NAOMS Workshop

March 1, 2000

WELCOME AND NAOMS INTRODUCTION

Linda Connell
NASA Project Manager, Level III

Background

Development Team

Under Battelle Support Service Contract to NASA

– Robert Dodd, Sc.D.	Principal Investigator
– Loren Rosenthal	AOMS Program Manager
– Jon Krosnick Ph.D.	Survey Methodologist
– Joan Cwi Ph.D.	Survey Application
– R. Iachan Ph.D.	Statistician
– Mike Silver M.S.	Survey Methodologist
– Mike Jobanek M.S.	Aviation Safety Analyst
– Elisa Ingebretson	Research Scientist

NAOMS CONCEPT, RATIONALE and FIELD TRIAL DEVELOPMENT

Robert Dodd Sc.D., M.S.

Principal Investigator,

Battelle

NAOMS Goals

Create a new capability that will:

1) Track aviation safety trends

2) Monitor the impacts of technological and procedural changes to the aviation system

NAOMS: Filling Important Data Gaps

- **NAOMS will not replace or duplicate current data collection efforts**
- **Designed to supplement current and future aviation safety data collection and analysis programs**
- **Will obtain accurate information from operational personnel**
  - Includes groups who traditionally have not been active sources of safety information

NAOMS Approach

- **Regularly survey pilots, controllers, mechanics, flight attendants and others who operate the national aviation system (NAS)**
  - View the national aviation system through their eyes
  - Includes all types of operations (air carrier, regional, corporate, general aviation, military)
- **Achieve scientific integrity by using well crafted survey instruments and carefully designed statistical sampling methods**

NAOMS
Will Generate . . .

Statistically valid estimates of the actual rates of safety events and related experiences occurring in the NAS

