



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

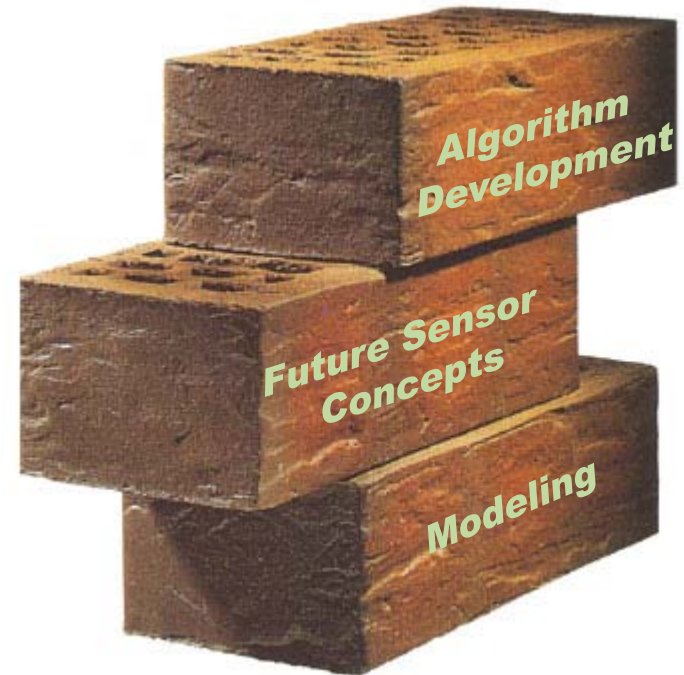
Research Test and Integration (RTI)



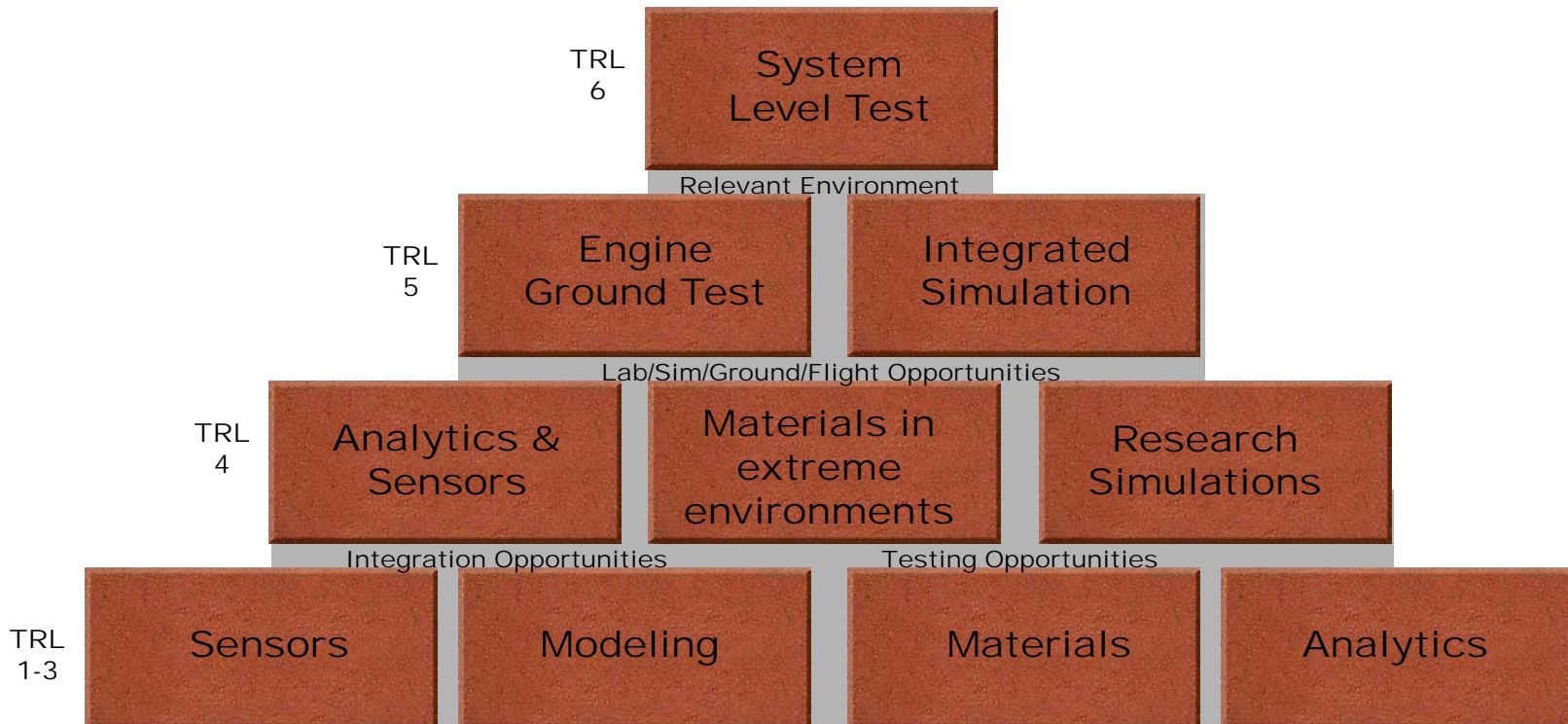
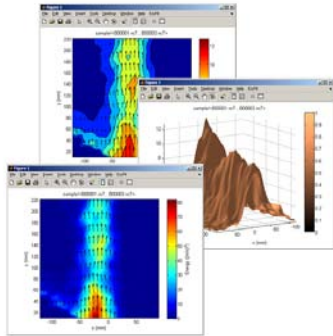
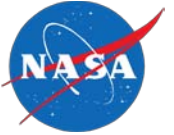
- Born out of Integrated Vehicle Health Management Project
- Under current structure RTI is housed in System Wide Safety Assurance
- RTI – The process of elevating a single research concept or multiple areas of research simultaneously to viable TRL levels that transfer to industry use.
- How RTI is accomplished:
 - 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



