



Collaborative Approach To Conducting Research

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2011 Annual Technical Meeting
May 10–12, 2011
St. Louis, MO



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- What is RTI under System Wide Safety Assurance
 - How RTI works
 - Success
 - In work
 - Future opportunities

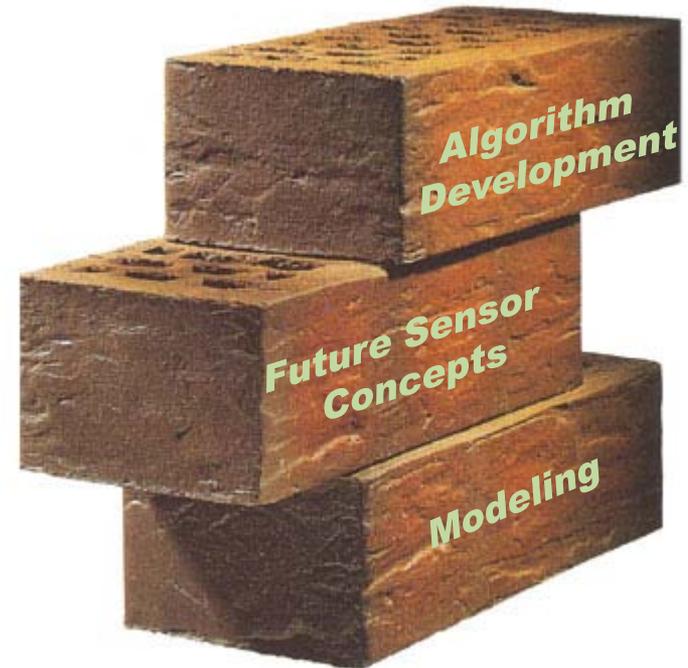
Research Test and Integration (RTI)



