Presented to:

American Helicopter Society

Future Directions in Tactical Vertical Lift

AMRDEC
STRENGTH THROUGH TECHNOLOGY

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Date 29 April 2010

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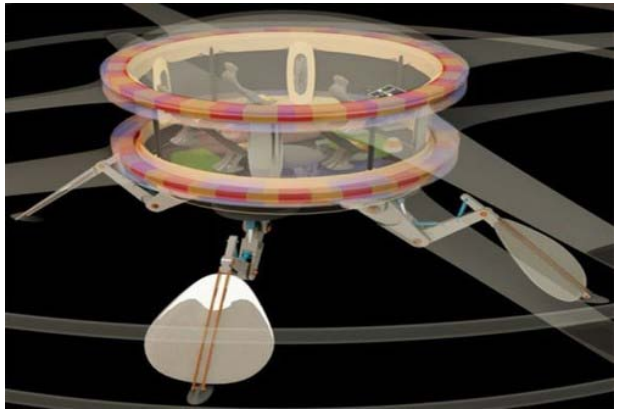
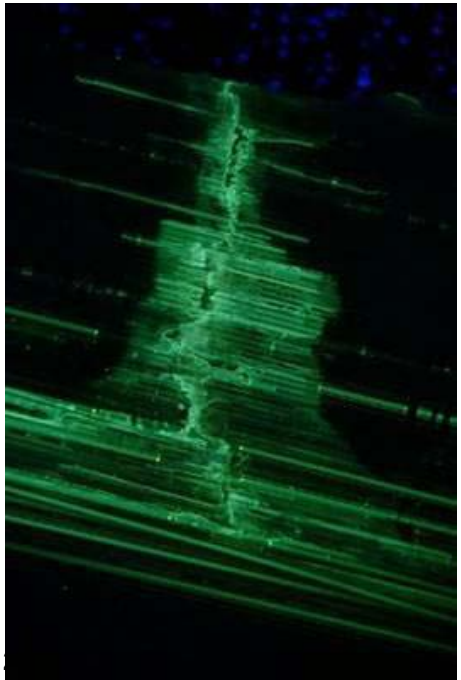
How to Think About Future Tactical Vertical Lift



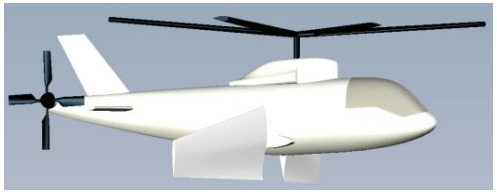


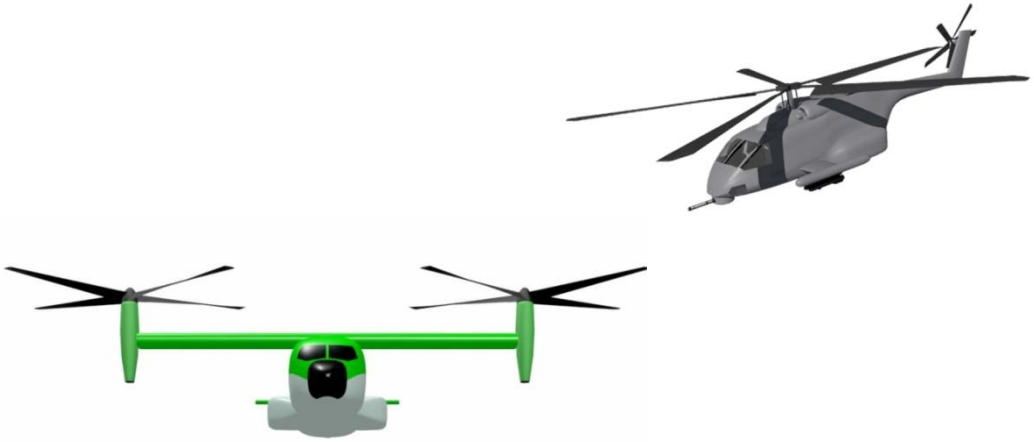
AGENDA

- Current Initiatives / Programs
- The Aviation Science and Technology Challenge
- OSD Future Vertical Lift
- Transition to the Future

