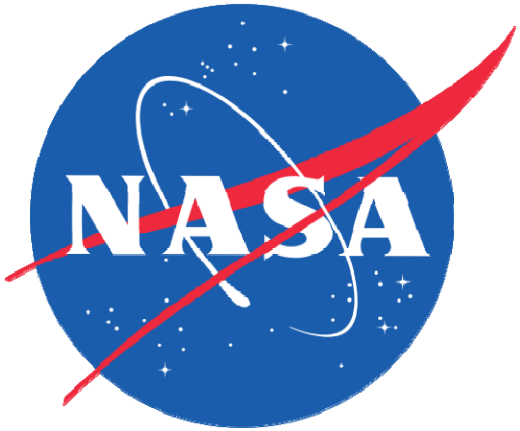

NASA Research Techniques for Future Aviation Systems: The Case of Synthetic and Enhanced Vision Systems

International Symposium on Aviation Psychology

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Workshop Themes

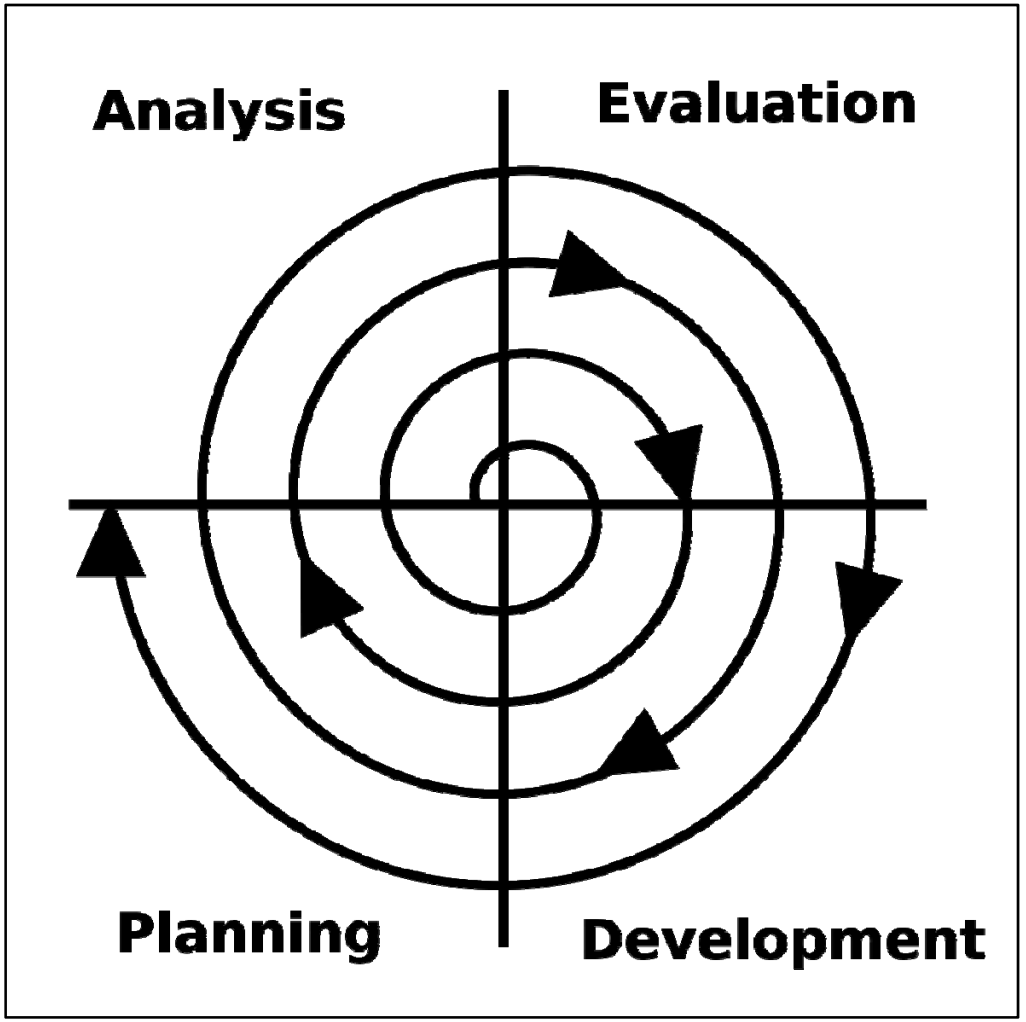
- “The need to apply a range of techniques over the development life-cycle for a new system….”
- “The need to understand the strengths and weaknesses of such methods, individual and together, ...”
  - What is the state of the art?
  - How good is it?
  - What are the weaknesses of each individual method?
  - When are they practical?
  - What are the barriers to their use?
- “How to get better: What are the most promising directions for further developing our repertoire of techniques for verification and validation of human-machine systems?”