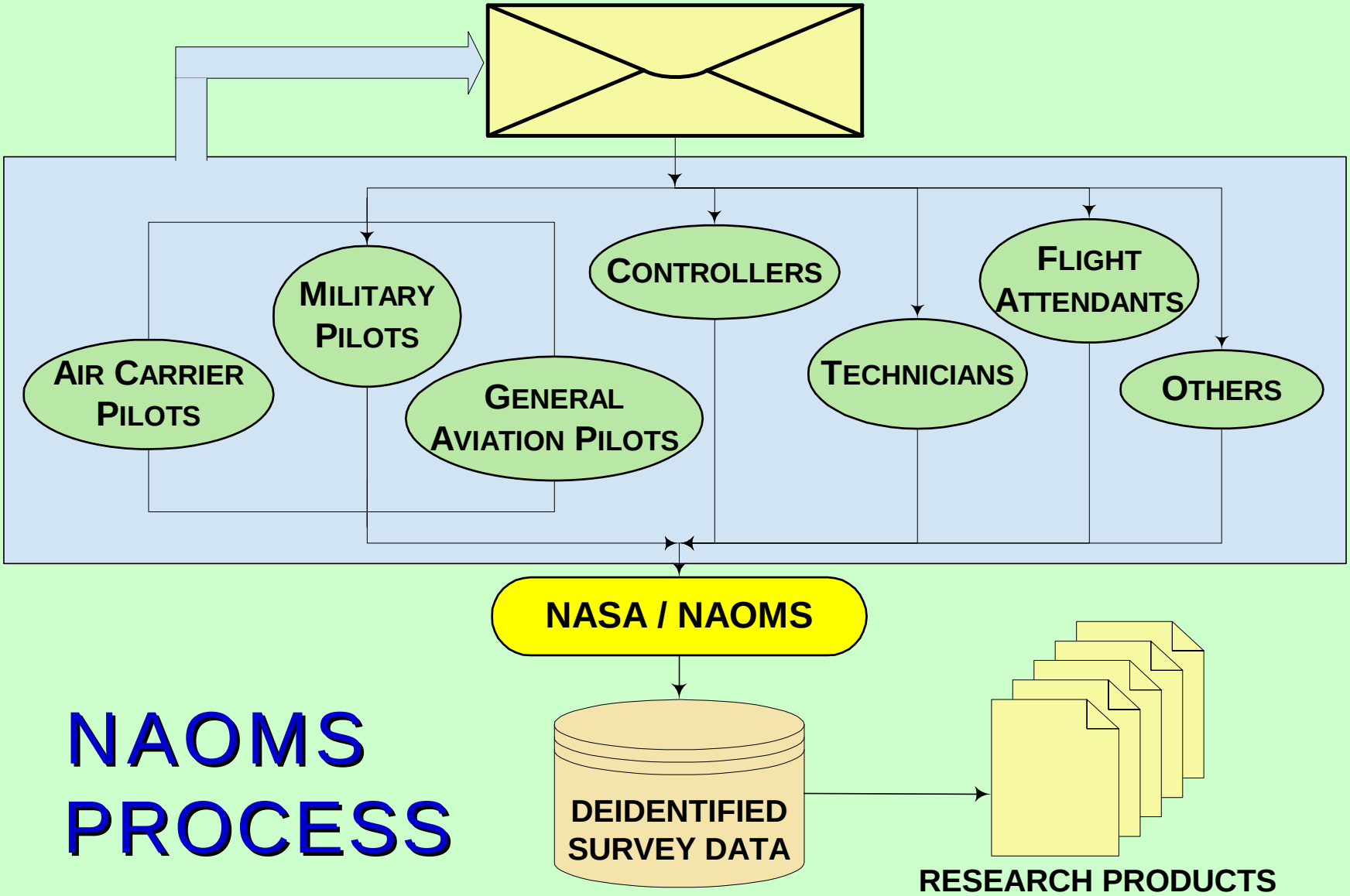
NAOMS Data Use

- **Used to track event trends**
  - Will identify incident trends
  - May not fully explain trends or causal factors
  - Additional investigation may be needed
  - NAOMS will complement, not replace existing data resources
- **Can provide detailed insight into topics of special interest**
  - Added to the questionnaire as needed
  - Can be accomplished relatively quickly

Why NAOMS Chose the Survey Method

- **Proven in other venues**
  - Public health
  - Public policy
  - Market research
- **Scientific and representative**
- **Capable of addressing human performance issues**
- **Timely data collection**
- **Well-developed methodologies**

NAOMS PROCESS



Participant Confidentiality is Assured

- We will have no means of tracing a survey response to the individual who provided it
- All tracking information is kept separate and destroyed after use
- No information is collected on operator name or airport name
- Reports and data sets will have no information that can be used to identify reporters

NAOMS
Will Collect Data on

<u>Participant Experiences</u> involving . . .

☆ **Aviation Operations (exposure)**

- Flight hours / legs
- Time on control position
- Other pertinent measures

🕐 **Safety Events**

- A standard set of benchmark incidents

🕑 **New Technologies and Procedures**

- First-hand experiences
- Continuously refocused in response to changing needs

NAOMS Products

- **EXPECTED OUTPUTS**
  - Summarized aviation operational experience data
  - Statistically reliable estimates of incident rates
  - Near real-time feedback on impacts of new technology and procedures
- **PRODUCT CONSUMERS**
  - Decision makers (government and industry)
  - Safety professionals and research organizations

NAOMS: Field Trial Goals

- **Determine Feasibility of Concept**
  - Can survey research techniques provide meaningful levels of reporting on safety events from the aviation community?
  - If so, is this level of reporting sufficient for trending?
- **Thorough and comprehensive evaluation of survey methodology**
  - Based on solid science and the best knowledge on survey methodology
    - Mode, recall period, etc
    - Sample size requirements and costs

Field Trial Focus

Methodology:

<u>NOT EVENTS</u>

No event information will be presented or published from the field trial.

Activities to Date

- **Feasibility Assessment**
  - Background Research
    - Literature review
    - Participant group profiles
  - Field Research
    - Conducted multiple focus groups with pilots
      - Obtained extensive listing of safety experiences
      - Solicited input on their likely response to a NAOMS survey
    - Conducted individual evaluation of pilot respondents
      - Ability to recall events
      - Method of categorizing events
  - Briefed Government and Industry Organizations

Activities to Date (cont'd)

- **NASA Workshops**
  - November 97 and May 1999
  - Government, Industry and Academia
- **Survey Instrument Development**
  - Drafts Developed, Extensive Review
    - Focus groups
    - ASRS analysts
    - Workshop comments

Field Trial Survey Instrument Structure

- **Section A: Operational Exposure**
- **Section B: Safety Event Experiences**
- **Section C: Focus Topics**
- **Section D: Participant Feedback**

Field Trial Approach

- **Assessment of the survey instrument and procedures**
  - Limited to air carrier pilots
  - Various versions were tested
  - Last section of survey asked participants for feedback on survey and process
- **Variations**
  - Mode (telephone, mail, face-to-face)
  - Recall period
  - Section order
  - Topical foci

NAOMS Field Trial Products

- **Response rates, quality and completeness by**
  - Mode
  - Recall period
  - Question order
- **Feedback on survey from respondents**
- **Dimensions of a fully operational system**
  - Sample size requirements
  - Mode
  - Recall period
  - Cost

How Was the Field Test Instrument Administered?