Current Initiatives
Shaping the Future

- US Army Aviation Center of Excellence (USAACE) Aviation Operations Capability Based Assessment (CBA)
- USAACE Joint Multi-Role (JMR) Aircraft Analysis Study
- DARPA/Army Study on the Future of VTOL Aviation
- OSD Future Vertical Lift Initiative
- Army Aviation JMR Demonstrator Program





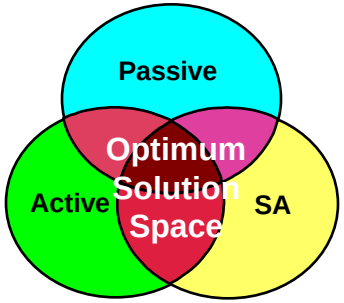
Current Army Rotorcraft S&T Investment

RDECOM

AMRDEC STRENGTH THROUGH TECHNOLOGY

Operations and Support
- CBM
- Rotor Durability

Advanced Technology Demonstration Efforts $550M



- Aircraft Survivability Equipment
- Aircraft & Crew Protection

Applied Research $316M

Human machine Interface

System concept studies

Reduced O&S Technologies

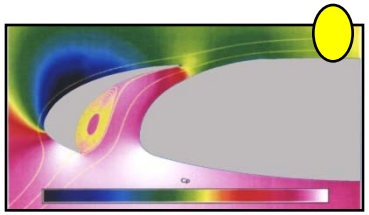
Advanced R/W Concept

Rotorcraft & Aircrew Survivability

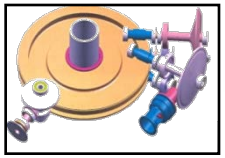
Rotors & Flight Controls

Propulsion & Drives

Aviation Weapons Integration



Rotors & Flight Control:
- Adaptive Vehicle Management
- Optimal Speed Rotor
- Reconfigurable Rotors
- High Performance R/W Designs

