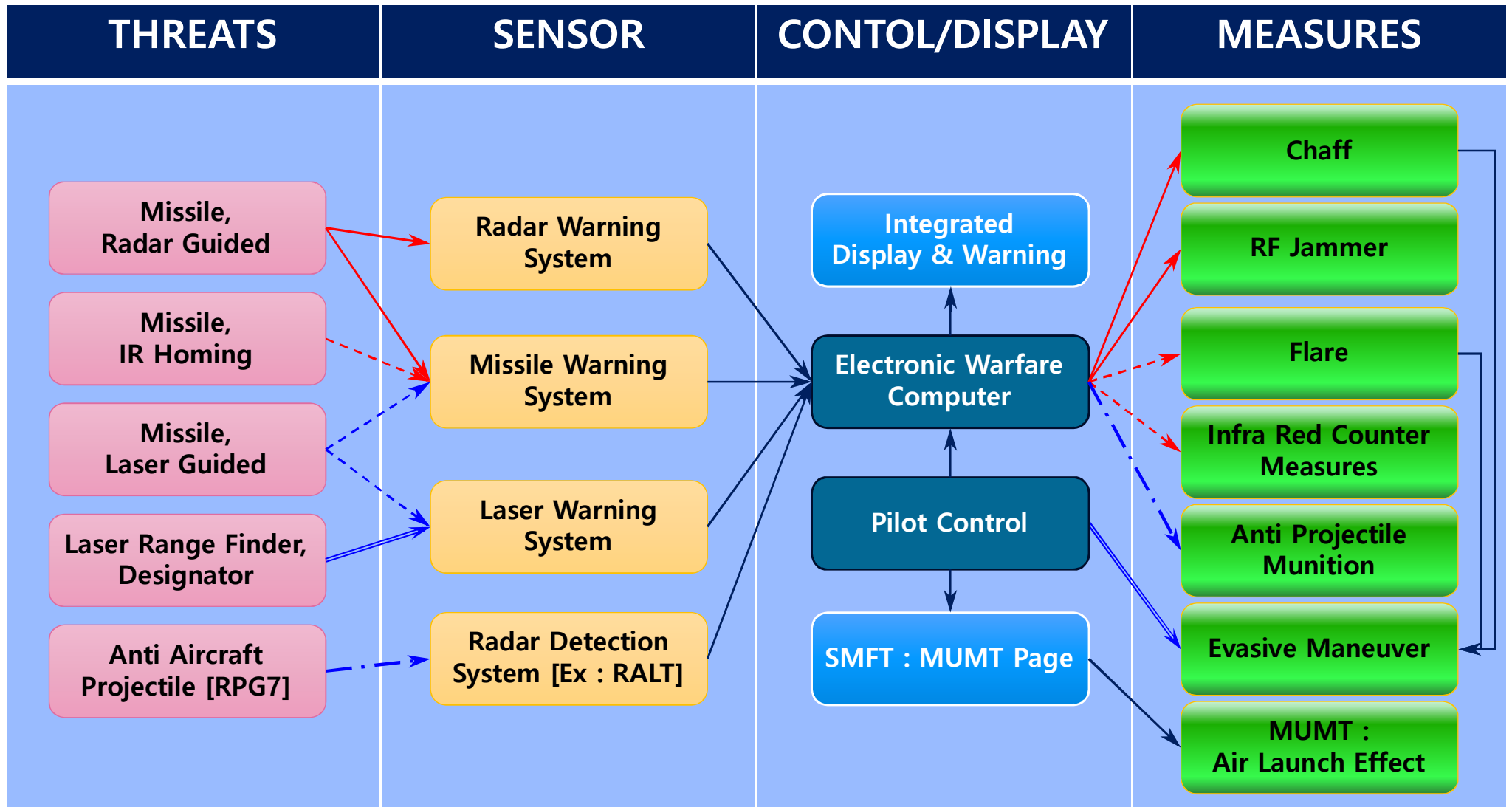
# 1. Introduction

## Type of Threat



# 1. Introduction

