Presented to:
Italian Vertical Lift Community

Technology for the Future of Vertical Lift

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TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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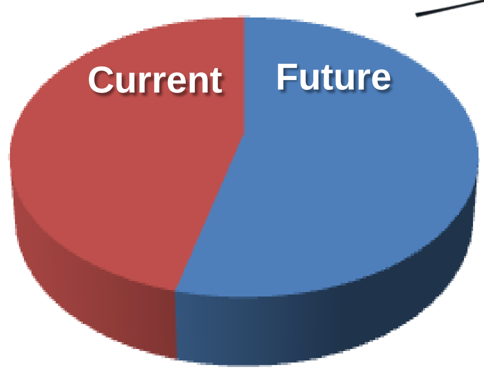
Bottom Line Up Front

- **Aviation S&T supports both the current helicopter and future rotorcraft fleets in improving survivability, performance, and affordability**
- **Current efforts are focused on platforms, power, mission systems, and sustainment**
- **Future efforts are focused on the Joint Multi-Role (JMR)**
  - **Future Vertical Lift Technologies**
  - **Unmanned and Autonomous Systems**



Army Aviation S&T balances the needs of the current and future fleets

Aviation S&T Supports the Current Fleet and Future Vertical Lift

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Why Future Vertical Lift?

CH-47 Basic Design Is 70+ Years Old

UH-60 Basic Design Is Nearly 50 Years Old

AH-64 Basic Design Is Nearly 50 Years Old

OH-58 Basic Design Is Nearly 50 Years Old

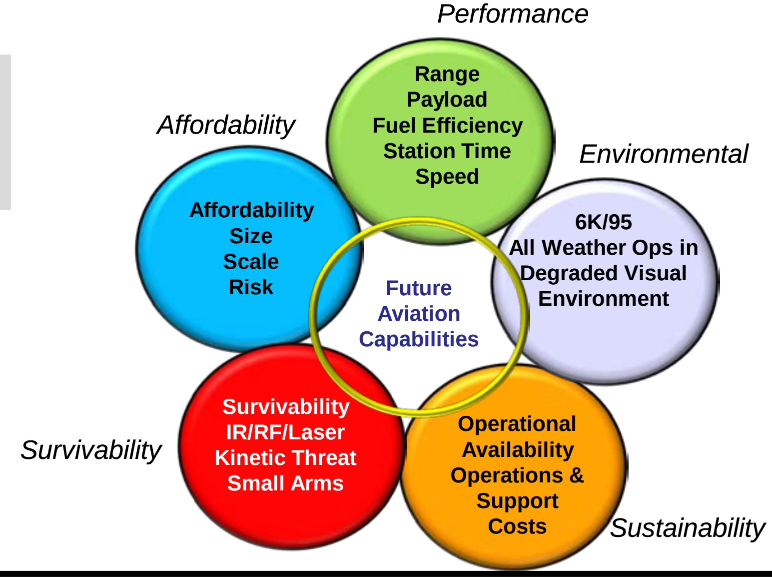
However…

They Will Not Last Forever

Future Vertical Lift (FVL) Rotorcraft Vision

- **FVL describes a family of vertical lift aircraft**
  - Includes **multiple sizes/classes** of vehicles
  - Considers the vertical lift needs **across the DoD**
  - Achieves **significant commonality** between platforms
  - Addresses the **capability gaps** identified in the Army Aviation Operations CBA, and the OSD-sponsored Future Vertical Lift CBA