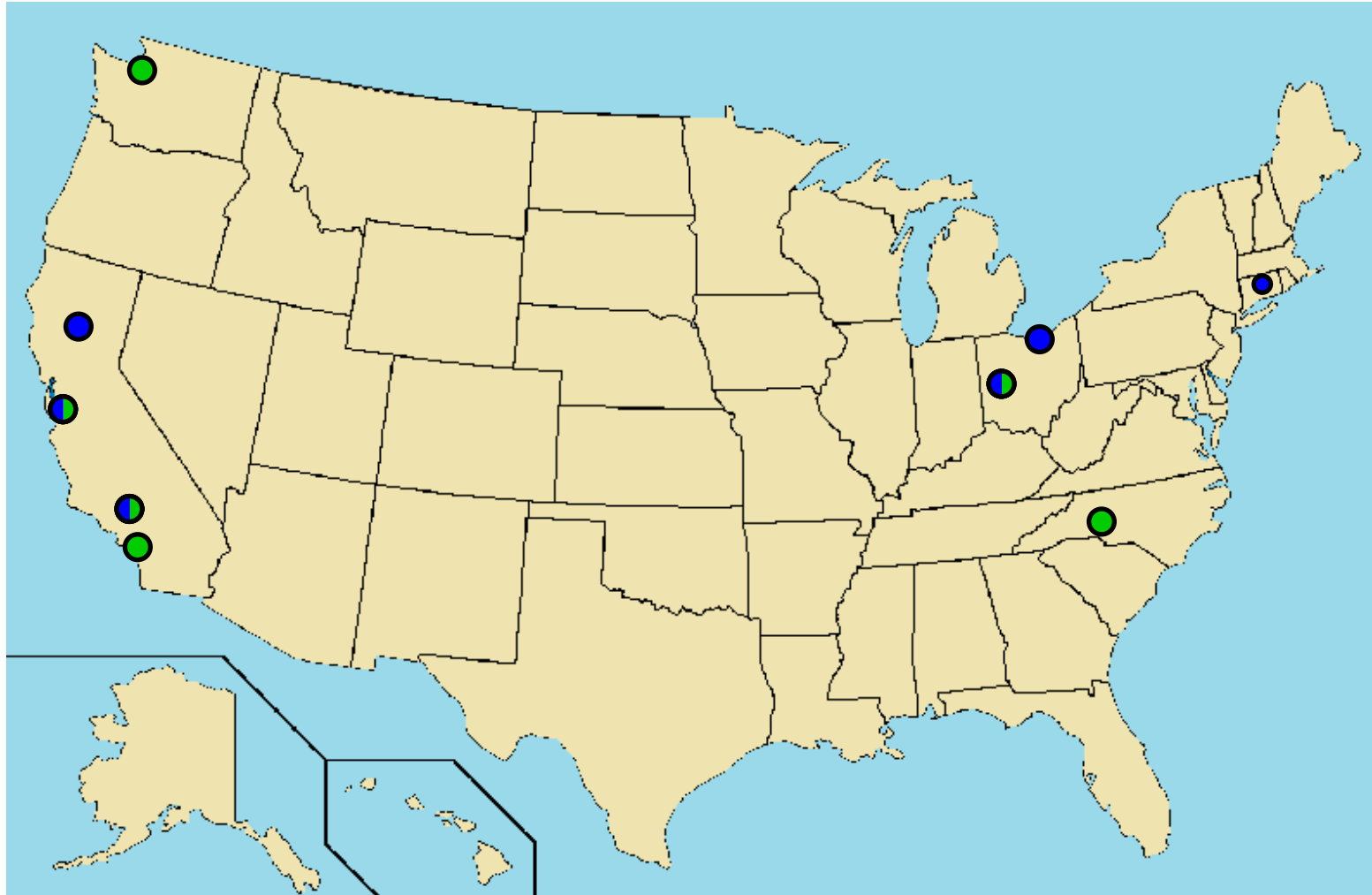
VIPR

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



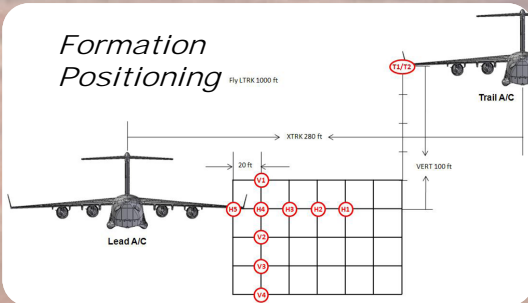
CAPFIRE – Cargo Aircraft Precision Formation for Increased Range and Endurance



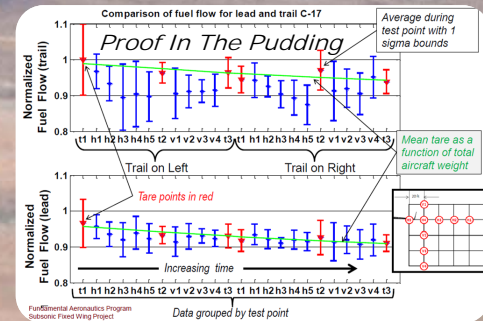
Joint USAF/NASA Flight Test/Research Flight



Formation Positioning



**Performed In
Conjunction
With IVHM
Asymmetric Thrust
Detection
Research**



VIPR – Vehicle Integrated Propulsion Research



VSSTProject:

