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Prescribed by ANSI Std Z39-18
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

Advanced Technology Demonstration Efforts $550M

Applied Research $316M

- Human machine Interface
- System concept studies
- Reduced O&S Technologies
- Advanced R/W Concept
- Rotors & Flight Controls
- Propulsion & Drives

Operations and Support
- CBM
- Rotor Durability

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

Propulsion & Drives Technologies
- Transmissions
- Engines

Aircraft Survivability Equipment
- Aircraft & Crew Protection

Optimum Solution Space

Passive

Active

Space SA

Aviation Weapons Integration

Unmanned Systems
- Unmanned-Manned Teaming/Autonomy
- Airspace Control
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.
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.
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 unfueled radius with 30 minutes station time; while, attack and reconnaissance aircraft should meet the 424 km unfueled radius with 120 minutes station time.
# The S&T Challenge

## Future Aviation Decision Points

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<thead>
<tr>
<th>MISSION</th>
<th>SERVICE</th>
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**Mission Services and Equipment**

- **MH/AH-6J**: Tied to Army OH-58D replacement
- **OH-58D (KW)**: Pending decision on armed recon analysis
- **AVIATION**
  - **Firescout**
    - **AH-1W**: 2011
    - **AH-1Z**: 2011
  - **UH-1Y**: 2010
  - **VH-3/60**: 2010
- **MV-22B**: ICD in work
- **CH-53D**: ICD complete; AoA next
- **UH-72A**: ICD complete; AoA next
- **UH-60A**: ICD complete; AoA next
- **CH-53K**: ICD complete; AoA next
- **MH-65C/DE**: ICD complete; AoA next
- **MH-60T**: ICD complete; AoA next
- **CV-22B**: ICD complete; AoA next
- **CVLSP***: ICD complete; AoA next

**Technology Development**

- **JFTL**: ICD complete; AoA next
- **ICD**: ICD complete; AoA next

**End of Useful Life**

- **Estimated Half-life**
- **Estimated End of Useful Life**

**Timeline**

- **2009-2015**
- **2020-2025**
- **2030-2035**

**Key Events**

- **Initial Operational Capability**
- **Estimated Half-life**
- **Estimated End of Useful Life**

**NOTE**

- **DP 1**: SLEP or New Start Technology Development
- **DP 2**: New Start EMD

**Department of Defense**

- **ARMY**
- **NAVY**
- **AIR FORCE**
- **MARINE CORPS**
- **COAST GUARD**

**End of Useful Life**

- **~2050**
The Congressional Rotorcraft Caucus is concerned about the lack of a strategic plan for vertical lift aircraft in the US.

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.

2009 National Defense Authorization Act

SECDEF Memorandum

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

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Robert Lindberg, National Institute of Aerospace</td>
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<td>Stephen Mundt, EADS North America</td>
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<td>Kip Freeman, Goodrich Corporation</td>
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THE ARMY RESPONSE
Joint Multi-Role
**Future Roadmap**

**ATTACK/RECON**
- **FYA3-09**
  - OH-58D KW
- **The POM Years**
  - Hunter
  - Warrior
  - Shadow
  - Raven
- **The EPP Years**
  - FCS Class I

**UTILITY**
- **FYA3-09**
  - UH-60A/L
- **The POM Years**
  - UH-60M
  - UH-72A
- **The EPP Years**
  - UH-60M/HH-60M

**CARGO/HVY LIFT**
- **FYA3-09**
  - C-23 (CARGO) (Divest)
- **The POM Years**
  - CH-47D
- **The EPP Years**
  - CH-47F

**FY 2025 and Beyond**

**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/95° flight performance
  - Extend Life of UH-60M
- Replace LUH with COTS

**2035 Timeframe**
- CH-47 Replacement
  - Common MEP/components
  - 6K/95° 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

Operational Support and Sustainment Technologies

Mission Systems Technologies

DECISION
## Future Aviation Decision Points

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**Initial Operational Capability**
- DP 1: SLEP or New Start Technology Development

**Technology Demonstrators**
- Joint Common Architecture
- Systems Analysis and Concepts

**Decision Points**
- Estimated Half-life
- Estimated End of Useful Life

* Not Program of Record

---

*Technologies Driven. Warfighter Focused.*
Joint Multi-Role Development

AMRDEC Redstone Arsenal

AMRDEC Aviation Applied Technology Directorate

Lead Demonstrator Program

FT Rucker

Lead Concepts and Studies

AMRDEC Moffat Field

Lead Research and Analysis

Lead Architecture Development
AMRDEC
Aviation Integration Facility

Joint Common Open Architecture

Full Authority Control

Reconfigurable Fiber Network

Mostly point-to-point, system-specific cables

Modular, Scalable, Permanent Future-Proof Fiber-Optic LAN

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.
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<td><strong>Survivability</strong></td>
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<td>– Signature Reduction</td>
<td>– Virtual Cockpit</td>
<td>– On Condition Maintenance</td>
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<td>– Aircraft Hardening</td>
<td>– UAS Associates</td>
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<td>– Redundancy</td>
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<td>– Speed</td>
<td>– Sensor Fusion</td>
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<td>– Active Protection</td>
<td>– Foliage Penetrating Sensors</td>
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<td><strong>Performance</strong></td>
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CAN WE SUCCEED?

CURRENT FLEET

Reconnaissance
Attack
Utility
Heavy Lift

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 unfueled radius with 30 minutes station time; while, attack and reconnaissance aircraft should meet the 424 km unfueled radius with 120 minutes station time.
The Manned/Unmanned System

424 Km / 120 Minutes Station Time

6K 95°

200+ Knot Cruise
CAN WE SUCCEED?