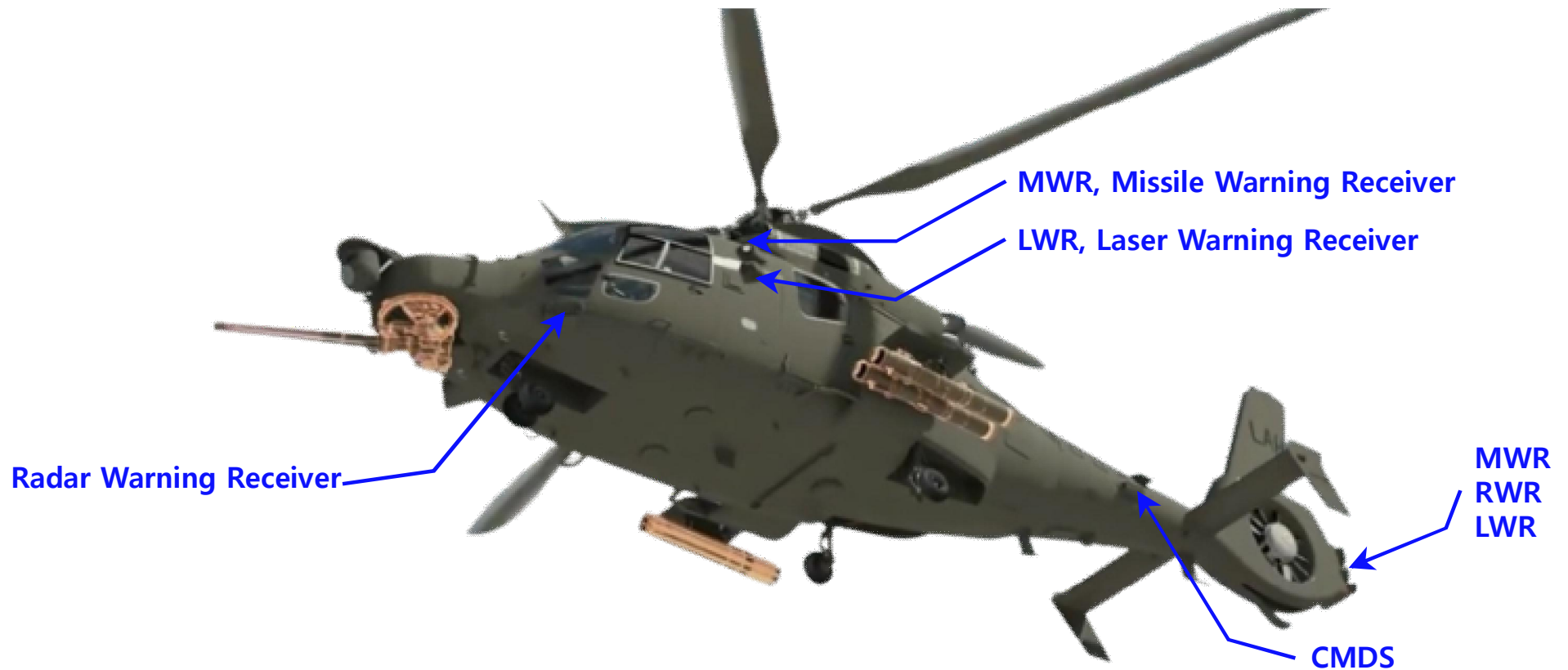
## Threat vs. Counter Measures for Helicopters