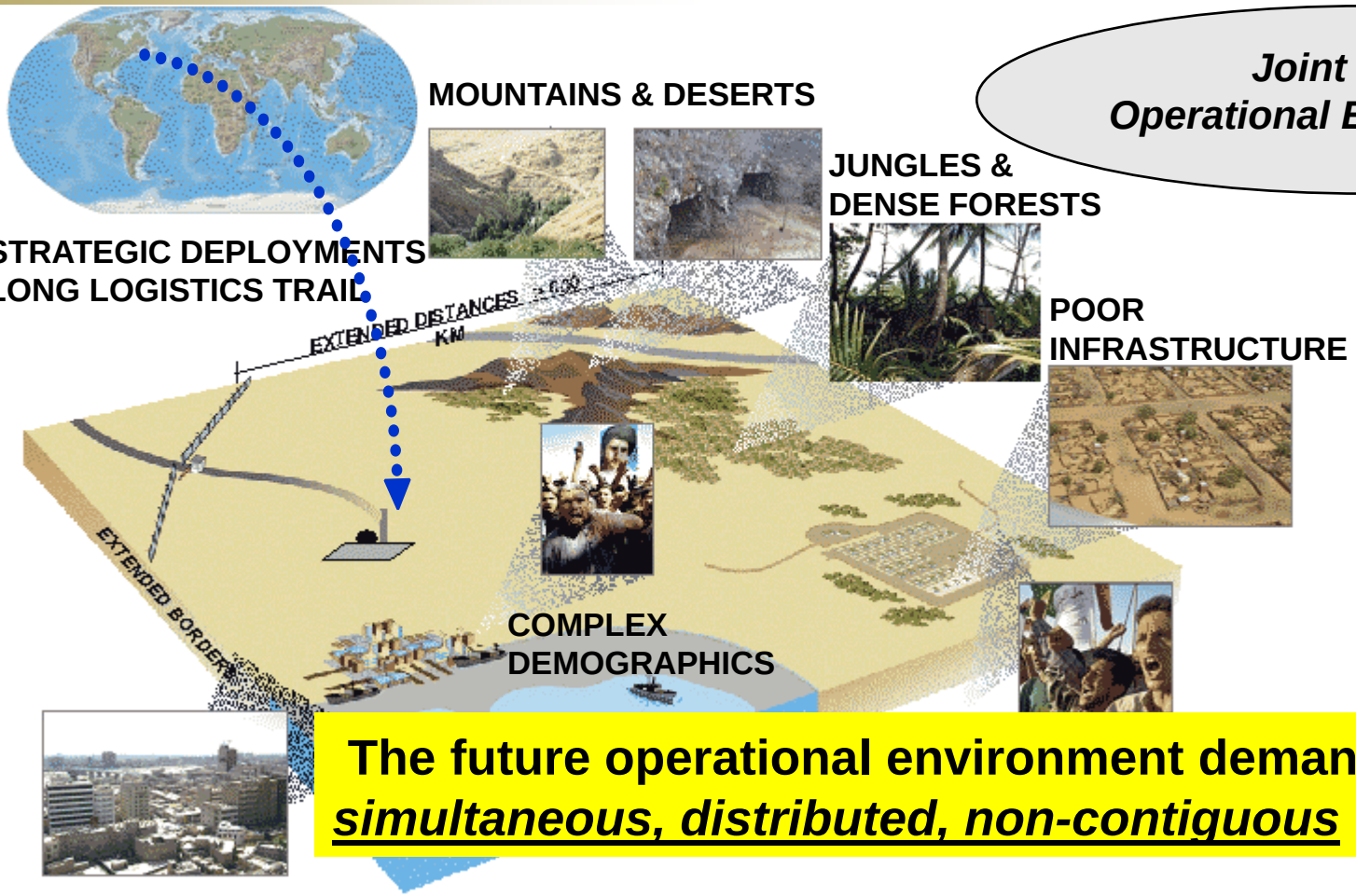


Propulsion & Drives Technologies
- Transmissions
- Engines

Unmanned Systems
- Unmanned-Manned Teaming/Autonomy
- Airspace Control

The S&T Challenge

Joint Future Operational Environment



The future operational environment demands *simultaneous, distributed, non-contiguous* operations

Increased reliance on force projection by Aviation

The S&T Challenge

- **“Army Aviation is the service's most requested asset around the globe, ….. some units are spending as much time on deployments as they do at home.” General James D. Thurman**

- **“I want vertical lift aircraft that fly faster, go farther and carry more stuff” Colonel Clay Hutmacher, Commander 160th Special Operations Aviation Regiment …. *Note: The 160th SOAR has been engaged continuously in combat operations since September 2001.***

The S&T Challenge

Commanding General's Intent

- We need an affordable and effective integrated pilotage system across the fleet, to enhance full spectrum operations, especially in degraded visual environments.

- It is paramount that all Aviation S&T efforts are focused, integrated, and synchronized. We must quit piecemealing component technologies and develop an integrated effort which considers all facets necessary to fielding a capability