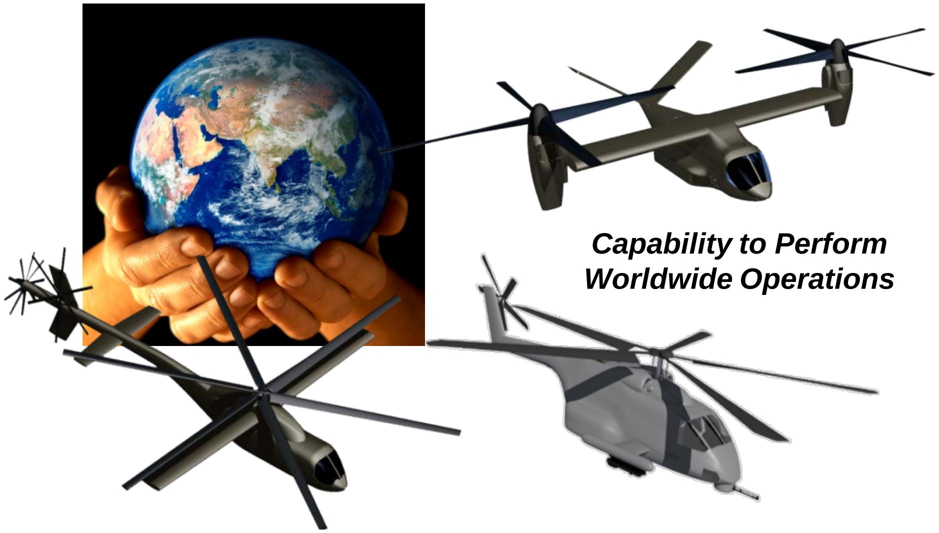
Light
Medium
Heavy
Ultra



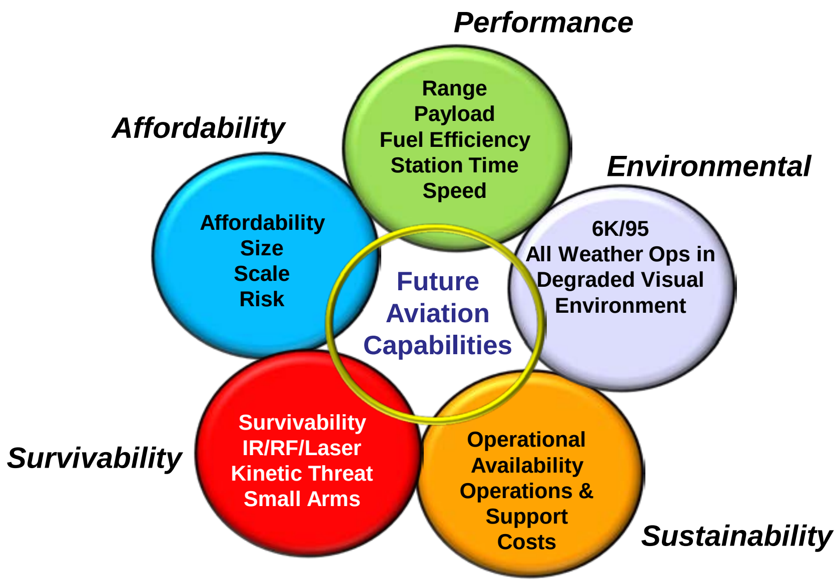
- **Objective vehicle attributes**
  - Scalable common core architecture
  - Integrated aircraft survivability
  - Speed 170+ kts
  - Range 424 km (combat radius)
  - Performance at 6,000 feet and 95ºF (“6k/95”)
  - Shipboard Compatible
  - Fuel Efficient
  - Supportable
  - Affordability
  - Optionally Manned
  - Commonality

Worldwide operations

JMR Technology Demonstrator (TD)



Capability to Perform Worldwide Operations



Purpose:

- ***Demonstrate transformational vertical lift capabilities to prepare the DoD for decisions regarding the replacement of the current vertical lift fleet***

Products:

- ***Demonstrated and refined set of technologically feasible and affordable capabilities***
- ***Technology maturation plans***
- ***Cost analysis for future capabilities***
- ***Two demonstrator test bed aircraft***

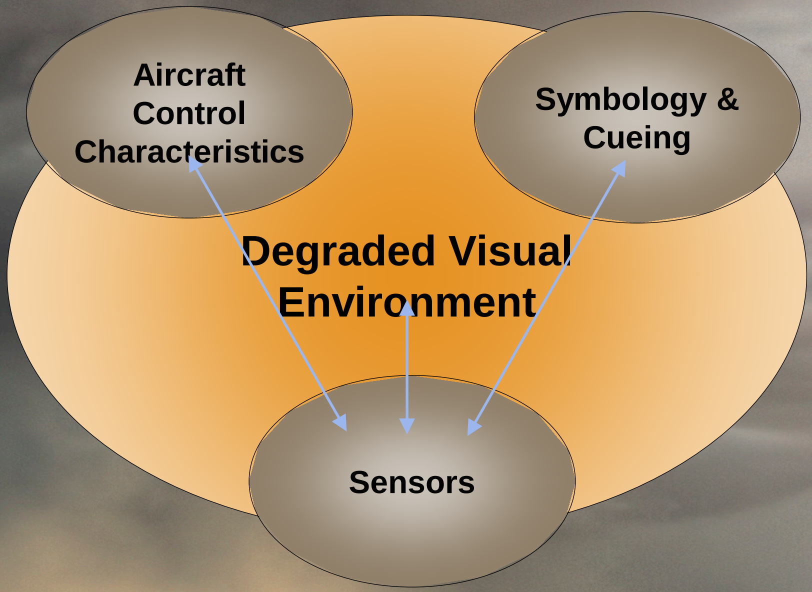
Payoff:

- ***Reduced risk for critical technologies***
- ***Acquisition workforce with improved skill sets to develop specifications and analyze technical data***
- ***Data readily available to support future DoD acquisitions***

Special Challenge - DVE

Over the last ten years, DVE conditions are the leading contributor of aviation deaths <u>and</u> loss of aircraft

- **Complex, Multi-disciplinary Problem**
- **Multiple Operating Environments**
- **Potentially Very Expensive**



Incremental Build on Capabilities

Network with other a/c

Fuse active sensor data

"Remove" brownout, detect obstacles

Fuse WFOV sensor video

Terrain/Obstacle/Threats

Synthetic Vision (All-weather)

Overlay Symbology

Display NFOV sensor video

Multi-Ship Collaboration
Networking, Digital Interoperability

Active Sensor(s)
Multi-function - MMW, 3D LADAR

Video Enhancement
Brownout, wire/obstacle detection

Passive Sensors
Multi-function, all-aspect capability

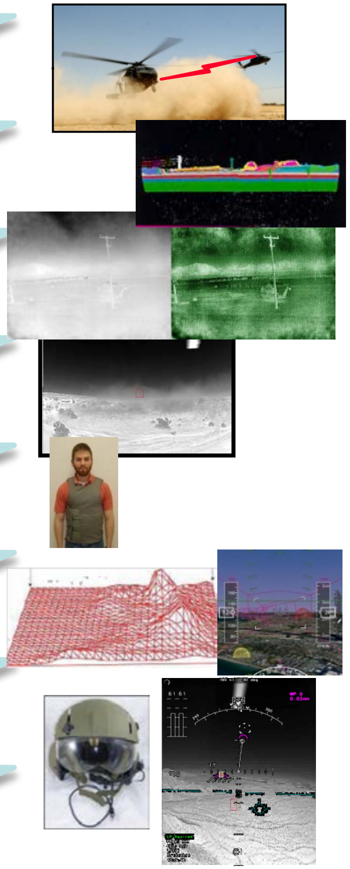
Crew Warning
Visual, Aural, Tactile

Digital Databases
Terrain, Obstacles, Wires

Symbology
BOSS, BFT, Threats

Display
MFD, HUD, HMD

FOUNDATION LAYER
Improved Flight Controls, Navigation, SVB
Existing Sensors
TTPs, Training



New Focus - Autonomy

Army Unmanned Aircraft Systems, across all tactical echelons supporting Army and Joint operations, provide the Warfighter a *disproportionate advantage* through:

- **Near real-time *situational awareness*,**
- ***Multi-role capabilities* on demand (including communications, reconnaissance, and armed response), and**
- **System employment from dynamic retasking through *autonomous* operations.**

Focus Areas

- **Near Term (Now -- 2015)**
  - **Improved Endurance/Range**
  - **Precision Engagements**
  - **Multi-mission capability**
  - **Optionally Piloted Vehicle Concepts**
  - **Improved Propulsion Systems**

- **Mid Term (2016 – 2025)**
  - **Increased commonality**
  - **Cognitive Aiding Software**
  - **Improved Survivability (onboard and swarm ASE)**
  - **Lethal/Non-Lethal Payloads**
  - **All Weather Capability**
  - **Fully Compliant Sense and Avoid**
- **Far Term (2026 – 2035)**
  - **Autonomous Behavior**
  - **Swarming and other Teaming Capabilities**
  - **Self Healing Network**

Army Aviation S&T Focus Areas

Platforms (54%)