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

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



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

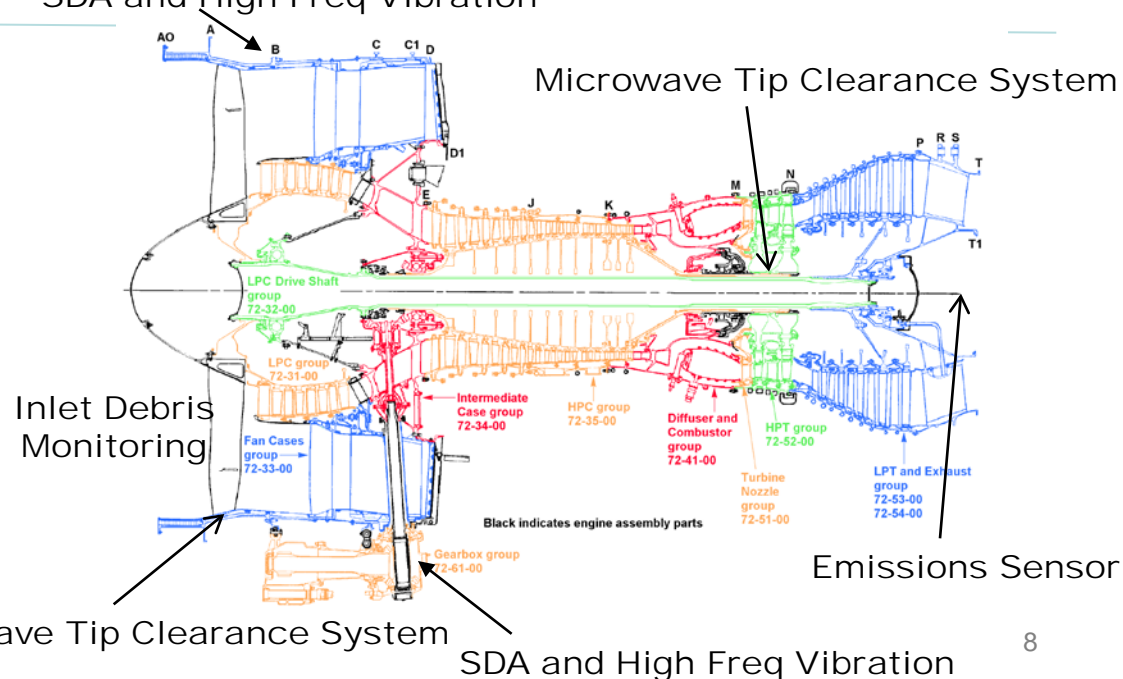
VIPR/Integrated Engine Tests

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

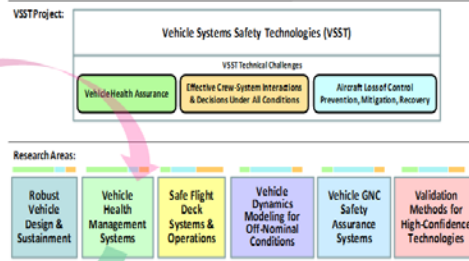
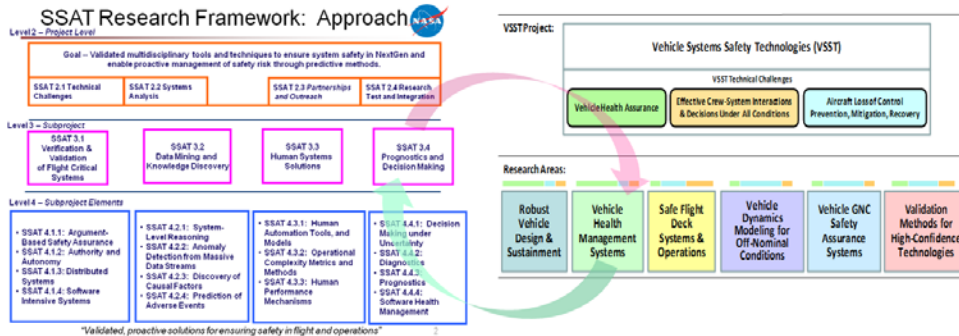