- **Mailed, Self-Administered:** May send postcard back indicating questionnaire returned, but no identifiers on returned questionnaire
- **Telephone, Scheduled:** Interviewer marked pilot/ATCs electronic record as completed, but questionnaire not linked to anyone
- **In-Person, Scheduled:** Interviewer had pilot/ATC place unmarked completed interview into postage-paid envelope for respondent to mail

All recorded responses held in strict confidence

BASIC FINDINGS

- **NAOMS is a *very viable* method to collect aviation safety data**
- **Response to survey very positive**
  - Very high response rates
- **The results indicate the most effective and efficient way to apply the survey is via telephone interviewing**
  - 10 to 20% more expensive than mail but roughly comp....;
    - better response rate
    - better accuracy
    - better question completion
  - Most common method for other surveys

The NAOMS Field Trial

Joan Cwi, Ph.D.

Director, Survey Operations, Battelle

Centers for Public Health Research and Evaluation

- CPHRE
- More than 20 years conducting surveys
- Currently conduct 100+ projects a year
- Clients include CDC, NCI, EPA, other federal agencies and research foundations

Field Trial Design

- **A field trial is a normal part of a good research design**
- **NAOMS field trial designed to study the effects of**
  - Mode
  - Recall period
  - Question order
- **Other information obtained**
  - Quality of data
  - Response rates
  - Cost
- **Goal was to complete at least 600 interviews**

Study Design--Mode

- **Three interviewing modes were tested**
  - Self-Administered Mail Questionnaire (SAQ)
  - Computer-Assisted Telephone Interview (CATI)
  - In-Person

Study Design--Recall Period

- **Six recall periods were tested**
  - 1 week
  - 2 weeks
  - 4 weeks
  - 2 months
  - 4 months
  - 6 months

Study Design--Question Order

- **There were four sections to the questionnaire**
  - Background questions
  - Safety events
  - Topical questions
  - Feedback
- **There were two sets of topical questions**
  - Minimum equipment lists (MEL)
  - In-close approach changes (ICAC)
- **The safety events and topical question order was switched in both MEL and ICAC questionnaires resulting in four questionnaire versions**

Questionnaire -- Background Questions

Section A – Background Questions

Before completing this questionnaire, please review the last **four weeks** in your logbook or other flight records. A recent study found that this will help you recall safety events that happened during that time period.

A3. In order to understand all of the types of flying that you perform, please fill in the types of aircraft, number of ***hours,*** and number of ***legs*** flown for each operation during the last four weeks. This information will be used for statistical purposes.

	Last Four Weeks		
COMMERCIAL OPERATION	**Aircraft Make/Model**	**Hours**	**Legs**
Scheduled Major or National	**1.**		
	2.		
Scheduled Regional	**1.**		
	2.		
Unscheduled	**1.**		
	2.		
Cargo	**1.**		
	2.		

Questionnaire -- Safety Related Events

Section B – Safety Related Events

In answering these questions, please report only events that you ***personally experienced*** on a commercial aircraft on which you were a crewmember. Please do not report other events that someone told you happened.

Below is a list of events that you might have experienced during the last four weeks. For each item, please indicate how many times, if any, you experienced the event. Please do not leave items blank. If you **did not experience the event** in the last four weeks, write **"0"** in the response box for that item.

Airborne Spatial Deviations		
During the last four weeks, how many times did an aircraft in which you were a crewmember…		
SD1.	…nearly collide with terrain or a ground obstruction while airborne?	
SD2.	…descend below its Minimum Safe Altitude?	
SD3.	…experience a valid GPWS alert?	
SD4.	…enter a MOA, ADIZ, or other special use airspace without appropriate clearance?	
SD5.	…enter any other controlled airspace without appropriate clearance?	
SD6.	…deviate from a route or vector heading for one minute or more?	
SD7.	…deviate from an assigned altitude by more than 300 feet?	

