

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

International Symposium on Aviation Psychology

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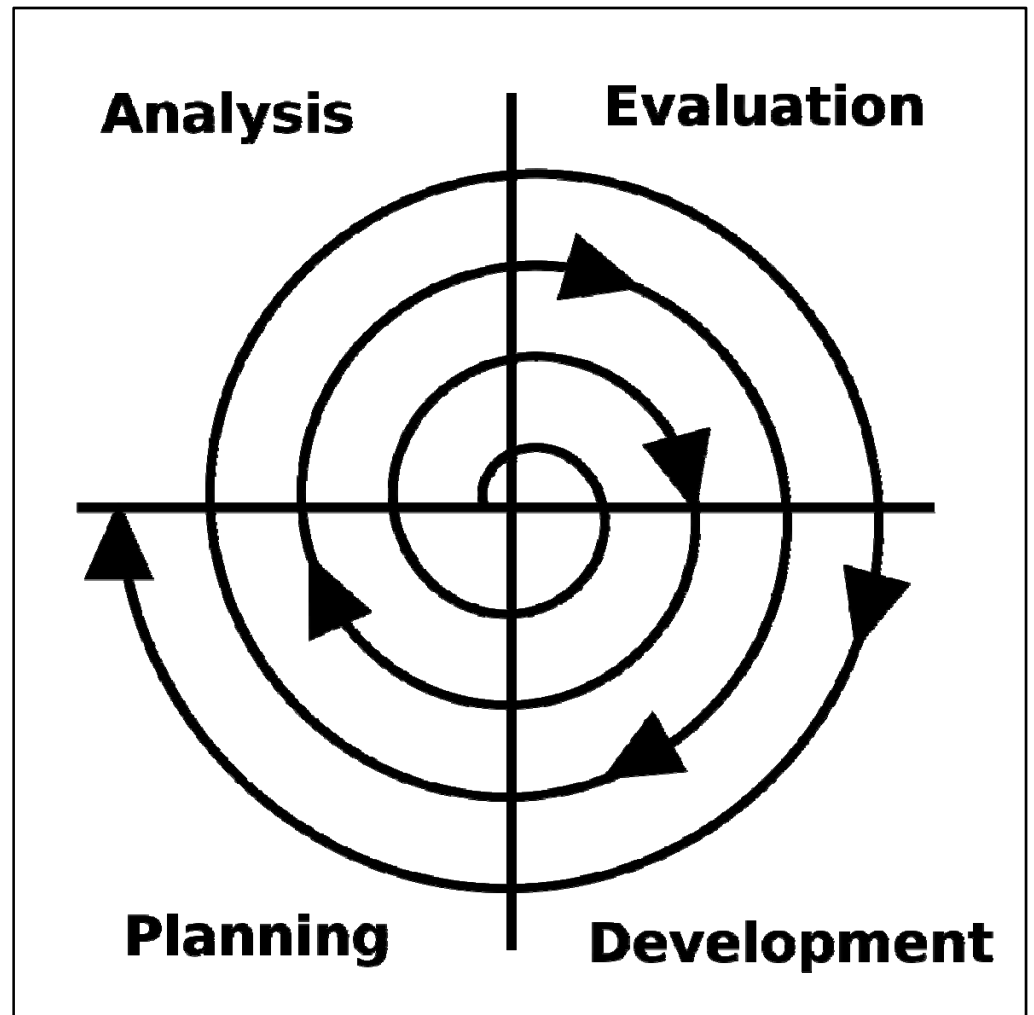
Workshop Themes

- “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?”

NASA Research Approach

Technology Readiness Level (TRL)

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



The Example Case



Enhanced Vision (EFVS)



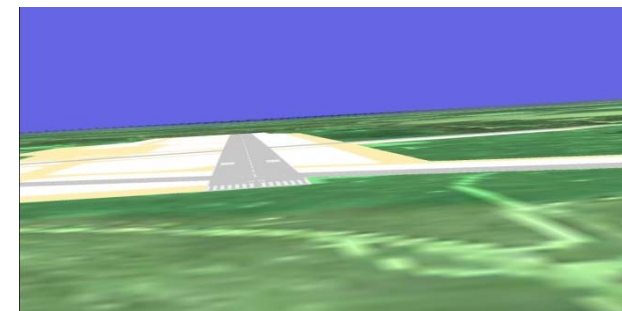
Synthetic Vision



Visual



Enhanced Vision



Synthetic Vision

Simulators and Laboratories



Part-Task Simulators

High Fidelity Simulators

Examples

Research Aircraft Used During Synthetic Vision Program



Project Flight Tests



AVL



EGE



RNO/WAL



ROA



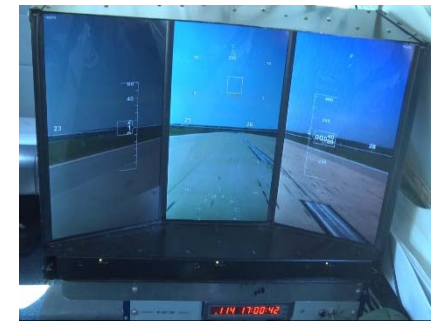
DFW



LFI/PHF



JNU



LFI/AKQ



SAV

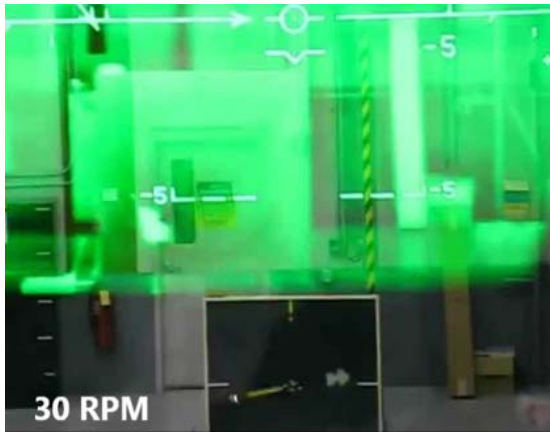


BEC



ATL

Diversity of Methods



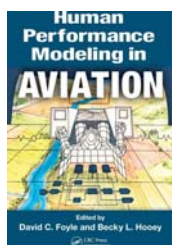
Engineering Methods



Psychophysiology



Traditional Measures



1 The NASA Human Performance Modeling Project Goals, Approach, and Overview

David C. Foyle and Becky L. Hooley

Modeling and Simulation



Rapid Prototyping

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



“How to Get Better...”



Better Measures and Techniques



Better Off-Nominal Testing



Better Applications



Better Communication