The S&T Challenge

Commanding General's Intent

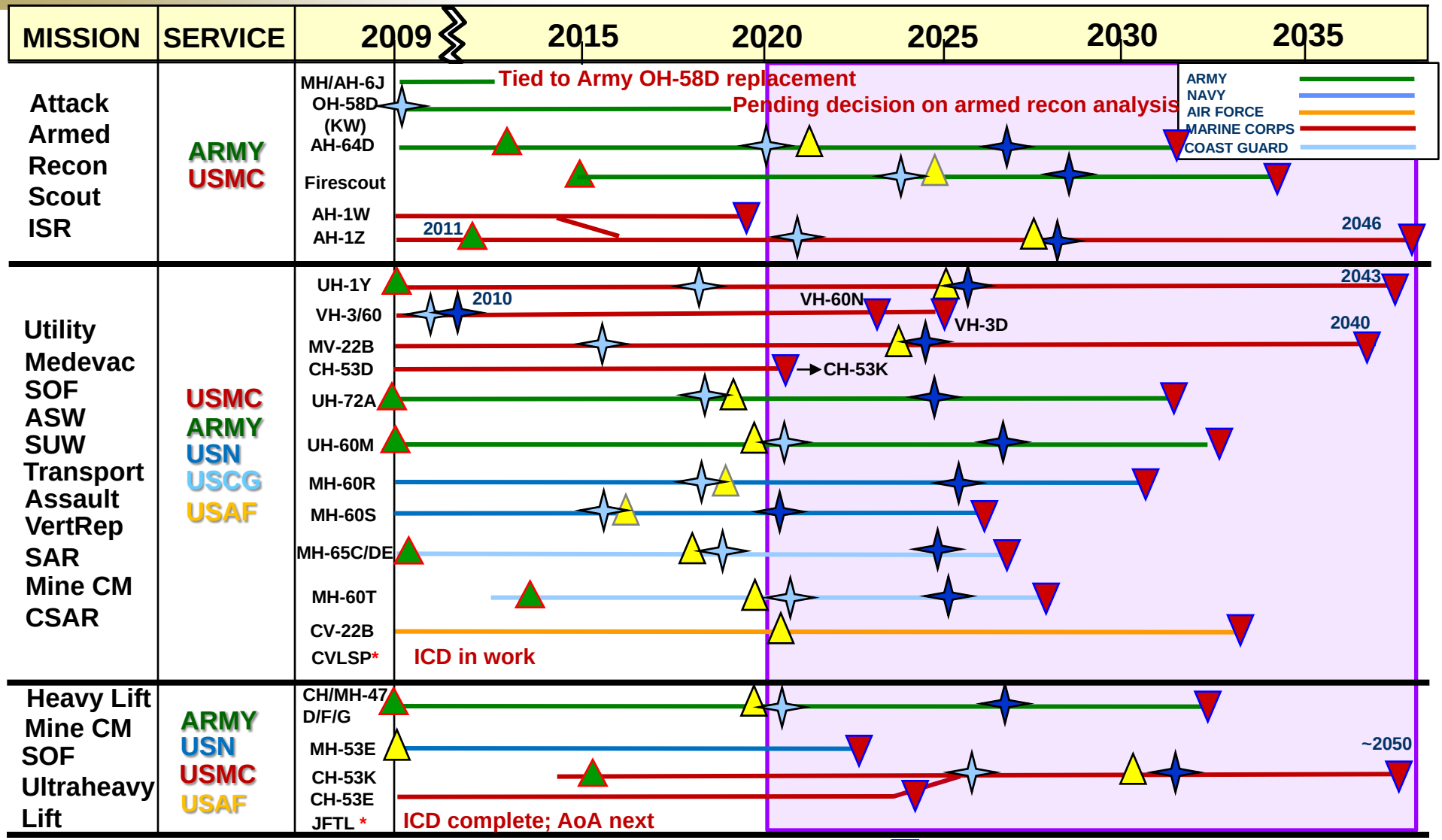
- The biggest impediment for rapid insertion of technology into our aircraft is the platform specific, proprietary architectures that require us to develop, test and field unique solutions for incorporation of technology improvements.

- Aviation platforms, must perform these tasks to standard, worldwide, in conditions ranging from standard sea level to high/hot (6k Pressure Altitude / 95 Deg F) across the full spectrum of environmental conditions.

- The utility and cargo fleet should carry their combat loads up to a 424 km unrefueled radius with 30 minutes station time; while, attack and reconnaissance aircraft should meet the 424 km unrefueled radius with 120 minutes station time.

The S&T Challenge

Future Aviation Decision Points



Initial Operational Capability

Estimated Half-life

Estimated End of Useful Life

DP 1: SLEP or New Start Technology Development

DP 2: New Start EMD

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

* Not Program of Record

Congressional / OSD Response

OSD Future Vertical Lift Initiative

2009 National Defense Authorization Act

The Congressional Rotorcraft Caucus is concerned about the lack of a strategic plan for vertical lift aircraft in the US

SECDEF Memorandum

I have directed OSD to lead the development of a CBA to outline an approach to future development of vertical lift aircraft for all Services

OSD Future Vertical Lift ESG

- Rotorcraft Survivability Study AUG '09
- Capabilities Based Assessment NOV '09
- S&T Plan JUN '10
- Strategic Plan JUL '10

VLC Board of Directors

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Ed Fortunato, Honeywell	Supplier
Kip Freeman, Goodrich Corportion	Supplier

THE ARMY RESPONSE
Joint Multi-Role

Future Roadmap

MISSION (Near Term)	(FY08-09)	(FY10-15) The POM Years	(FY16-24) The EPP Years	FY 2025 and Beyond
ATTACK/ RECON	AH-64A	AH 64D LB Block III		
	OH-58D KW			
	Hunter			
	Warrior			
	FireScout			
	Shadow			
	Raven			
	FCS Class I			
UTILITY	UH-60A/L	UH-60M	UH-60M/HH-60M	
	UH-1 (Divest)		UH-72A	
CARGO/ HVY LIFT	CH-47D		CH-47F	
	C-23 (CARGO) (Divest)		JCA	