Questionnaire -- Topical Minimum Equipment Lists

Section C – Questions on Minimum Equipment Lists (MELs)

The following topical questions relate to practices on the use of Minimum Equipment Lists and the deferral of MEL maintenance items.

MEL Knowledge and Training				
MEL1.	Have you read the FAA preamble / introduction to the MEL for the aircraft you are currently flying?	Yes	No	Unsure
MEL2.	Did you receive training at your company regarding the MEL documentation for your aircraft?	Yes	No	Unsure
			SKIP TO MEL5.	
MEL3.	How long did the training last?			**HOURS**
MEL4.	Do you believe the training adequately described methods for resolving MEL-related questions or issues?	Yes	No	Unsure

Questionnaire -- Topical
In-Close Approach Changes

Section C – In-Close Approach Changes

The following topical questions relate to clearance changes that have been received on approach.

General Questions			
IC1.	Within the last four weeks, did you receive an unrequested in-close approach clearance change involving a runway, altitude, or a related factor?	Yes	No
			SKIP TO SECTION D.

IC2. At which airports did you receive an in-close approach/runway change within the last four weeks, and how many times?

Location Identifiers/Airports	Number of Times

Questionnaire -- Feedback

Section D – Questionnaire Feedback

Your participation today has helped us in the first test of NASA National Aviation Operations Monitoring Service. Because we're interested in making sure this questionnaire is designed as well as possible, we have included just a few more questions about this survey.

D1.	How many minutes did it take you to complete the questionnaire up to this point?	**MINS**
D2.	How confident are you that you reported accurately all the significant safety-related events that you experienced for the time period specified in the survey? *(Please check the appropriate box.)*	❑ not confident at all ❑ moderately confident ❑ rather confident ❑ very confident ❑ extremely confident
D3.	In your opinion, were the questions asked in Section B of this survey relevant to tracking long-term trends in aviation safety?	Yes No

Sample Design

- Sample came from 2-year old database of all certified pilots available on www.landings.com (N=670,000)
- Selected pilots living in U.S. who flew commercially (N=55,000)
- Randomly selected 13,712 names and submitted to Telematch for address and telephone number updates--used only pilots with address/telephone match

Sample Design

- All pilots with “301” and “410” telephone prefixes (Baltimore, northern Washington DC) assigned to in-person mode and random cell assignment
- Random selection among remaining pilots with addresses/telephone numbers and random assignment to mail and telephone cells
- Total field trial sample equaled 1,251 pilots
- Randomly assigned cases into 3 modes x 4 versions x 6 recall periods for a total of 72 cells