## 2. LAH Survivability System

## 2. LAH Survivability System

### ASE(Aircraft Survivability Equipment)



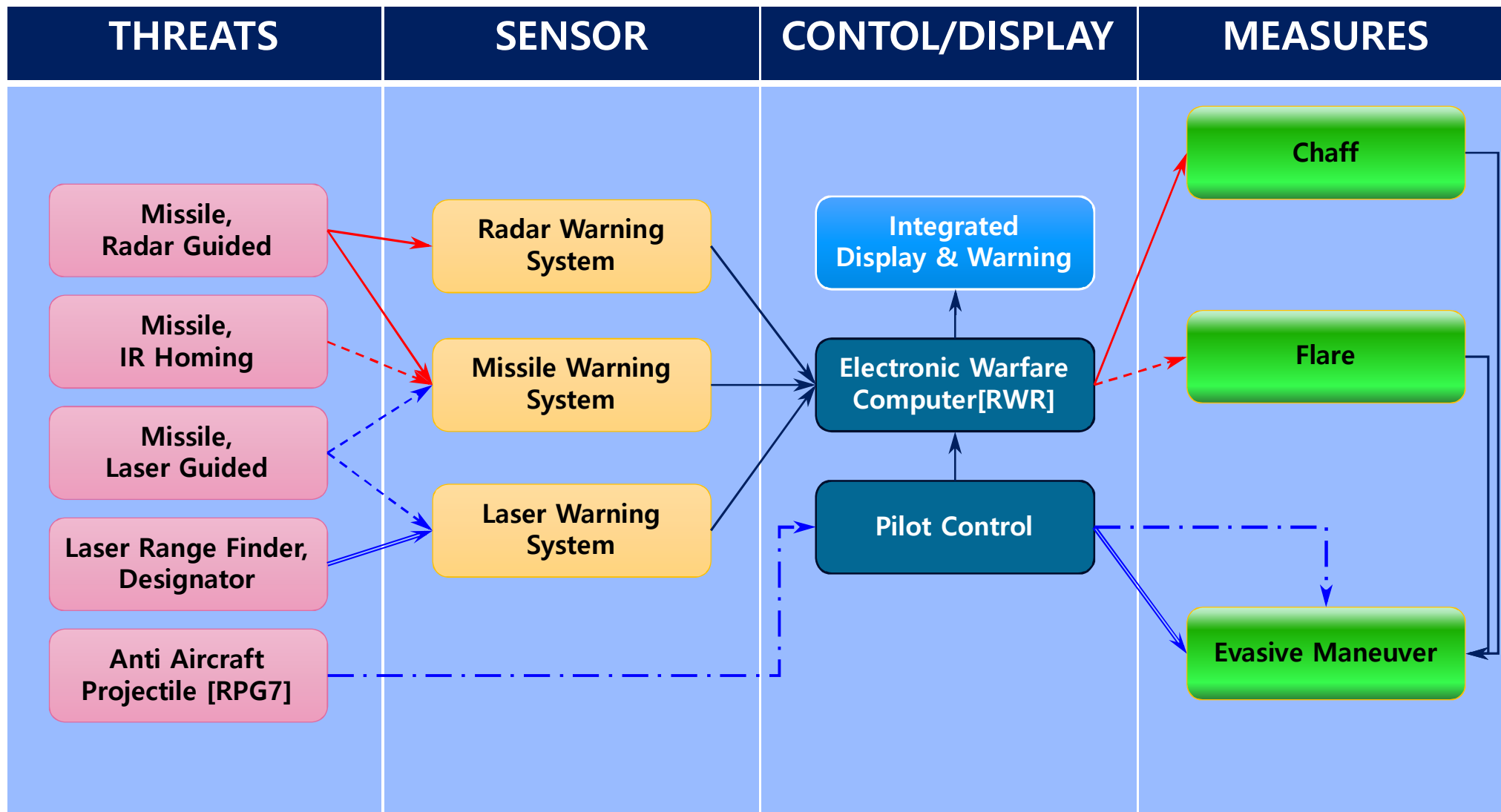
# 2. LAH Survivability System

## ASE (Aircraft Survivability Equipment) Components

Items		Company	Model	Remarks
RWR	Control Unit	Hanwha Systems	-	LAH (RWR + EWC)
	Sensors			
LWR	Control Unit	ADD/ Hanwha Systems	-	KUH
	Sensors			
MWR	Sensors	Hensoldt D&S	MILDS AN/AAR-60	KUH
CMDS	Programmer	BAE Systems	AN/ALE-47	KUH
	Panel			
	Safety Unit w/Flag			
	Dispenser			
	Magazine			