SDA and High Freq Vibration



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

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

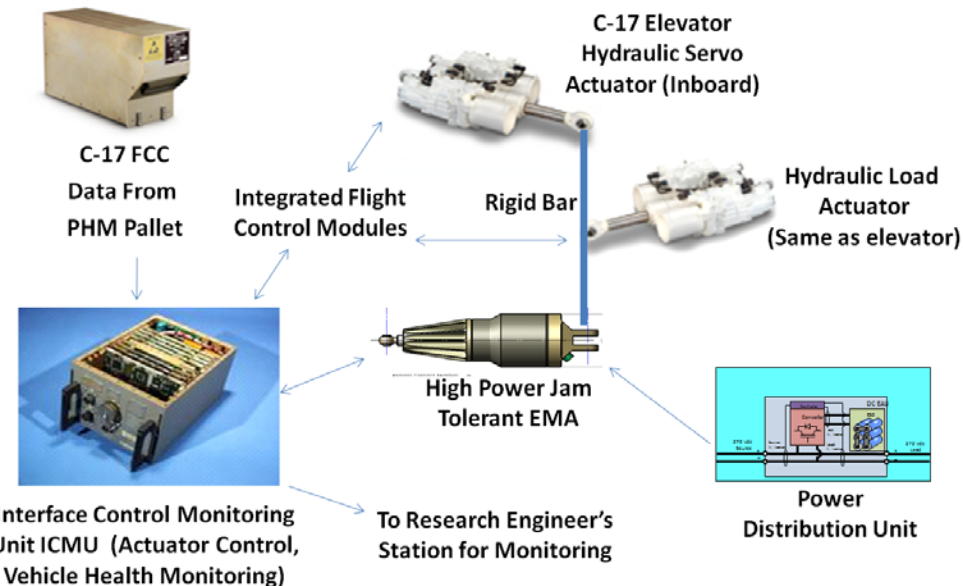
-Mature health management algorithms for the EMA/PDU subsystems in a flight environment

Results:

-Provide health monitoring algorithms and data that addresses VSST.03.03.03 need: Diagnostic Methods for Avionics

