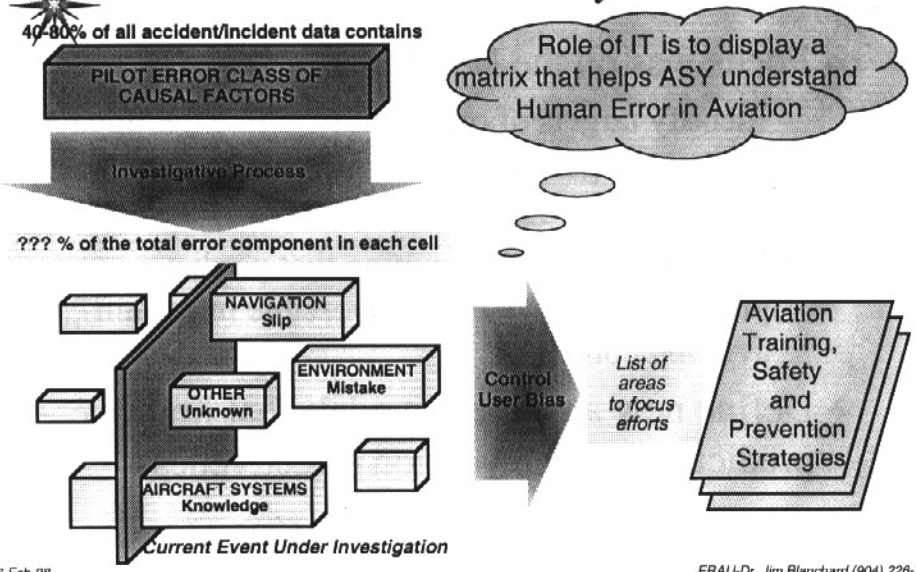# Session I
Safety and Security

GAIN/Integration Tool

James Blanchard, Embry-Riddle

Flight Crew Human Factors Data (Integration Tool) NEXTOR Task 1

Embry Riddle Aeronautical University

Jim Blanchard, Sc.D., Principal Investigator

2

Human Factors Analysis Process

40-80% of all accident/incident data contains

PILOT ERROR CLASS OF CAUSAL FACTORS

Investigative Process

??? % of the total error component in each cell

NAVIGATION Slip

ENVIRONMENT Mistake

OTHER Unknown

AIRCRAFT SYSTEMS Knowledge

Current Event Under Investigation

Role of IT is to display a matrix that helps ASY understand Human Error in Aviation

Control User Bias

List of areas to focus efforts

Aviation Training, Safety and Prevention Strategies

26-Feb-98

ERAU-Dr. Jim Blanchard (904) 226-7037

Task 1a: IT Demonstrations and Evaluations

- ◆ The IT is on the intranet at ERAU
- ◆ Numerous demonstrations have been conducted for industry
- ◆ US Navy, US Air Force and various civilian users have requested Internet access and been briefed on the system capabilities
- ◆ IT was used to conduct limited analysis of the NTSB "domain classifications" seeking to pinpoint the safety "target areas"

Task 1b: Analysis Methods

- ◆ Focus was on the NTSB data
  - ◆ Identify targets of opportunity where the impact is likely to generate measurable improvements in safety
  - ◆ Move forward on the notion that predicting and preventing human error is possible in certain aviation contexts
- ◆ Define new analytical models that improve prediction and prevention effectiveness

Task 1b: Analysis Methods - continued

- ◆ Prevention strategies can be developed by the user based on an analysis of the patterns in the matrices, i.e., "categorization"
- ◆ Statistical techniques were applied to show that matrix "cell-magnitude" can be used to:
  - ◆ Determine relative importance, and
  - ◆ Identify trends in the corresponding "domain/error" categorization
- ◆ Quantify data for operational risk assessment

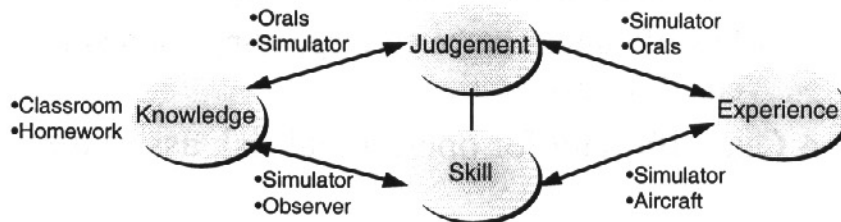# Task 1c: Flight Crew Training Needs Assessment Processes

- ◆ Study the initial training and certification of airmen looking for systemic problems
- ◆ Use IT to track results of training where the organization has a model for determining pilot performance and data is readily available
- ◆ Use IT to implement "data use" strategies that help the airline industry migrate toward the effective use of next-generation human performance data

Task 1c: Identifying Strategies Using IT and Data

✦ JESK principles state that knowledge is a foundation (pre-requisite) element

✦ Skills are observable, and consist of some judgement

✦ Judgement is not observable, while effects may be...

✦ Experience comes after both skill and judgement

Task 1c: IT Identifies Issues in GA Training Needs Assessment

✦ IT shows "see and avoid" is still a problem...