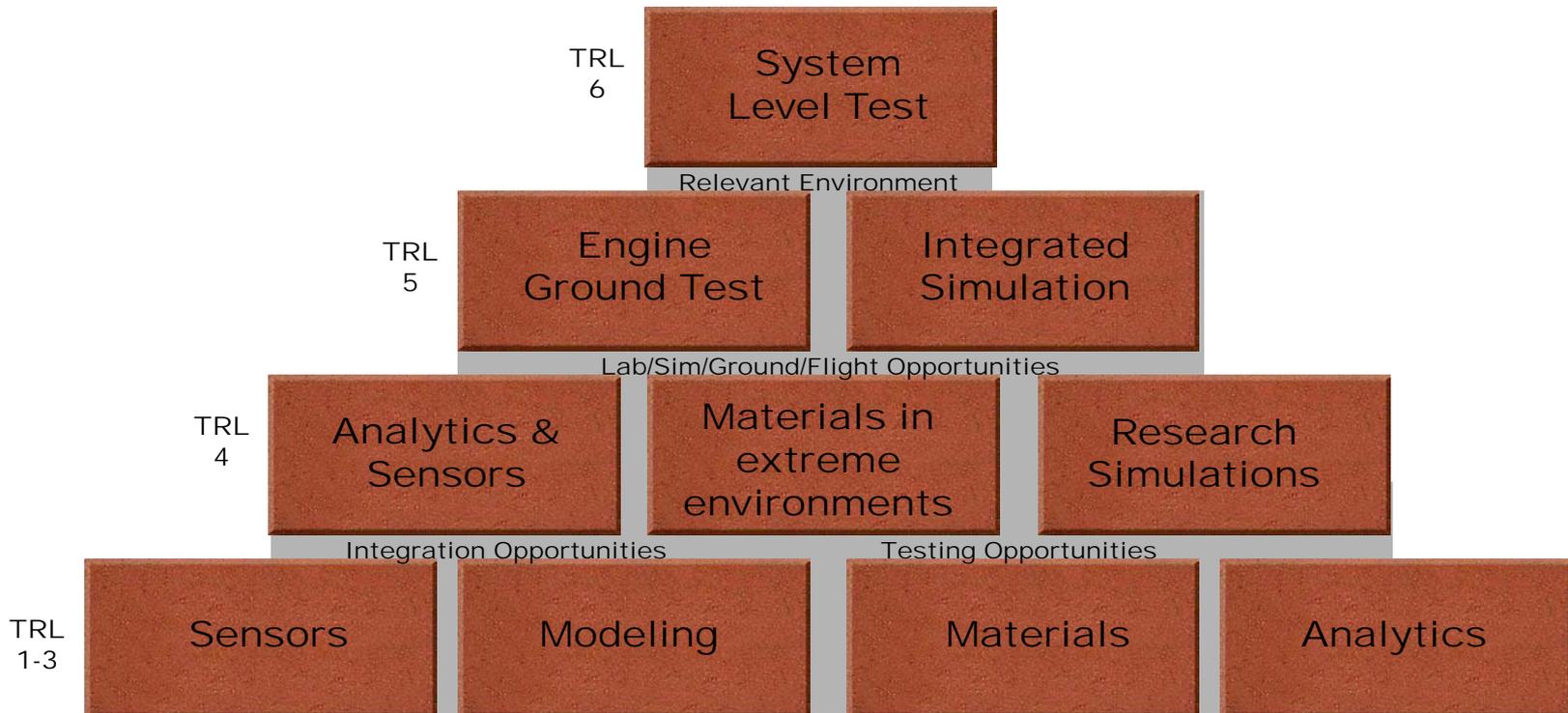
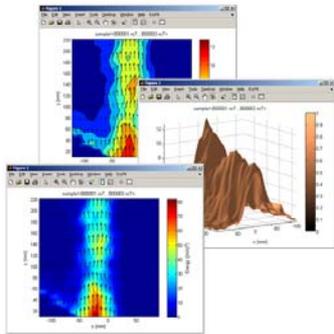
- Born out of Integrated Vehicle Health Management Project
- Under current structure RTI is housed in System Wide Safety Assurance
- RTI – The process of elevating a single research concept or multiple areas of research simultaneously to viable TRL levels that transfer to industry use.
- How RTI is accomplished:
 - Thru a team of cognizant disciplines within research engineering gathering aspects of the research and developing technical demonstrations in which to gather data for validation of the research hypothesis.
 - Demonstrations can range from simple laptop modeling, test fixtures, simulation methods and full flight research demonstrations.
 - Technical demonstrations take into consideration combined research opportunity, multiple-center involvement to include industry partners and other government agencies.
- Benefit of RTI:
 - Shared cost
 - Larger scale demonstrations and completeness to the research goal.
- Research Test and Integration Plan (RTIP) is the method in which to coalesce the needs of the researchers and the technical demonstration requirements into an online working wiki environment.

- Start small
- Understand the research.
- Identify the researcher's need.
- Solicit interest
- Develop collaboration
- Research force multiplier!