# 2. LAH Survivability System

## ASE (Aircraft Survivability Equipment) ; Current Feature



### 3. LAH Survivability with Modular Open System Approach

# Modular Open System Approach

## U.S. DoD, Under Secretary of Defense for Research and Engineering

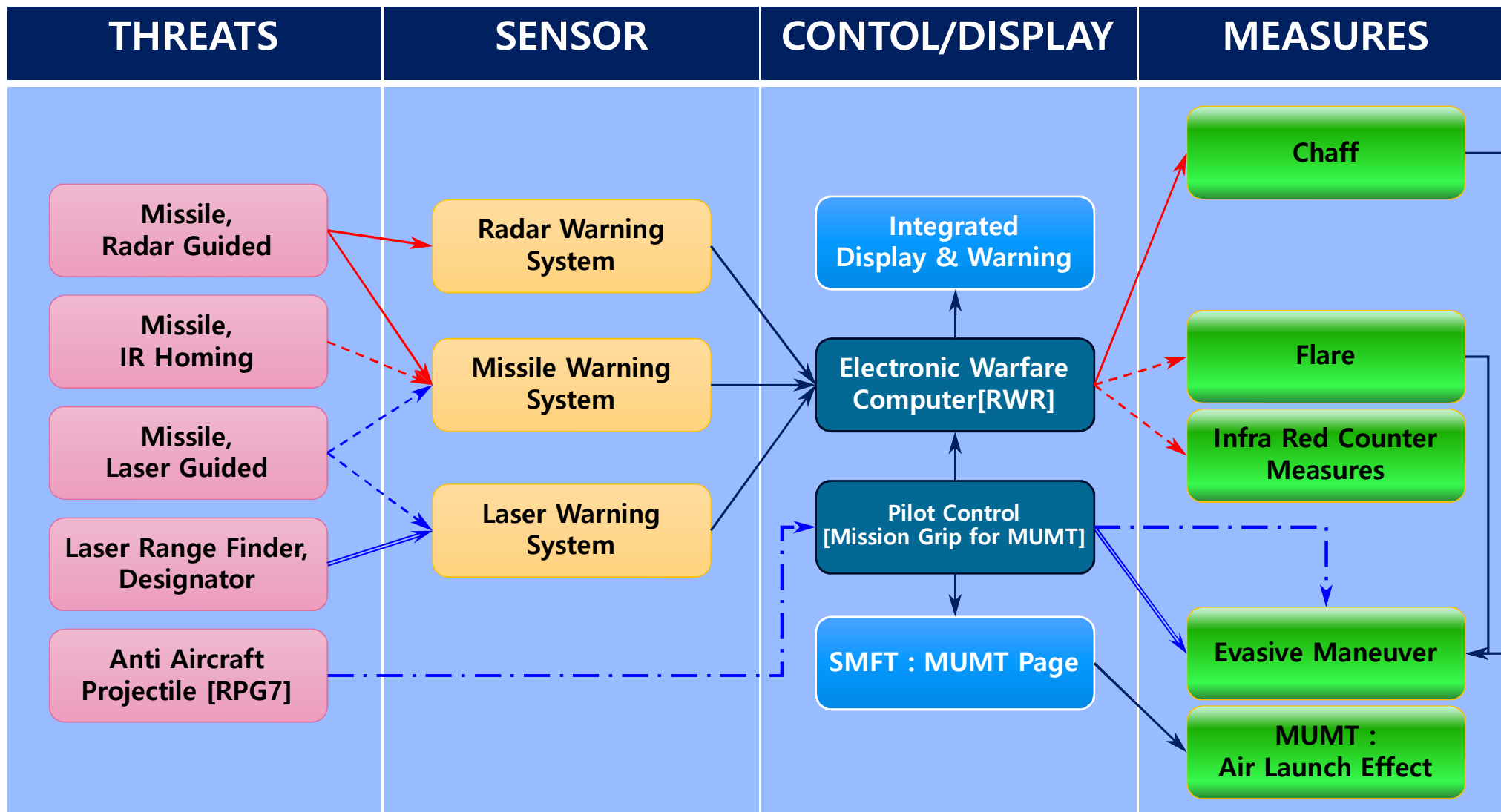
- ▶ An integrated business and technical strategy to achieve competitive and affordable acquisition and sustainment over the system life cycle.





