

# The Human Contribution to Structural Inspection

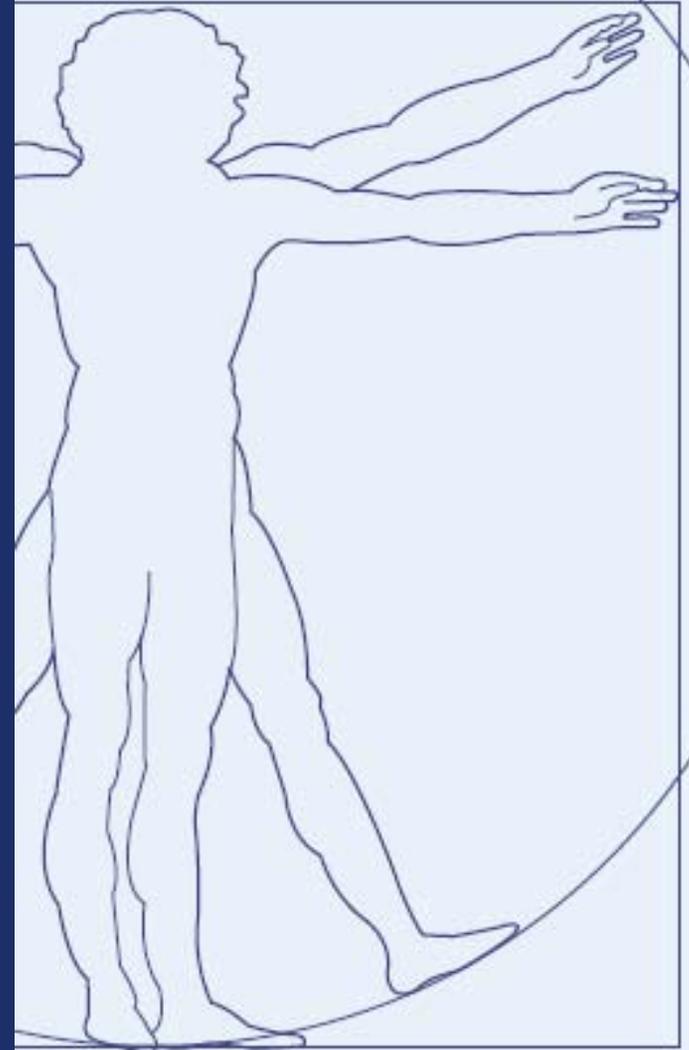
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**Aviation Safety Organization (AVS)**

**NTSB Fuselage Structural Integrity Forum**  
**Washington, DC**  
**September 21-22, 2011**

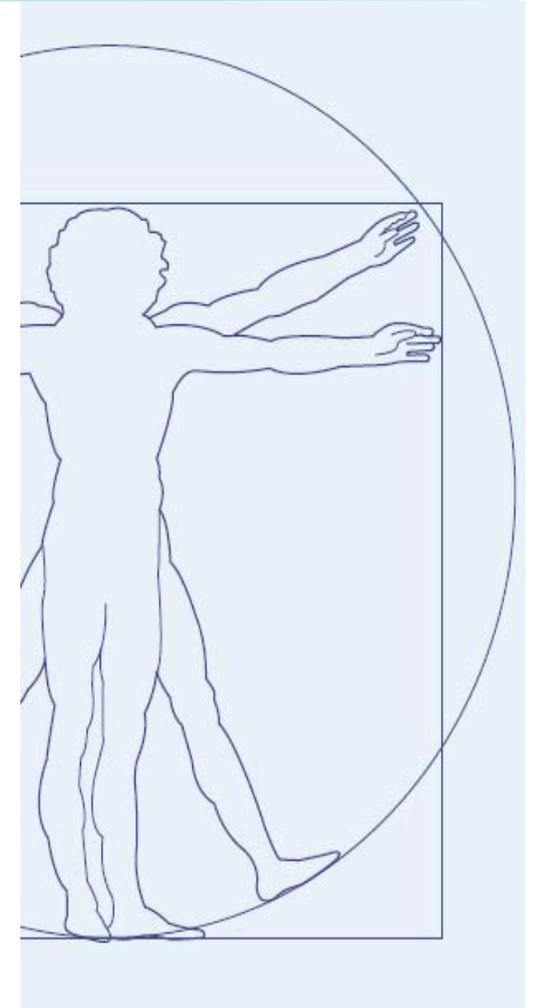


**Federal Aviation  
Administration**



# Presentation Plan

- **FAA History with HF in Inspection**
  - Sponsors
  - Goals and Deliverables
- **Current R&D and Guidance**
  - Specific Advisory examples
  - Harmonization with EASA
  - Current HF R&D Generic approach with applied results