Foundational Research



RTI: Building The Wall – Getting Research Done



Partnership Success



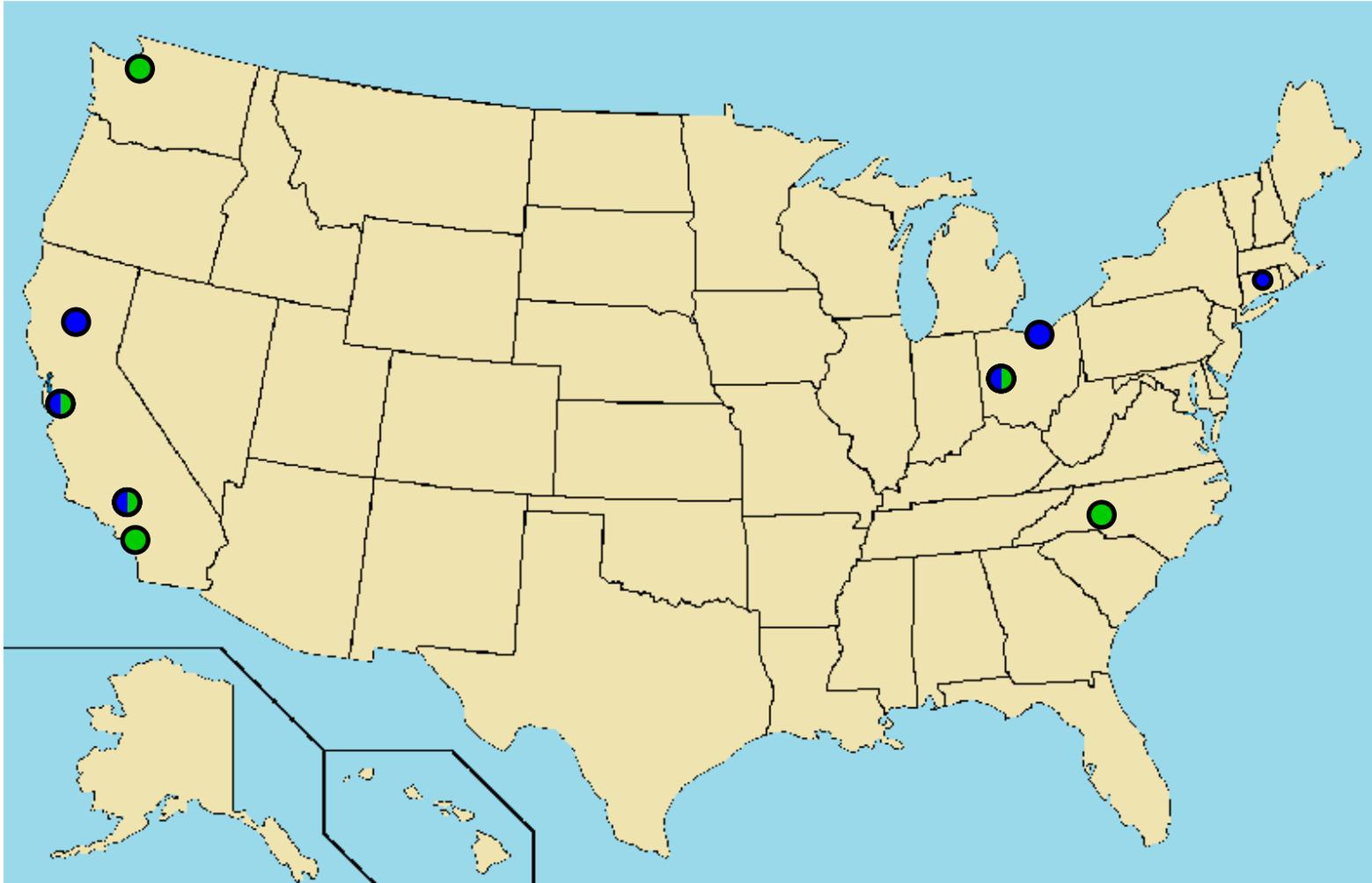
● VIPR

NASA Ames, NASA Dryden, NASA Glenn
Makel Engineering, Pratt & Whitney,
Wright-Patterson AFB