Confidentiality

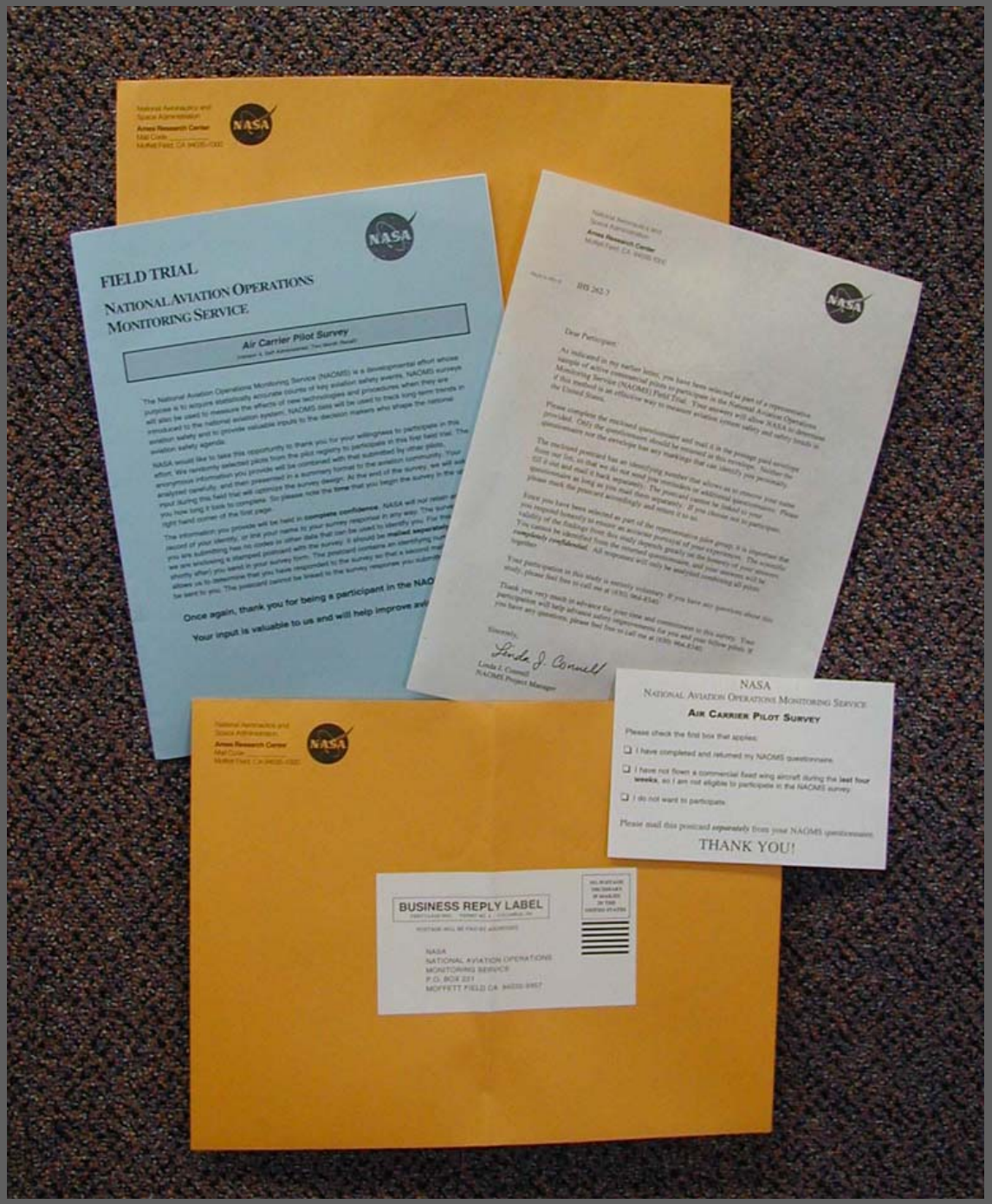
- **Preserving confidentiality an important part of field trial design**
  - **Mail.** There were no identifiers on the completed interview or return envelope
  - **Telephone.** There was no link between the interview database and pilot data
  - **In-Person.** The completed interview had no identifiers on it.

Self-Administered (Mail) Mode

- **Four Mailings**
  - Advance letter
  - First packet one week later
  - Reminder postcard two weeks later
  - Second packet three weeks later
  - Third packet two months later

Self-Administered (Mail) Mode

- **Packet contents**
  - Letter
  - Questionnaire
  - Stamped, addressed return envelope
  - Response postcard
- **Returned materials required editing and data entry**



FIELD TRIAL

NATIONAL AVIATION OPERATIONS MONITORING SERVICE

Air Carrier Pilot Survey

Once again, thank you for being a participant in the NAO

Your input is valuable to us and will help improve avi

Dear Participant:

Linda J. Connell

Linda J. Connell
NAOMS Project Manager

NASA
NATIONAL AVIATION OPERATIONS MONITORING SERVICE
AIR CARRIER PILOT SURVEY

Please check the first box that applies:

- ☐ I have completed and returned my NAOMS questionnaire.
- ☐ I have not flown a commercial fixed wing aircraft during the **last four weeks**, so I am not eligible to participate in the NAOMS survey.
- ☐ I do not want to participate.

Please mail this postcard **separately** from your NAOMS questionnaire.

THANK YOU!

BUSINESS REPLY LABEL

NASA
NATIONAL AVIATION OPERATIONS
MONITORING SERVICE
P.O. BOX 231
MOFFETT FIELD CA 94035-0057

CATI (Telephone) Mode

- Advance letter
- Call pilots to arrange interview appointment
- Interviewer administers from telephone center
- 10% of interviewer's work is validated
- Questionnaire pre-programmed into computer so data entered immediately--no additional data entry
- CATI has most error checks built into the programs--requires little editing

In-Person Mode

- Advance Letter
- Interviewer calls to schedule appointment
- Interviewer travels to appointment
- Questionnaire conducted face-to-face
- Interviewer returns completed interview to office for editing and data entry
- Due to time and costs, in-person mode was terminated early