✦ Define issues that are inherent in the training of traffic pattern operations

✦ Identifying the need to improve the "system" requires preventing errors

✦ Focusing on the specifics of getting the pilot to "see" outside

J

$\mu(J)$

E

S

K
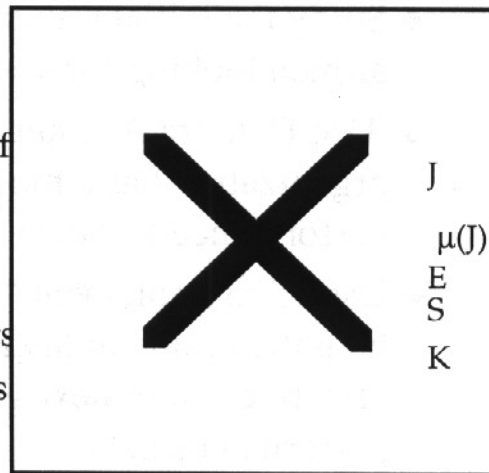
Task 1c: Air Carrier Training Needs Assessment

- ◆ Partnerships with USAirways and the ATA Data Management Committee:
  - ◆ Developed a methodology for collecting data suitable for:
    - ◆ AQP assessment
    - ◆ Error analysis
  - ◆ Potential role of IT to support data collection activities related to:
    - ◆ Post-flight analysis by the crews and evaluators
    - ◆ Training operations research

Next Steps

- ◆ Improve the ability of the user to specify the search criteria relative to their own data
- ◆ Include technical and philosophical documentation with the IT distribution
- ◆ Provide on-site training for the IT users
- ◆ Improve collaboration between users through the use of IT to perform comparative analyses across different data sets

Supporting Slides

To accompany the briefing for FAA
Office of System Safety

Concept Diagram: CADS-A^3

- Curriculum
  - AQP
  - ACT
- Task Analysis

- Learning Objectives
- Observation Markers
- Performance Criteria

- Statistics
- Charts/ Graphs

- Data storage
- Data link
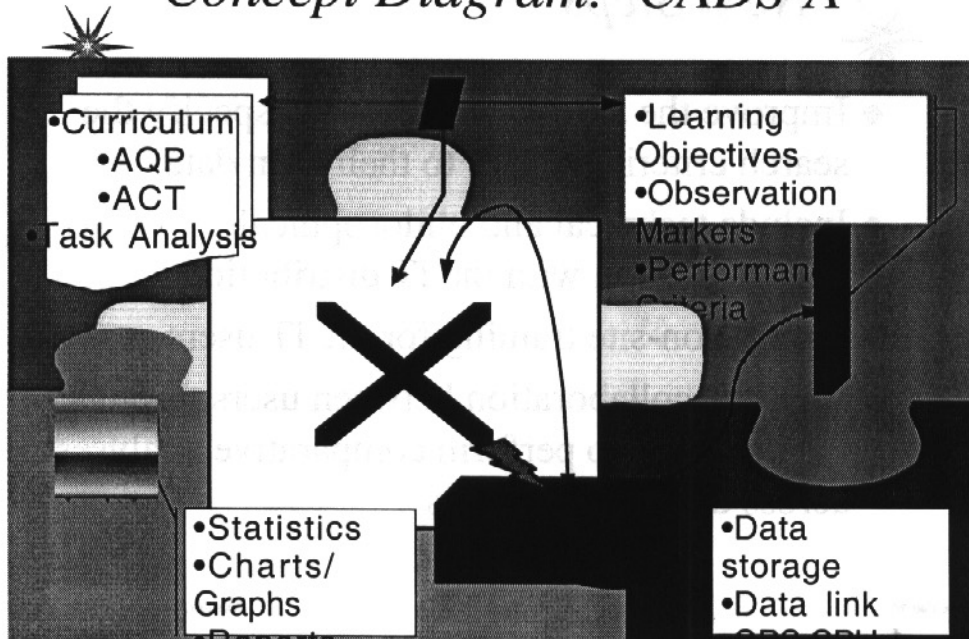
The Big Picture

Improving the Data and the Usefulness of the Data Collected
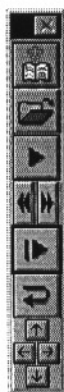
- ◆ Tools to improve the pre- and post-flight briefings
- ◆ In-flight tracking of the observable behaviors improves the data quality
- ◆ Analysis and self-critique tools are applied using the IT

Usefulness in Pilot Training: Immediate and Accurate Replay

◆ Pilots can use this view to see the flight, hear the in-flight conversation, and enter a self-critique of the flight

◆ Data from the flight is put in an analysis model that is used to generate immediate feedback

I should have kept the take-off going since I was past V$_1$
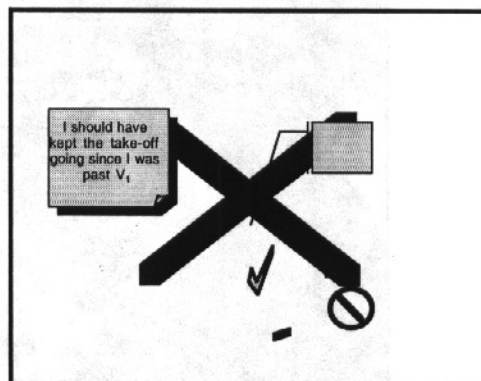
Analytical Techniques for Training Centers and Analysts