● HILEAP

NASA Ames, NASA Dryden
Boeing, Goodrich
Wright-Patterson AFB

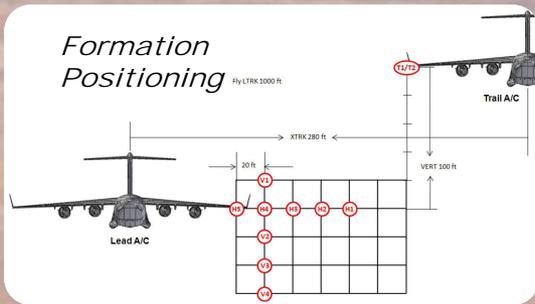
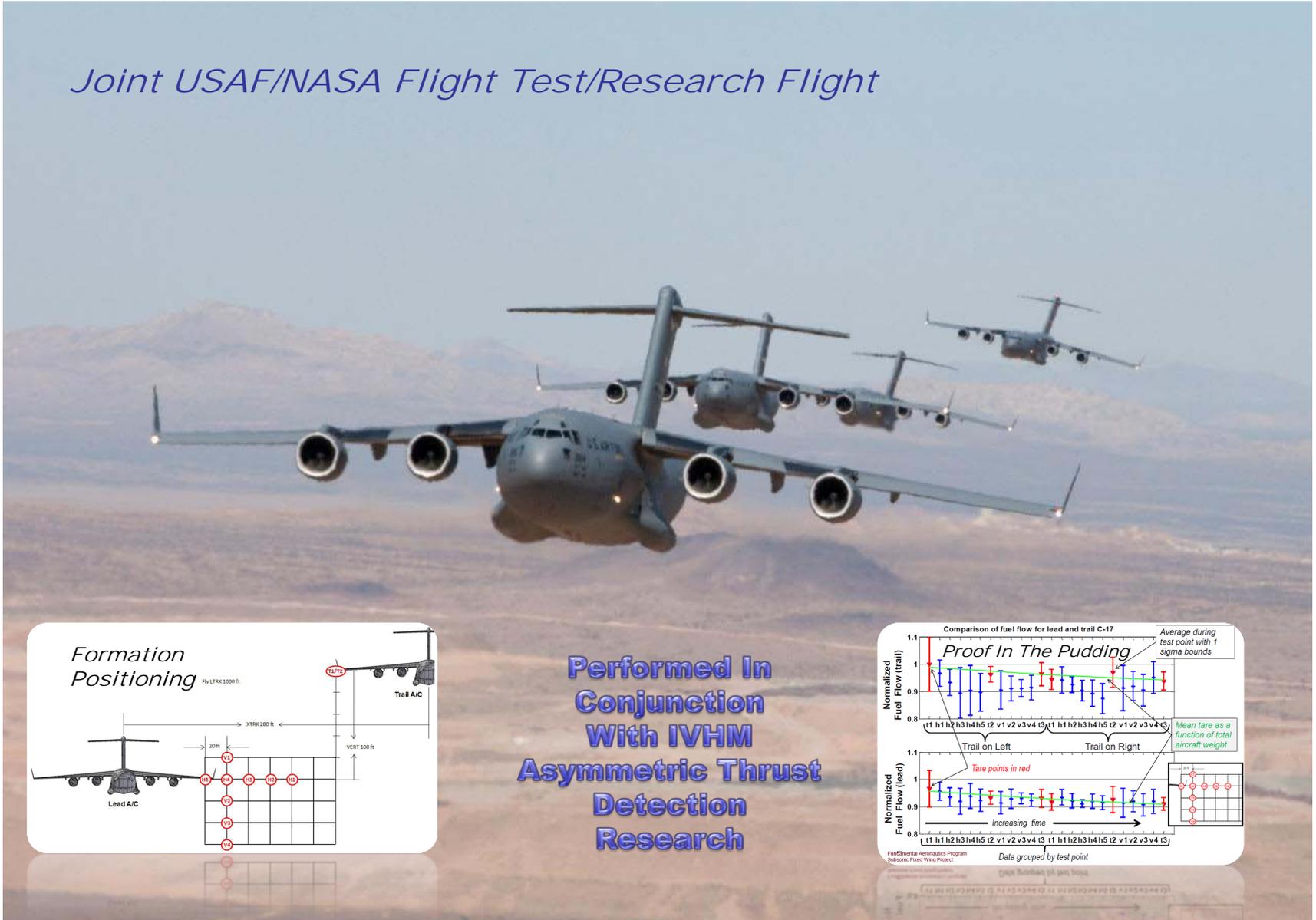
● VIPR/HILEAP



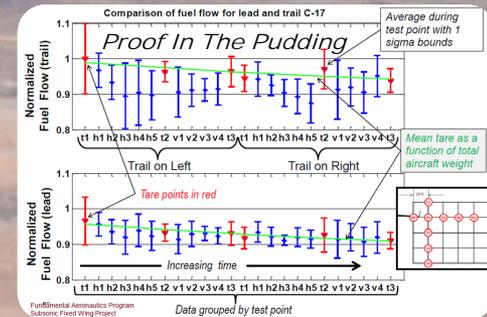
CAPFIRE – Cargo Aircraft Precision Formation for Increased Range and Endurance



Joint USAF/NASA Flight Test/Research Flight



Performed In Conjunction With IVHM Asymmetric Thrust Detection Research



VIPR – Vehicle Integrated Propulsion Research



VSST Project:

Vehicle Systems Safety Technologies (VSST)

VSST Technical Challenges

- Vehicle Health Assurance
- Effective Crew-System Interactions & Decisions Under All Conditions
- Aircraft Loss of Control Prevention, Mitigation, Recovery

Collaboration between:
 NASA DFRC, NASA GRC,
 Pratt & Whitney, Makel
 Engineering, USAF
 AFFTC, NASA ARC,
 USAF AFRL

Research Areas:

- Robust Vehicle Design & Sustainment
- Vehicle Health Management Systems
- Safe Flight Deck Systems & Operations
- Vehicle Dynamics Modeling for Off-Nominal Conditions
- Vehicle GNC Safety Assurance Systems
- Validation Methods for High-Confidence Technologies



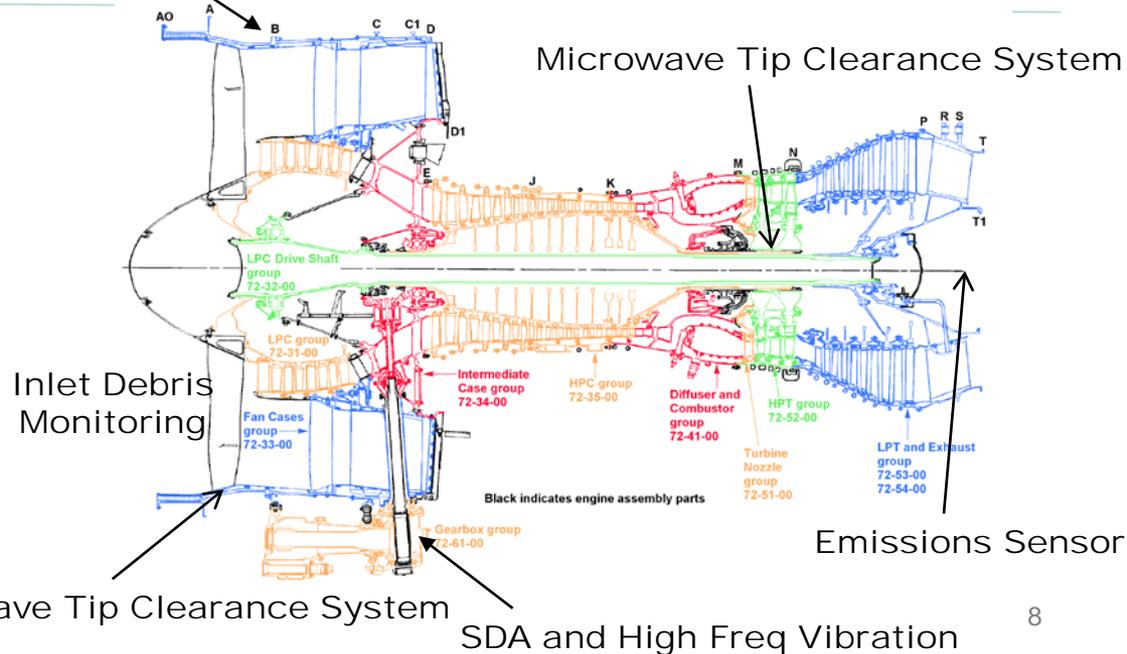
VIPR/Integrated Engine Tests

Objectives: Mature engine health management sensors and algorithms in a relevant operating environment

Results:

- VIPR will complete VSST3.3.3.04: Integrated Vehicle Health Management Engine Test
- VIPR directly supports VSST.03.02: VHMS Propulsion Health State Assessment and Management