# 3. LAH Survivability with MOSA

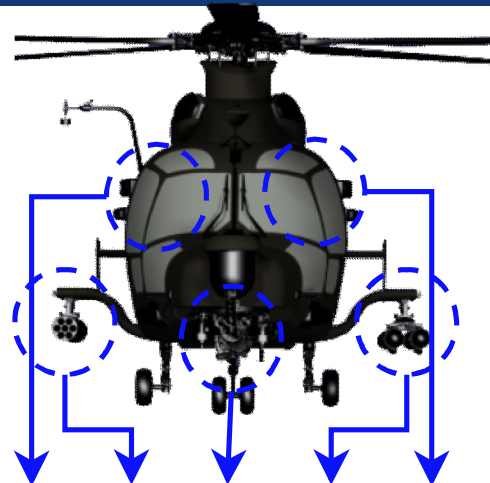
## ASE (Aircraft Survivability Equipment) : Future Provision



# 3. LAH Survivability with MOSA

## LAH + DIRCM

- ▶ Weight and C.G.
- ▶ Structural Reinforcement
- ▶ Electrical Power
- ▶ Antenna Pattern

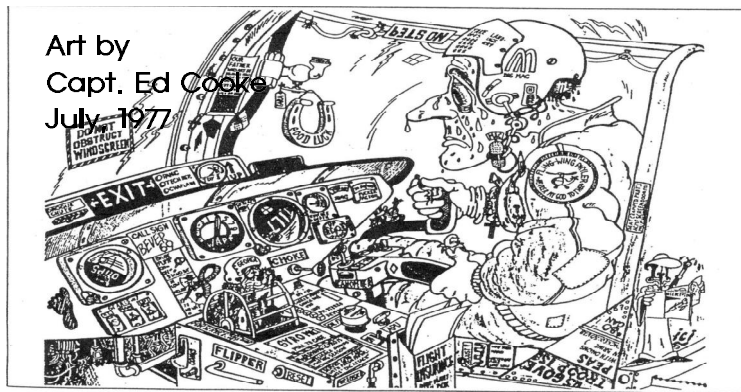
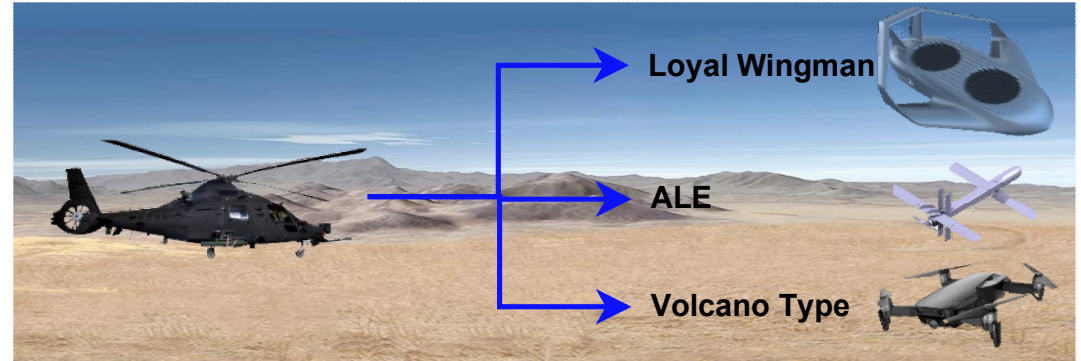


