



Aviation Safety Program

Decision Support Tools for Safety Research Investments

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National Aeronautics and Space Administration

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Outline

- **AvSP Program**
- **AvSP Program Assessment Metrics**
- **Decision Support Tools Objectives**
- **Decision Support Tool Research**
- **Concluding Remarks**



AvSP Organization

Program Office

George Finelli, Acting Director

Brian Smith, Dep Prog Mgr (ARC)

Ron Colantonio, Acting, Dep Prog Mgr (GRC)

Glenn Bond, Senior Prog Analyst

Technical Integration

Frank Jones (LaRC)

Program Integration

Michael Basehore (FAA)

Carrie Walker (Hq)



AvSP Projects

Aviation System Monitoring & Modeling

Dr. Irv Statler
(ARC)

- System Monitoring
- Data Sharing
- Data Analysis

System-Wide Accident Prevention

Dr. Bettina Beard
(ARC)

- Human Error Modeling
- Maintenance Human Factors
- Training
- Program Human Factors

Single Aircraft Accident Prevention

John White
(LaRC)

- Health Management & Flight Critical Systems Design
- Control Upset Management
- Engine Containment



AvSP Projects

Weather Accident Prevention

Gus Martzaklis
I (GRC)

- Aviation Weather Info
- Communications
- Turbulence

Accident Mitigation

Bob McKnight
(GRC)

- Systems Approach to Crashworthiness
- Fire Prevention

Synthetic Vision

Daniel Baize
(LaRC)

- Commercial & Business Aircraft
- GA & Rotorcraft
- Enabling Technologies



AvSP Program Assessment Metrics

- **Safety benefits**
 - **accident rate**
 - **system risk**
- **Technical Development Risk**
- **Implementation Risk**
- **Cost/Return on Investment**

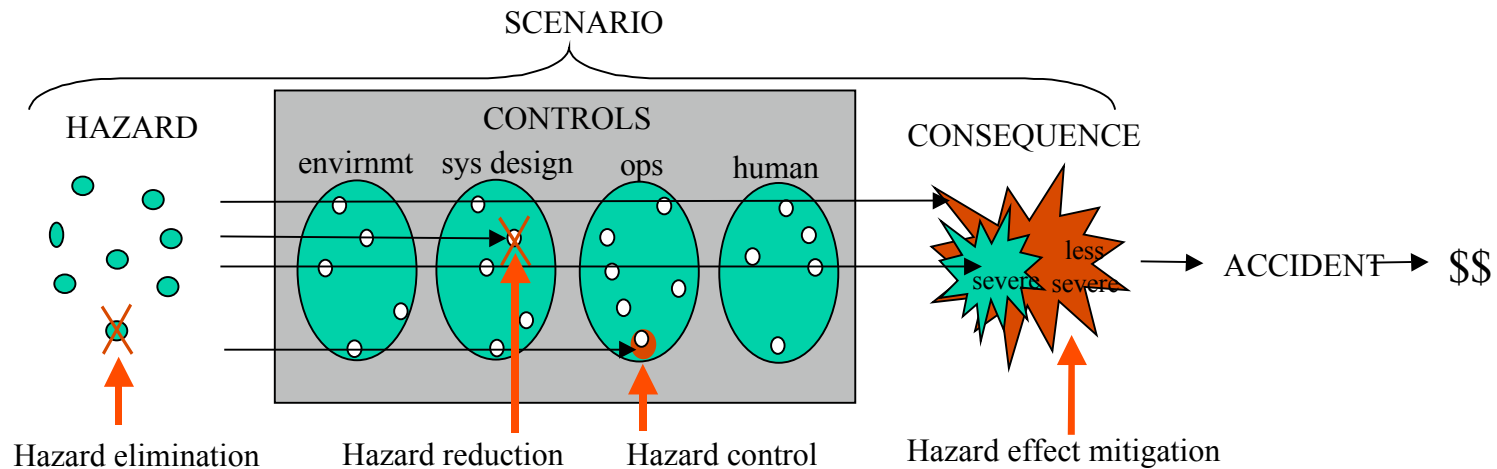


Decision Support Tool Objectives

- Enable measurement of technology benefit as an **effect on risk**
- Enable the translation of this **effect** measurement into monetary units
- Provide a process that produces results that are: reproducible, objective, and quantitative
- Provide a process that describes the uncertainties associated with the results