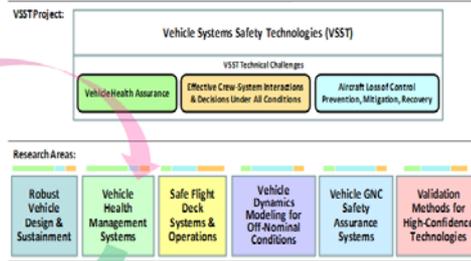
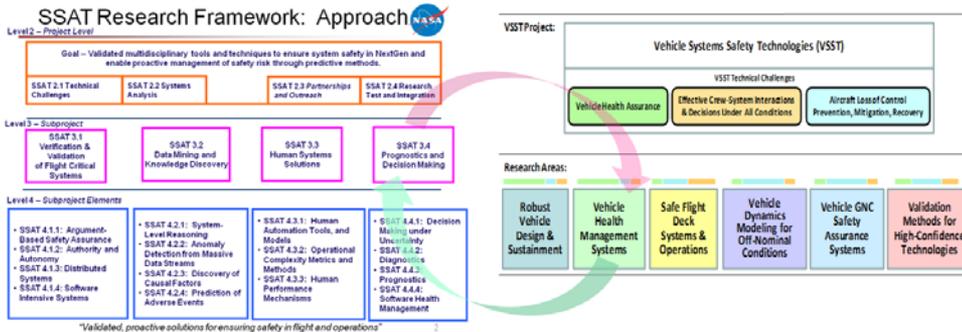
SDA and High Freq Vibration



HILEAP – Hybrid Integrated Linear Actuator Control Project



Proposed Project: HILEAP



Collaboration between: NASA DFRC, NASA ARC USAF AFRL, ASC C-17, AFFTC, Boeing, BAE Systems, BF Goodrich, PC Krause, Frontier, GE Avionics

System Architecture

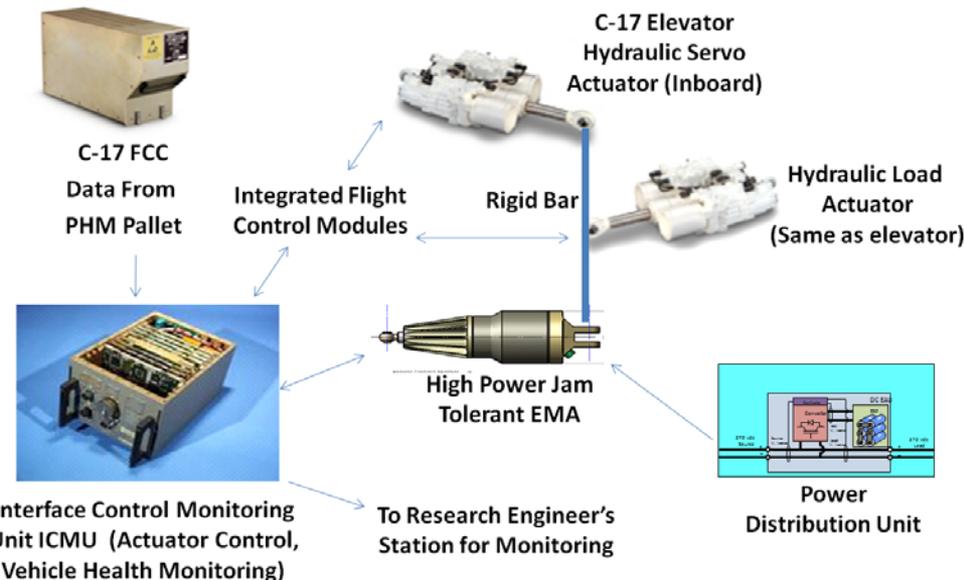
Objectives: Demonstrate next generation jam tolerant EMA technology in a realistic flight research environment

-Mature health management algorithms for the EMA/PDU subsystems in a flight environment

Results:

-Provide health monitoring algorithms and data that addresses VSST.03.03 need: Diagnostic Methods for Avionics