- Advanced Air Vehicle System Concepts
- Joint Multi-Role Technology Demonstrator
- Rotorcraft Airframe Technology
- Platform Durability and Damage Tolerance
- National Rotorcraft Technology Center
- Reduced Vibrations
- Reduced Acoustic Signature
- Adaptive Vehicle Management
- Improved Vehicle Performance

Power (15%)

- Increased Fuel Efficiency Engines
- Lightweight Drive Trains
- Improved Reliability and Durability
- Reduced Weight/Vibration
- Alternative Concept Engines

Operations Support & Sustainment (7%)

- Reduced Maintenance Actions
- Improved Reliability
- Improved Mission Readiness
- Reduced Spares Logistics
- High Rel Prognostics/Diagnostics

Mission Systems (21%)

- DVE Mitigation
- Common Human Machine Interface
- Increased Levels of Autonomy
- Manned-Unmanned Intelligent Teaming
- Reduced Vehicle Signatures
- Threat Warning Sensors
- Active Jammers & Decoys
- Weapons Integration

Concept Design & Evaluation (3%)

- Advanced Concept Studies
- Configuration Trades & Analysis

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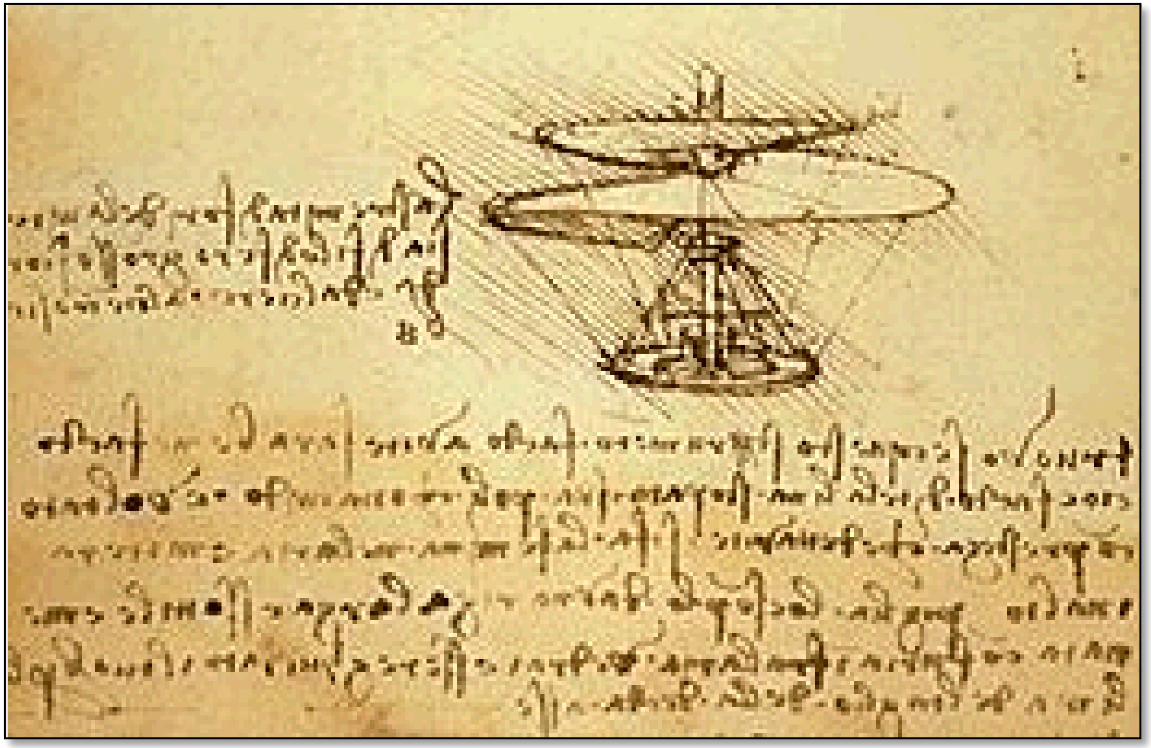
International Cooperation

- AMRDEC maintains several levels of international engagement with various international partners in mutual areas of interest

- Interest Areas
  - Engines and Drive Trains
  - Platform Design and Structures
  - Rotors and Vehicle Management
  - Aircraft and Occupant Survivability
  - Unmanned and Autonomous Systems
  - Maintainability and Sustainability
  - Basic Research in Rotorcraft Technologies

Questions



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