2025 Timeframe
- AH64/KW replacement
  - Smaller, lighter, more affordable
  - Integrated approach to survivability
  - Optionally manned
- Manned-Unmanned complementary MEP and weapons
- UAS autonomy/FBCT objective UAS systems

2030 Timeframe
- UH-60 Replacement
  - 6K/95º flight performance
  - Extend Life of UH-60M
- Replace LUH with COTS

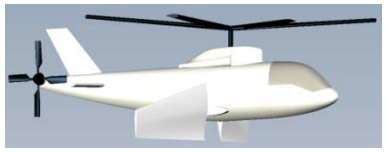
2035 Timeframe
- CH-47 Replacement
  - Common MEP/ components
  - 6K/95º flight performance
  - Leverage JHL tech demo

Army Aviation
Joint Multi-Role Development

FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20

Platform Technologies

Power Technologies



10 Year S&T Investment

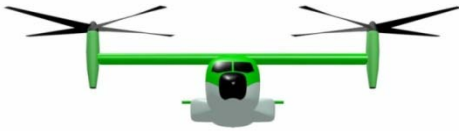
Systems Analysis and Concepts

Technology Demonstrators (Manned / Unmanned)

Joint Common Architecture

DECISION

Operational Support and Sustainment Technologies



Mission Systems Technologies

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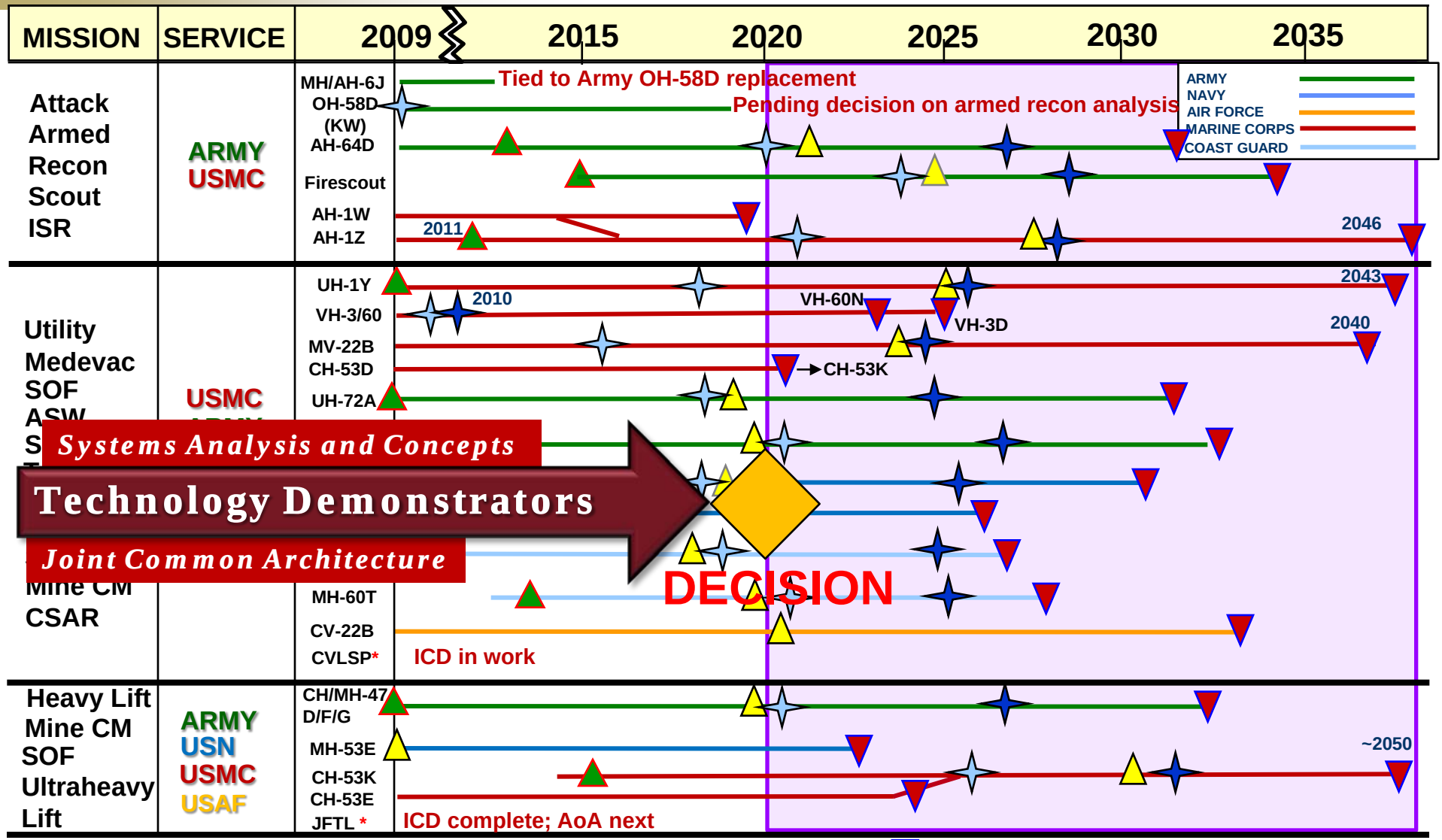
Future Aviation Decision Points