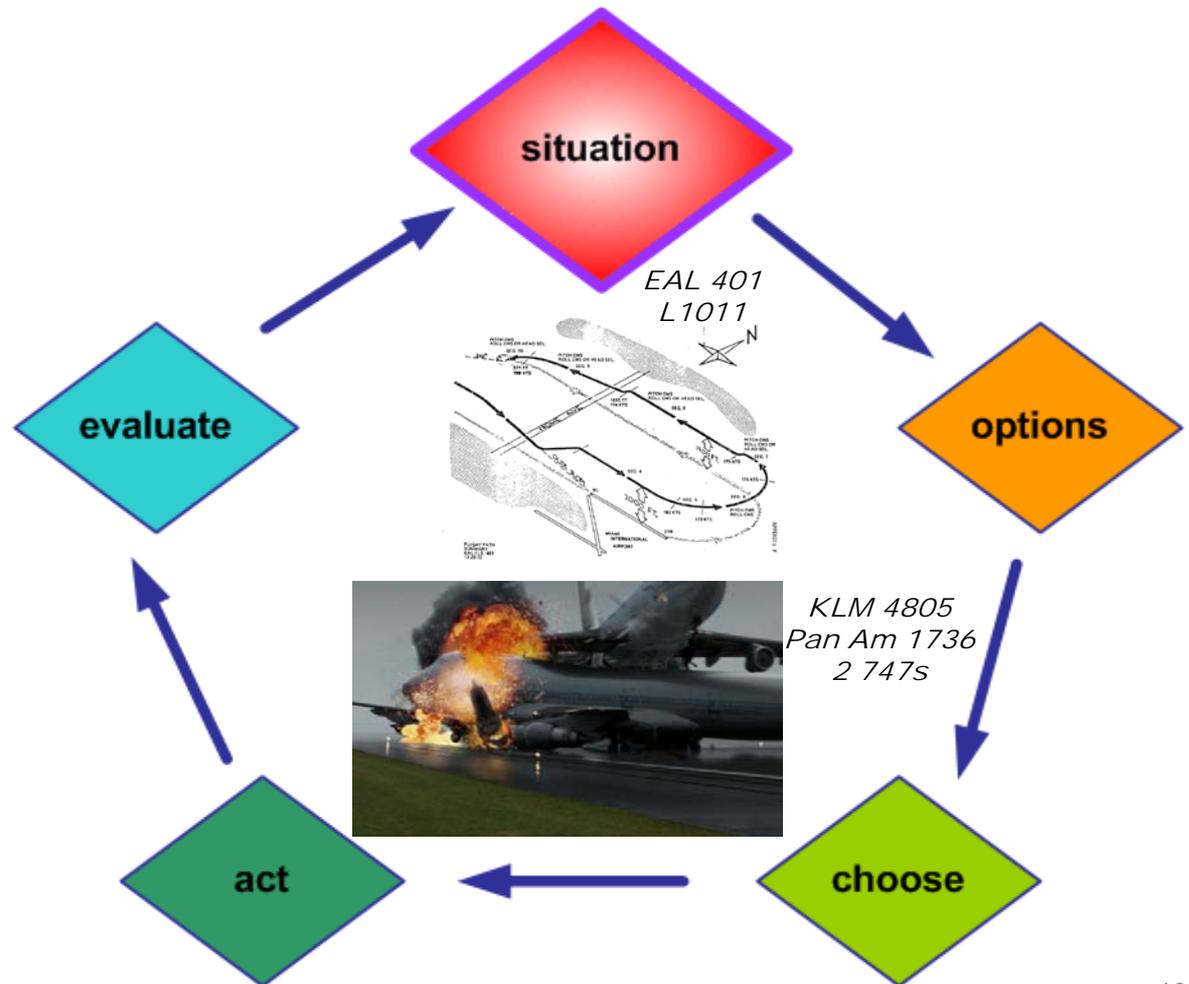
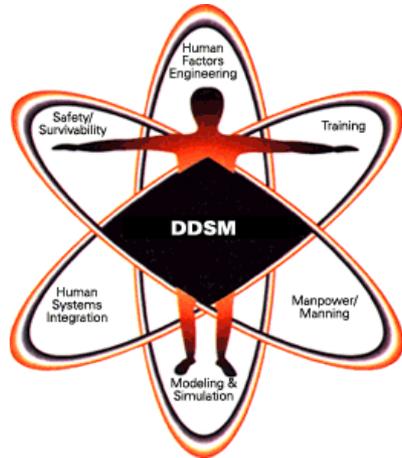
-Provide fault injection techniques that can be used by NASA and Industry for system safety assurance



HSS – Human Systems Solutions



In work developing partnerships and planning future flight opportunities utilizing real world human factors environments.





Questions??

Just because you have a question does not mean we have
an answer!

Just because we have an answer doesn't mean it answers
your question!