# Evolution, FAA Sponsors, Objectives

- **Impact of the Aviation Safety Research Act of 1988**
  - Aloha Accident
  - National Plan for Aviation Human Factors (1989-90)
  - Aging Aircraft Program
  - High motivation at all levels
- **HF work was led by Flight Standards and the Office of Aviation Medicine (starting in 1988)**
  - Annual Maintenance HF Workshops (25 so far)
  - Respect for basic scientific research with an expectation of applied deliverables
  - Create guidelines and products that industry can use
  - [www.hfskyway.faa.gov](http://www.hfskyway.faa.gov)



# Approach and Deliverables

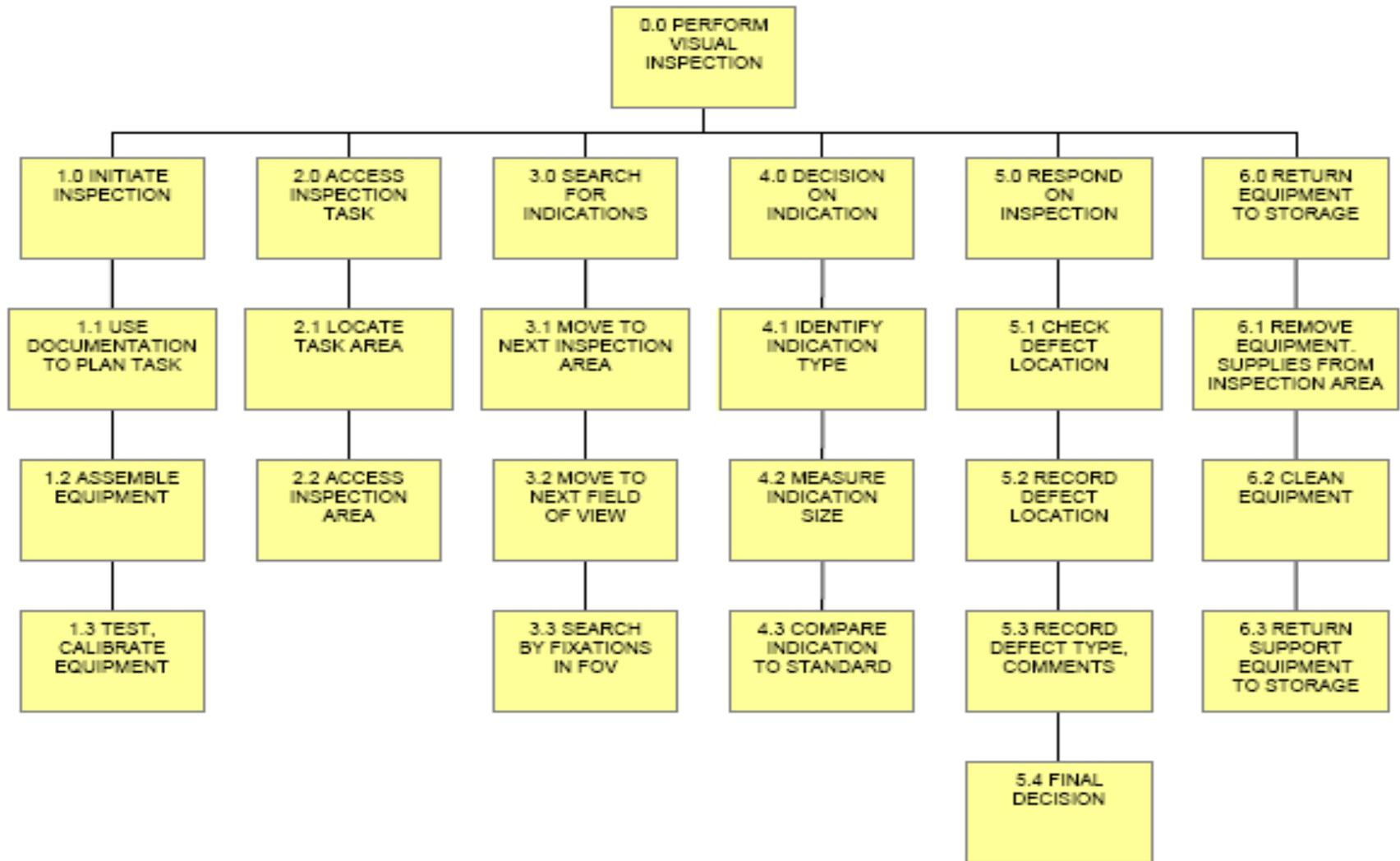
- **Capitalize on FAA internal expertise and draw on the respected external organizations and consultants**
  - Technical Specialists (Like Dr. Broz, Mr. Rusty Jones)
  - FAA Centers (Atlantic City, Oklahoma City)
  - Gov Labs (Like Sandia National Laboratory)
  - Centers of Excellence (Like Wichita State U., Iowa State U.)
  - Research Universities/Institutions (Like U. of Buffalo) (Dr. Colin Drury [colindrury@hotmail.com](mailto:colindrury@hotmail.com)) (Clemson U.)
- **Close cooperation with industry at all times**
  - Airlines
  - MROs
  - US and International Participation

