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ScMvr-28

# Virtual Risk-informed Agile Maneuver Sustainment (VRAMS)

## S&T Campaign: Sciences for Maneuver
*Logistics and Sustainability*

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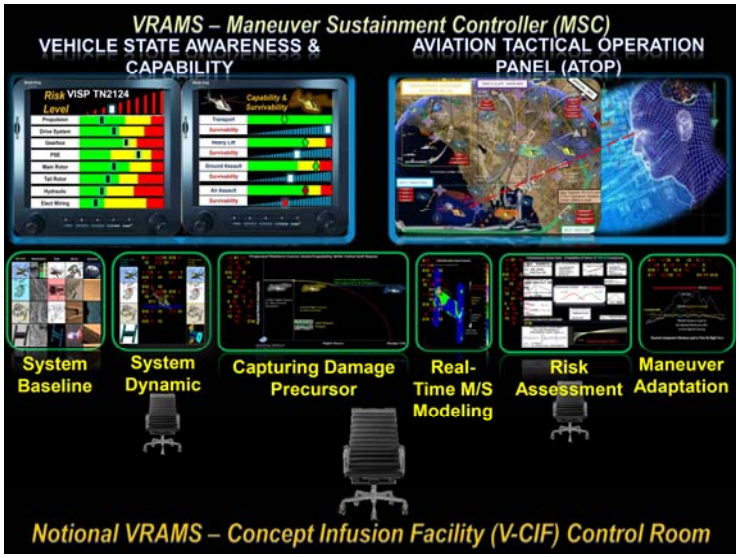
## Research Objective

Enable an integrated capability within Army manned/unmanned vehicles to:

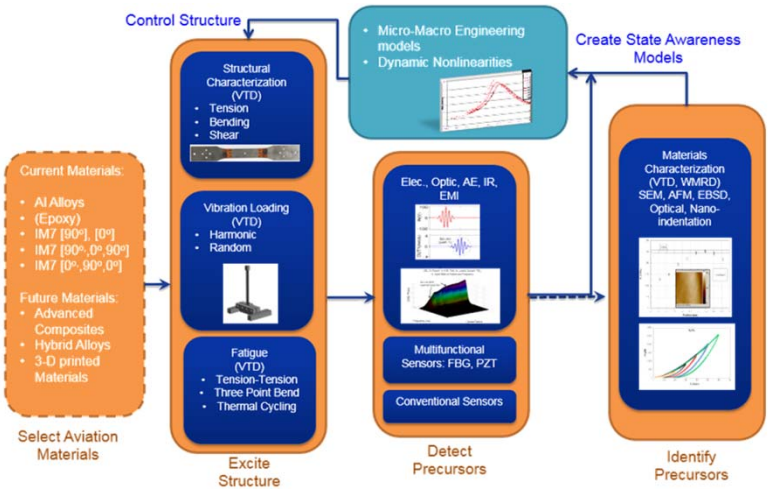
- Automatically track changes in health state
- Assess functionalities and capabilities
- Adapt accordingly to achieve mission objectives
- Increase availability and reduce life cycle costs




Intelligent Materials State Awareness System Core Engine

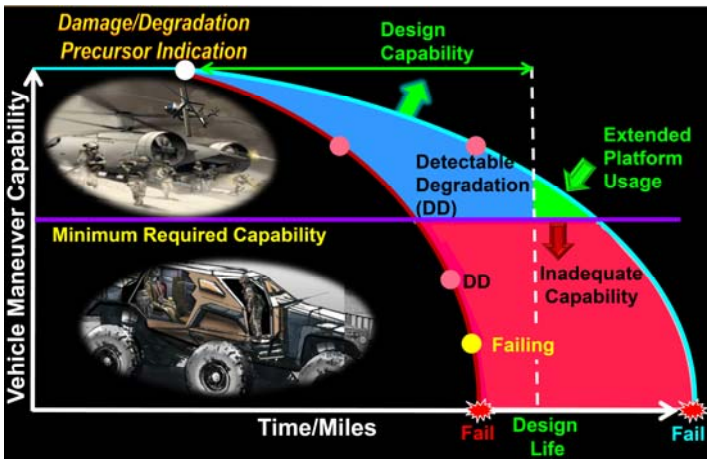
## Challenges

- Ability to detect and identify *Damage Precursors*
- Multiscale physics-based models to forecast evolution in material-state prior to crack initiation
- Remaining capability and risk predictions
- Health-state adaptation




## ARL Facilities and Capabilities Available to Support Collaborative Research

- Reliability and State Awareness Testbed (RSAT): multiaxial shaker, biaxial fatigue testing, UAS cage, RQ-2 Shadow, OH-58, and adaptive control simulator
- Prognostics and Diagnostics Laboratory: advanced sensors and data acquisition, single axis shakers
- Access to High Performance Computing
- Failure testing and analysis, flight test evaluation, Health and Usage Monitoring System (HUMS), Structural Health Monitoring (SHM)




Holistic Approach for Sustaining Future Vehicles Using Health Consciousness

## Complementary Expertise/Facilities/ Capabilities Sought in Collaboration

- Multiaxial/multiscale, physics-based damage modeling
- Damage precursors, materials genome, multifunctional and adaptive structures
- Adaptive built-in sensing network, sensor-fusion
- Probabilistic and risk assessment
- Damage-based flight controls
- Virtual reality

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