Session I
Safety and Security

GAIN/Integration Tool
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Human Factors Support to FAA Office of System Safety for GAIN

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Presentation Outline

➔ Context of Flight Crew Error Analysis

➔ Flight Crew Human Factors Data Project

➔ Overview of Integration Tool

➔ Flight Crew Human Factors Data Analysis *(ERAU)*

➔ Technical Review and Strategic Plan *(UCB)*
  - Findings/Recommendations

What is the problem?

Flight crew error estimated to contribute to over 60% of all air carrier accidents and incidents and to over 80% for GA

Magnitude and complexity of current databases makes manual analysis impractical and computer analysis extremely challenging

Current analysis techniques not consistent, so results are difficult to verify/validate

Present Situation

→ Relevant data spread across multiple database

- Many databases not capturing pertinent human factors and contextual data
- Need to integrate data from several sources

→ No standard methods for analyzing human factors data

→ No capability to spot trends and emerging issues

Project Goals

→ Support efforts to eliminate aviation accidents and incidents caused by human error

→ Continue developing a process to identify and analyze flight crew errors associated with accidents and incidents so that prevention strategies can be developed

→ Increase FAA and industry capability to access integrate, and analyze human factors data
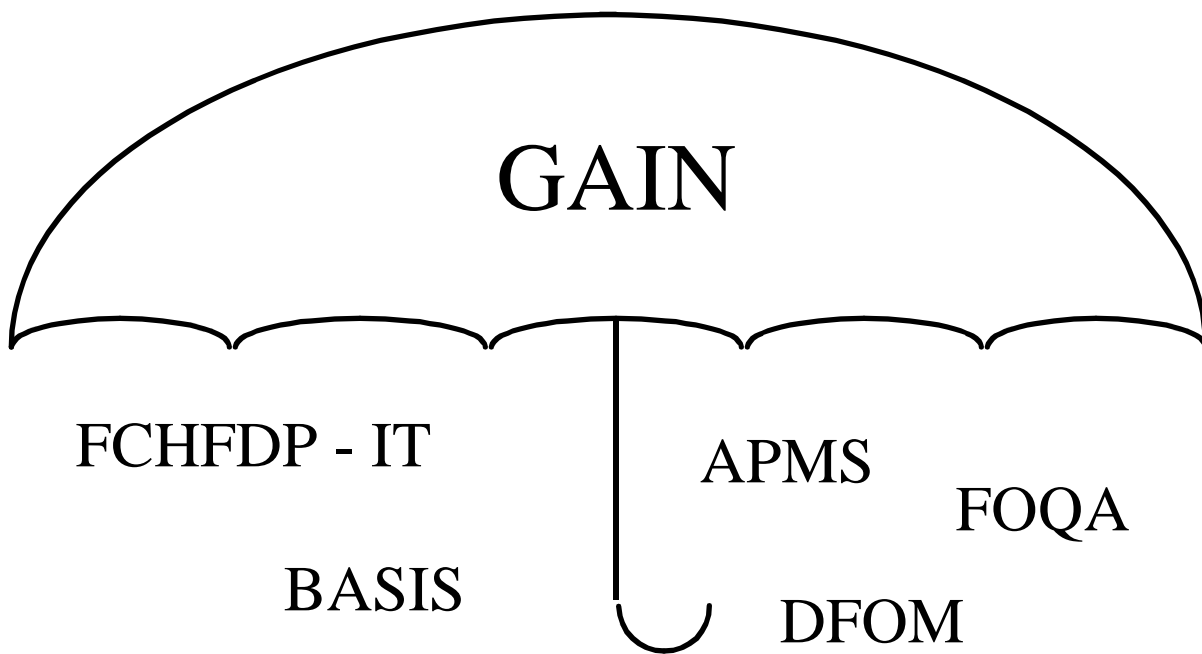
GAIN - Global Analysis and Information Network