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

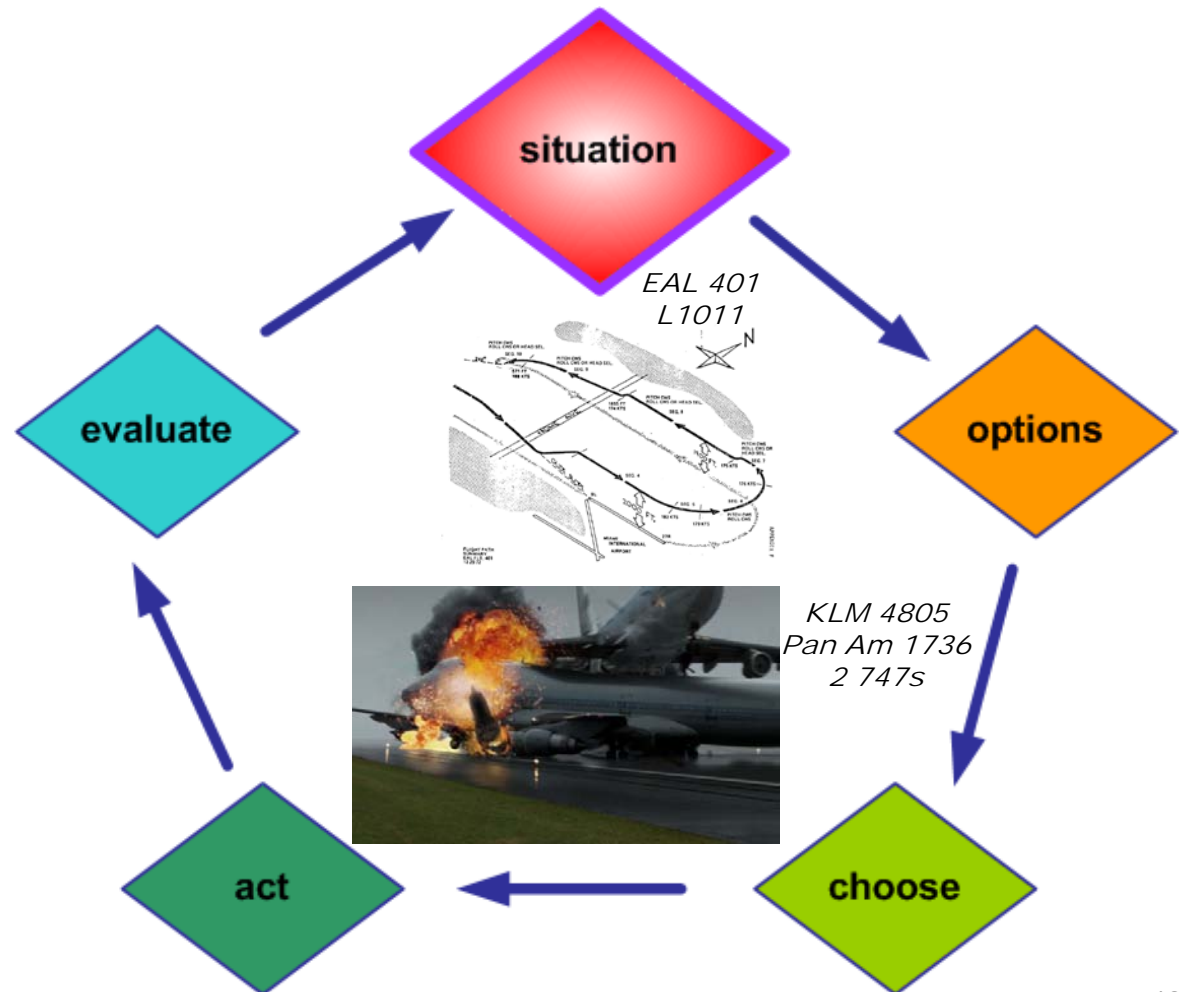
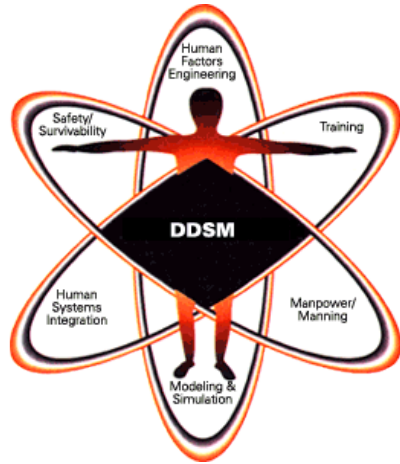
System Architecture



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!