Decision Support Tool Research

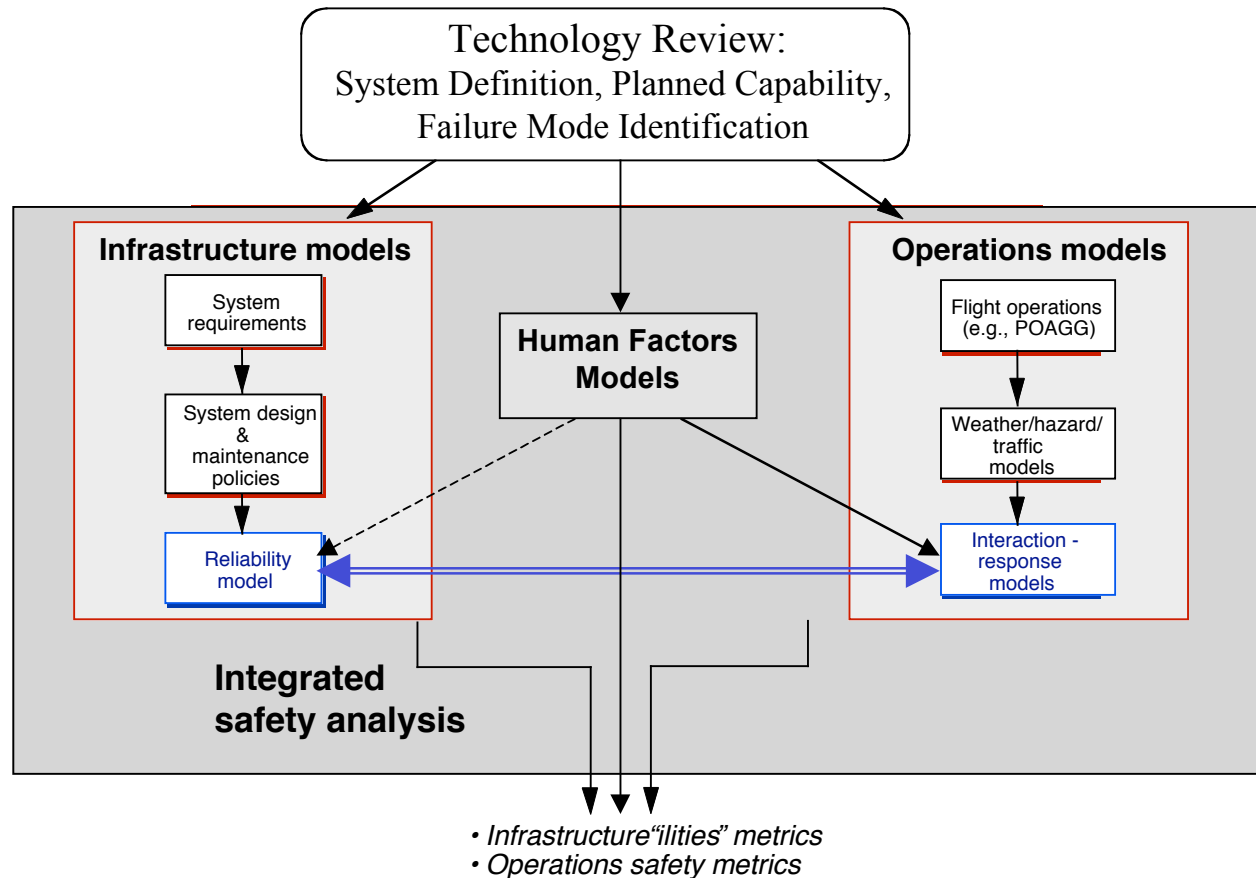
ACCIDENT MODEL



RISK is a function of (1) likelihood of hazard occurring, (2) likelihood hazard leads to an accident (duration and exposure), (3) severity of consequences of the accident



PRA Model for Synthetic Vision & Turbulence Detection Technologies



$$P(\text{Resultant Hazard}) = P(\text{Component Failure}) * P(\text{Accident} | \text{Failure})$$