➔ Identify safety concerns

➔ Disseminate information quickly

➔ "To facilitate the real-time, cost effective exchange of air safety information between industry participants through an environment of trust to ultimately eliminate aircraft accidents."
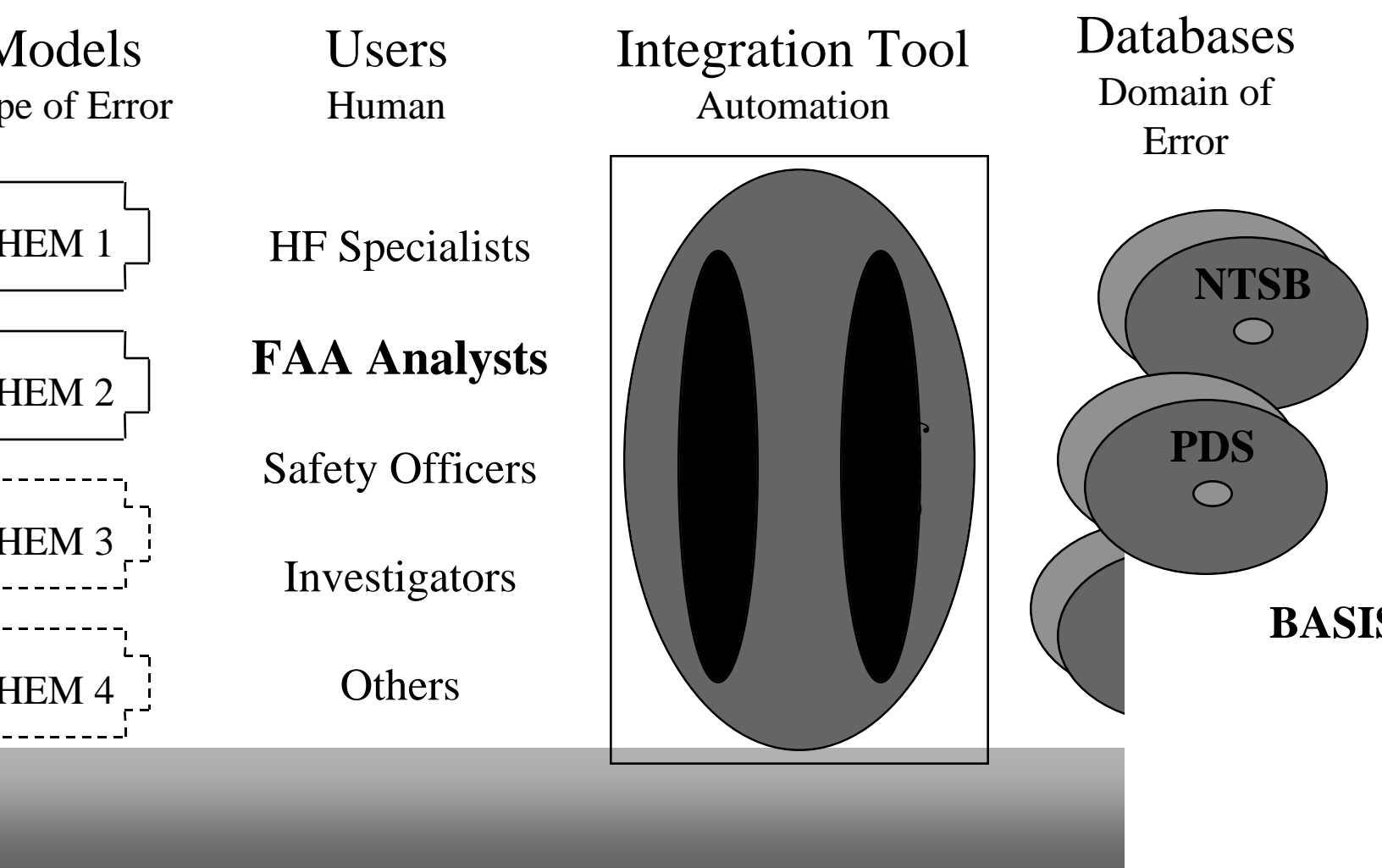
Flight Crew Human Factors Data Project

→ Flight Crew Human Factors Data
  - Maintain Integration Tool/Website
  - Provide Analysis Methods
  - Develop Flight Crew Training Needs Assessment Processes

→ Technical Review and Integration Plan
  - Technical Review of Integration Tool
  - Strategic Plan for Human Error Analysis

Other Data Analysis Efforts

GAIN

FCHFDP - IT

APMS

FOQA

BASIS

DFOM

The Integration Tool

Models	Users	Integration Tool	Databases
pe of Error	Human	Automation	Domain of Error

HEM 1

HF Specialists

FAA Analysts

HEM 2

Safety Officers

HEM 3

Investigators

HEM 4

Others

NTSB

PDS

BASIS

Current Capabilities

✦ Provides access to two aviation safety databases

✦ Designed to permit access via the Internet

✦ Applies two human error models to information in databases

✦ On-line help and documentation

Human Error Models

HEM1

- Slips - Unintentional Action
- Mistakes - Intentional Action

HEM2

- Skill-Based Slip - Unintentional action: Lack of attention
- Rule-Based Mistake - Intentional action: Inappropriate decision
- Knowledge-Based Mistake - Intentional action: Unfamiliar situation, insufficient information

Databases

✈ NTSB Accident and Incident Database

✈ NAIMS Pilot Deviation System Incident Database

Technical Review and Strategic Plan

�Technical Review of Previous Work
- Integration Tool Development
- Flight Crew Training Needs Assessment

➤Develop Strategic Plan
- Improve Integration of Human Error Analysis for Flight Crews and Air Traffic Controllers
- Enhance IT Functionality

Findings & Recommendations 1

- IT provides a user-friendly window into safety databases
  - Standardized interface
  - On-line data content & definition information
  - Variety of support tools and models
  - Ease of access via the Internet
- Automated data analysis ensures consistency of results
  - Automate data manipulation but not interpretation

Findings & Recommendations 2

- ✈ Continued development is in order

- ✈ There are several other systems being developed to support safety data analysis
  - *BASIS, APMS, DFOM, etc.*

- ✈ Need to coordinate IT development
  - Avoid redundancy
  - Look at lessons learned
  - Continue soliciting input from potential users

Findings & Recommendations 3

- ✦ Current datasets and models limit potential analysis
  - Inflexible application of HEMs
  - Limited cross checking/verification
  - Limited number of properly classified events

- ✦ Important to expand number of datasets
  - *ASRS, APMS, NASDAC, etc.*

- ✦ Need ability to link to databases on-line

Findings & Recommendations 4

Current HEMs do not provide direct insight on causes of human error

Expand range of error models
- Explore alternative HEMs (esp. involving organizati
- Improve documentation of HEMs

Improve IT functionality
- More flexible implementation of HEMs (user define
- Provide way to archive results

NEXTOR

Conclusions

- IT provides a valuable capability to support human factors analysis

- Broad potential application throughout aviation industry
  - Provides technical capability to support GAIN
  - Range of application areas within FAA

- Further development is needed

- User support is critical