Next: NASA Research Approach

NASA Research Approach

Technology Readiness Level (TRL)

9	Actual System *Flight Proven* in Operation
8	Actual System *Flight Qualified* By Demonstration
7	System Prototype Demonstration in an *Operational Environment*
6	System/Sub-System Model or *Prototype Demonstrated* in a Relevant Environment
5	Component and/or Breadboard *Validation* in a Relevant Environment
4	Component and/or Breadboard Validation in a *Laboratory Environment*
3	Analytical and Experimental Critical Function and/or Characteristic *Proof-of-Concept*
2	*Technology Concept* and/or Application Formulated
1	*Basic Principles* Observed and Reported



Next: The Example Case

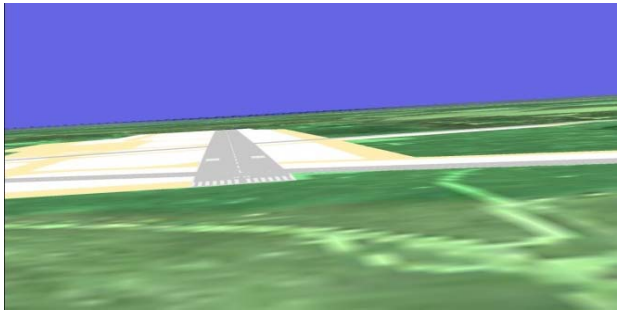
The Example Case

Enhanced Vision (EFVS)

Synthetic Vision

Visual

Enhanced Vision



Synthetic Vision

Next: Simulators and Laboratories

Simulators and Laboratories




Part-Task Simulators




High Fidelity Simulators

Examples

Next: Research Aircraft Used During Synthetic Vision Program

Research Aircraft Used During Synthetic Vision Program

Next: Project Flight Tests

Project Flight Tests

AVL

EGE

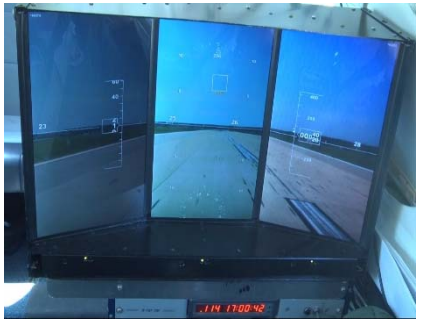
RNO/WAL

ROA

DFW

LFI/PHF

JNU



LFI/AKQ

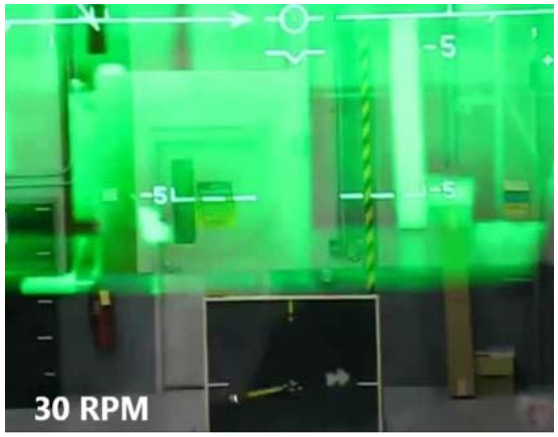
SAV

BEC

ATL

Next: Diversity of Methods

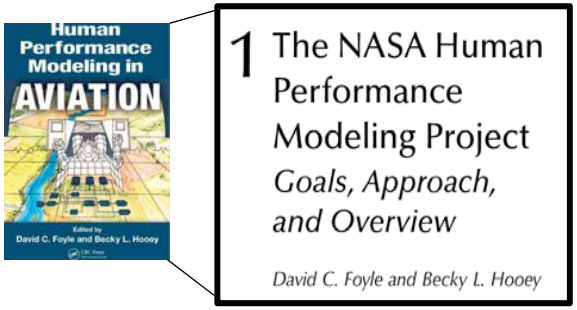
Diversity of Methods



Engineering Methods

Psychophysiology

Traditional Measures



Modeling and Simulation

Rapid Prototyping

Next: Collaboration and Communication

Collaboration and Communication

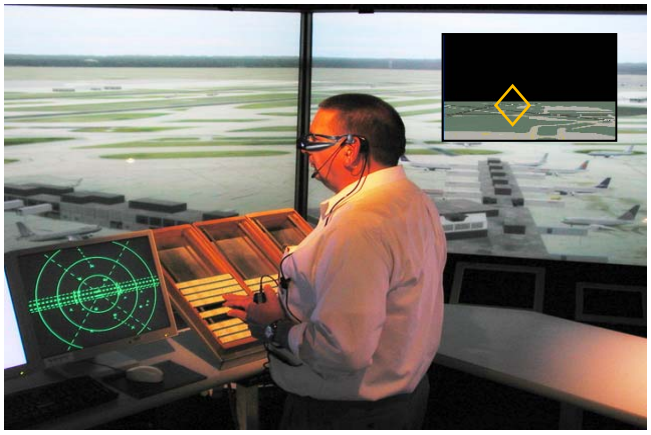
- Collaborations
  - Industry
  - Academia
  - NASA Centers
  - Government Agencies
  - International collaborations
- Communication
  - NASA technical documents
  - Conference presentations
  - Journal articles
  - Software releases
  - Patent and invention disclosures
  - Workshops
  - Rulemaking committees

Next: “How To Get Better….”

“How to Get Better…”

Better Measures and Techniques

Better Off-Nominal Testing



Better Applications

Better Communication