AGM & Rocket		O	X	O		<ul style="list-style-type: none"> <li>▪ Removes the TGS</li> </ul>
Wire Deflector			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> </ul>
DIRCM [1 or 2]			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> <li>▪ Electric Wiring</li> <li>▪ Electrical Power Increase</li> <li>▪ Antenna Pattern Analysis</li> </ul>
Control & Display Aural Warning (Inter-comm)			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> <li>▪ Electric Wiring</li> <li>▪ OFP(SMFD) Update</li> </ul>
Rearrange Avionics Equipment			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> <li>▪ Electric Wiring</li> </ul>

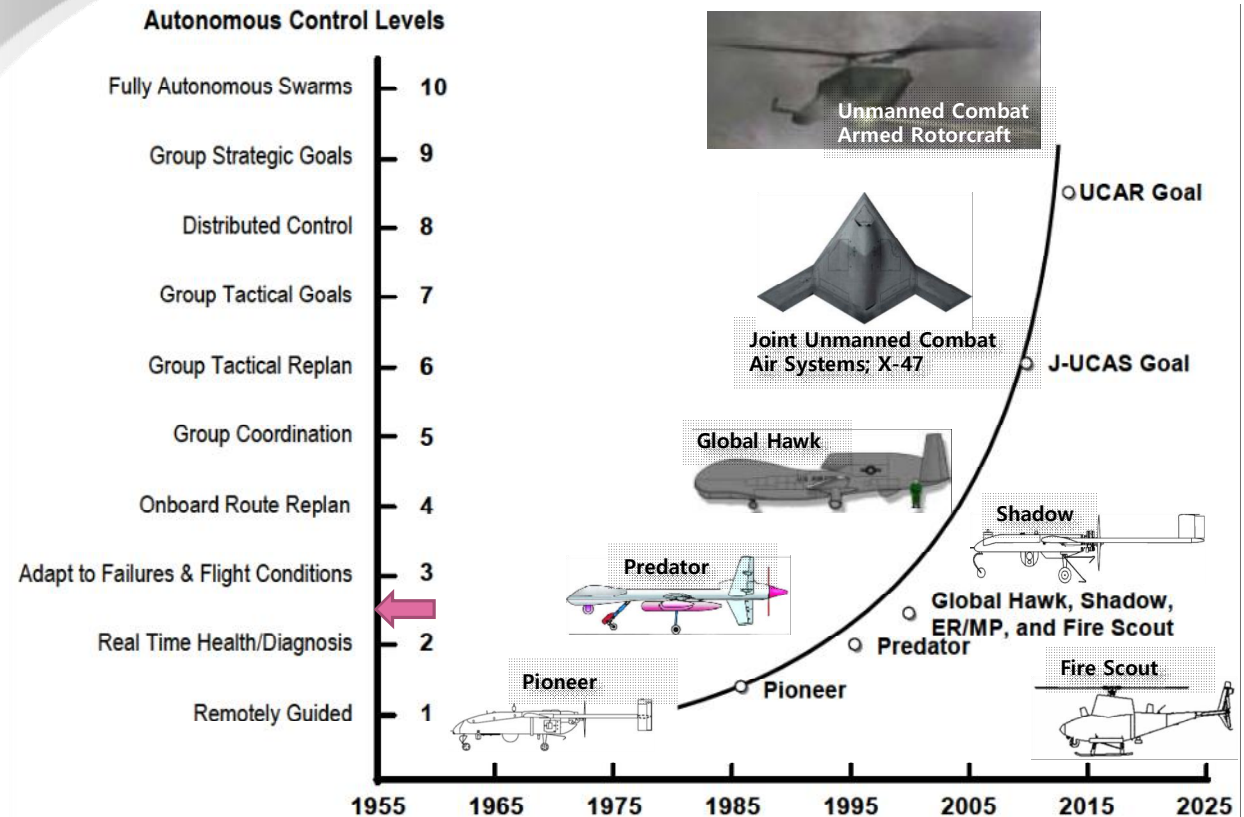
# 3. LAH Survivability with MOSA

## Similarity of MUM-T : Relationship between Infantry and K-9 dog.

- ▶ Expanding the Situational Awareness
- ▶ Manned Helicopter Protection



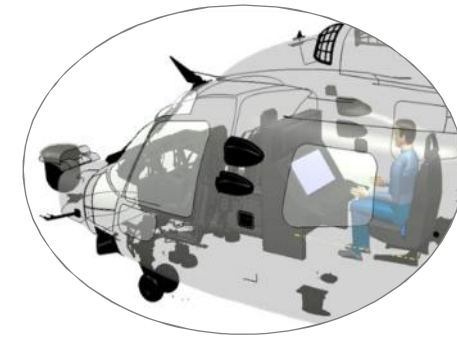
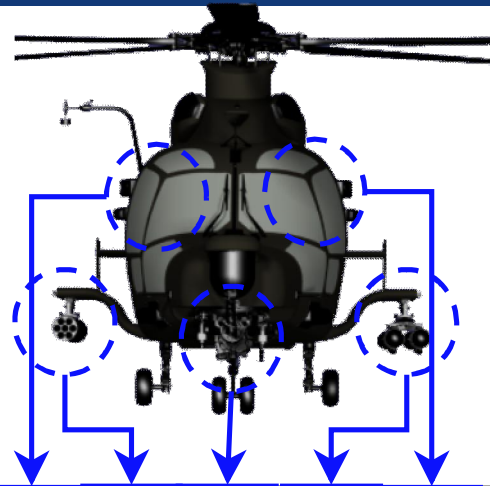
- ▶ Movie 'Meagan Leavey', 2017
- ▶ KAI homepage
- ▶ U.S. Army Roadmap for UAS 2005-2030 Appendix D-10, 2005.8



# 3. LAH Survivability with MOSA

## LAH + MUMT

- ▶ Weight and C.G.
- ▶ Structural Reinforcement
- ▶ Cabin Environment
- ▶ Window Modification



ALE(Air Launch Effect)		O	X	O		<ul style="list-style-type: none"> <li>▪ Removes the TGS</li> </ul>
Wire Deflector			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> </ul>