Led by Mary Reveley (GRC) with support from the Logistics Management Institute



PRA Model for Maintenance Error

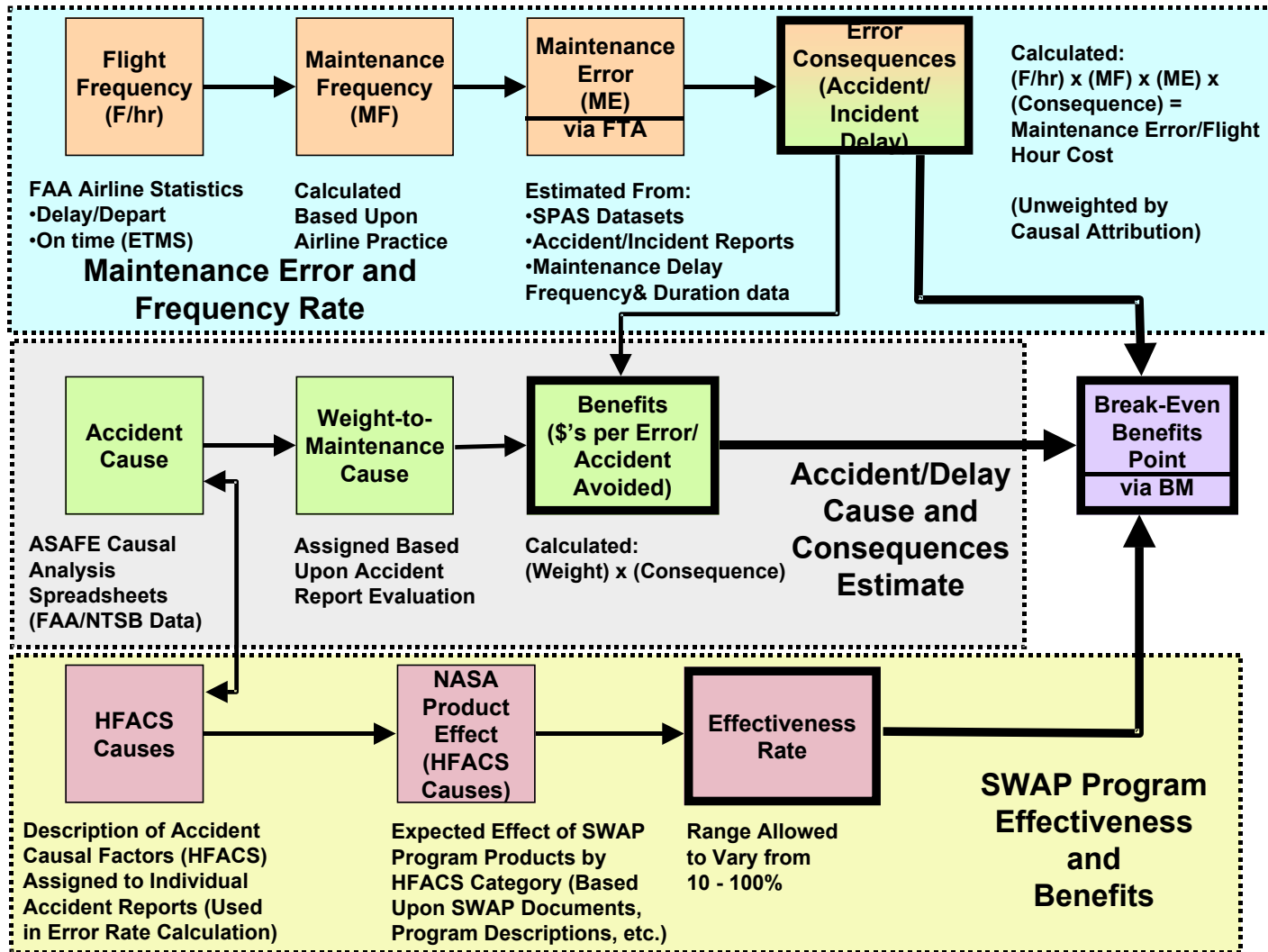
Process Description

- **Maintenance frequency and error rate**
- **Accident/delay cause and consequences estimate**
- **Maintenance human factors effectiveness and benefits**

Led by Mary Reveley with support from DOT/Volpe



PRA Model for Maintenance Error





Probabilistic Decision Support to Evaluate Technology Insertion

Objective:

To Provide a prototype capability that demonstrates the effectiveness of risk mitigation strategies, such as technology insertions/interventions in the NAS.

Approach:

Describe scenarios, identify nodes, construct influence diagrams, build BBN, insert technology/intervention, assess relative risks.

Led by Sharon Monica Jones (LAC) with support from Rutgers University



Concluding Remarks

- Tools are being developed to determine the relative safety benefits of inserting new technologies into the NAS.
- Cost/ROI assessments also needed to make new technology insertions attractive to end users.

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