# Approach and Deliverables (Continued)

- **Extensive field observations**
- **Many controlled laboratory and controlled field experiments**
- **Over 200 publications/presentations (In public literature today)**
- **Combined the science of human factors and inspection principles/practices to create recommendations**
- **Disciplines of Systems Engineering, Industrial and Mechanical Engineering, Psychology, Human Factors.....**
- **Graduate Work: PhD's: 8+ MS's: 20+**



# Hierarchical Task Analysis – Example Method



# Examples areas addressed and documented

- **Speed-Accuracy Trade-off (How much to inspect)**
- **Time limits in inspection**
- **Technical Documentation (46% of Errors had Docs as Contributing Factor)**
- **Training and Selection**
- **Workplace Design**
- **Equipment Usability**
- **Human-Computer Interaction and Interface**
- **Task Allocation**
- **The Visual Environment**
- **Interpersonal System Design – The Organizational issues**

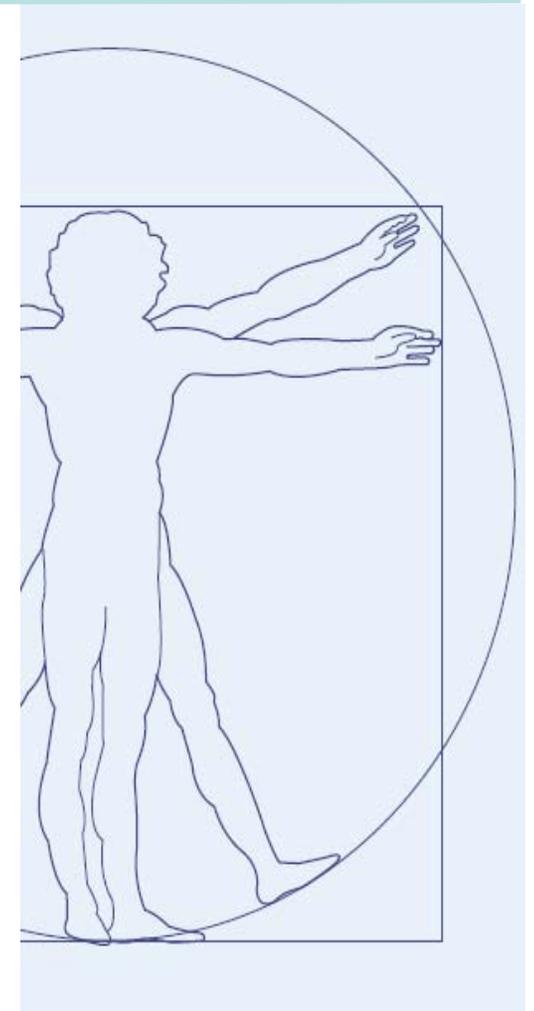
# Presentation Progress

## FAA History with HF in Inspection

- Sponsors
- Goals and Deliverables

## • Current R&D and Guidance

- Specific Advisory examples
- Harmonization with EASA
- Current HF R&D Generic approach with applied results



# Example Advisory Circulars

AC 43-204 Visual Inspection of Aircraft

AC 65-31A Training, Qualification, and Certification of Nondestructive Inspection (NDI) Personnel

AC 65-33 Development of Training/Qualification Programs for Composite Maintenance

AC 120-72 Maintenance Resource Management

AC 120XX, Air Carrier Maintenance Training (Pending)

AC 145-10, Repair Station Training Program (Pending)

# Other Relevant FAA Activities

- **Increasing harmonization with EASA on maintenance-related rules.**
- **HF Training for FAA Aviation Safety Inspectors**
- **Advisory Circulars for Repair Stations for EASA compliance**
- **Revised rule for Part 121 Maintenance training programs**
- **Helped to affect a culture of voluntary reporting and open communication.**



# Current Maintenance Human Factors R&D

- **Fatigue Awareness**  
(see [www.mxfatigue.com](http://www.mxfatigue.com))
- **Peer-to Peer Assessments in Maintenance to support SMS**  
(see [www.mrlosa.com](http://www.mrlosa.com))
- **Calculating Return-on-Investment measured in money and safety**  
(see [www.mxfatigue.com](http://www.mxfatigue.com) by late October)
- **Plans to address technical documentation design, development, and use.**



- **People** who perform the job
- **Environment** for work - Organizational and physical
- **Actions** (tasks) performed as part of the job
- **Resources** like equipment, tools, procedures, and more

*Thank You, Bill Johnson*