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Joint Multi-Role Development

AMRDEC Moffat Field

Lead Research and Analysis

AMRDEC Redstone Arsenal

Lead Architecture Development

AMRDEC Aviation Applied Technology Directorate

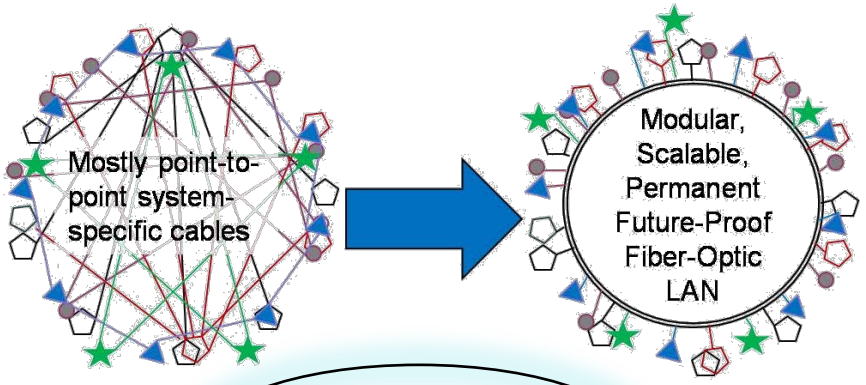
Lead Demonstrator Program

FT Rucker

Lead Concepts and Studies

AMRDEC
Aviation Integration Facility

Full Authority Control



Joint Common Open Architecture

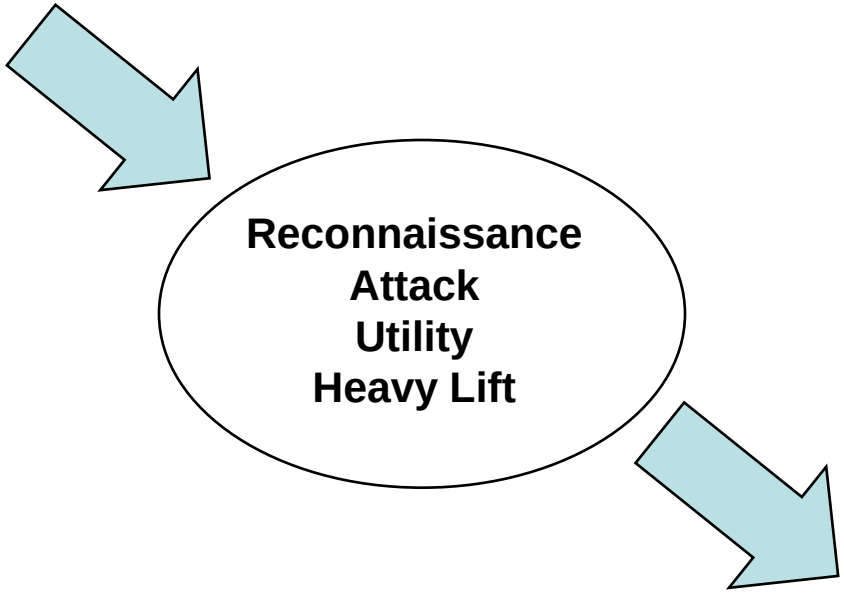
Reconfigurable Fiber Network

S&T Investment Interest Areas

• **Survivability** – Signature Reduction – Aircraft Hardening – Redundancy – Speed – Active Protection	• **Situational Awareness** – Virtual Cockpit – UAS Associates – Degraded Visual Environment (DVE) Control – Sensor Fusion – Foliage Penetrating Sensors	• **Affordability** – On Condition Maintenance – Non-proprietary software – Commonality