Cabin Floor and Window			O			<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> </ul>
Cabin Environmental Control and Communication(Inter-comm)	O				O	<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> <li>▪ Electric Wiring</li> <li>▪ Plumbing</li> </ul>
Install Control Console	O		O		O	<ul style="list-style-type: none"> <li>▪ Structural Reinforcement</li> <li>▪ Electric Wiring</li> <li>▪ OFP Modification[if necessary]</li> </ul>
Rearrange Avionics Equipment			O			<ul style="list-style-type: none"> <li>▪ Electric Wiring</li> <li>▪ Install Shelf</li> </ul>

➤ KAI - Image capture, edited

## 4. Summary

# 4. Summary

## LAH Survivability with Modular Open System Approach

- ▶ **Current ASE(Aircraft Survival Equipment) for LAH**
  - **Sensor**
    - Radar Warning Receiver / Missile Warning Receiver / Laser Warning Receiver
  - **Control & Display**
    - EWC(RWR) / SMFD(ICS for Aural Warning) / CMDS Control Device
  - **Counter Measures : Chaff / Flare**
  
- ▶ **Future ASE for LAH Considerations ;**
  - **Control & Display**
    - MUMT : SMFD(MUMT Page) + Mission Grip(Optional Item)
  - **Counter Measures**
    - DIRCM : Laser Jamming / Laser Weapon[option]
    - MUMT : ALE(Air Launch Effect)

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14. [U.S. Army Roadmap for UAS 2005-2030 Appendix D-10, 2005.8](#)



*Any Question ?*