• **Performance** – Hybrid Engines – Active Rotor Control – Swashplateless – Variable Geometry Rotors – Sea Based	• **Network** – GIG Compatibility – Multi-level Security – SW driven waveforms – Integrated Assured Comms	• **Lethality** – Directed Energy – Scalable – Auto/Ai Target recognition – Selectable yield warheads
•TBD	•TBD	•TBD

CAN WE SUCCEED?

CURRENT FLEET



JMR

Airframe Growth
6000/95F / Mission Profile

- Aviation platforms, must perform these tasks to standard, worldwide, in conditions ranging from standard sea level to high/hot (6k Pressure Altitude / 95 Deg F) across the full spectrum of environmental conditions.

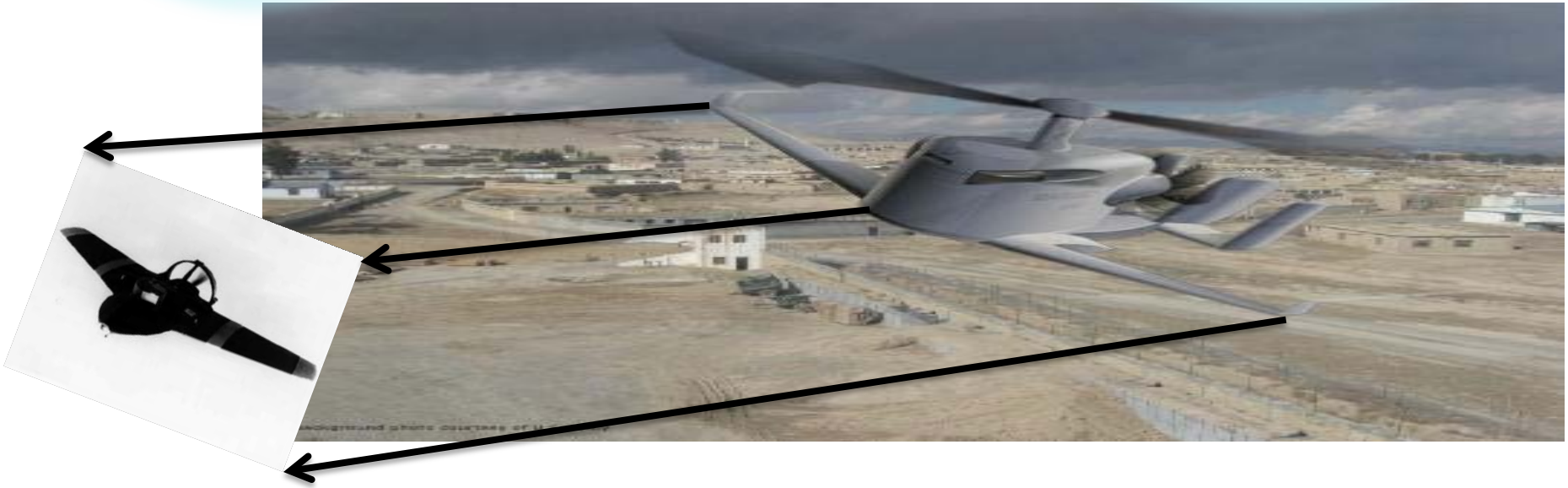
- The utility and cargo fleet should carry their combat loads up to a 424 km unrefueled radius with 30 minutes station time; while, attack and reconnaissance aircraft should meet the 424 km unrefueled radius with 120 minutes station time.

The Manned/Unmanned System

424 Km / 120 Minutes Station Time

6K 95°

200+ Knot Cruise



CAN WE SUCCEED?

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.