NASA FOCUS Lab Operations Manual

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Literature Review

• 70% of all aviation accidents and incidents have occurred due to a breakdown in aviation teams (Hamman, 2004; Helmreich, 2000)

• Two key differences between each aviation discipline that contribute to the breakdown in aviation teams (Hamman, 2004)
  • Physical separation
  • Organizational factors

• Colleges have implemented the use of simulations to bring aviation college students from every discipline together to:
  • Develop effective communication
  • Practice and develop teamwork skills
  • Prevent breakdowns in aviation teams in the future (Bond et al., 2007; Bowers, Rhodenizer, & Salas, 2009; Lateef, 2010).
Literature Review (cont.)

• Simulations are effective, but . . .

• Two major pitfalls of simulations
  • Students engaging in “negative learning” (Bond et al., 2007; Burke & Salas, 2002)
  • Students viewing simulations as unrealistic (Adobor & Daneshfar, 2006)
• Before 2010, MTSU aerospace students were taught in their individual “silos”
Flight Operations Center
Unified Simulation
CRJ-200 Aircraft Simulator
• Simulation of a flight operations center of a regional airline called “Universal E-Lines”

• Teams consist of 10 – 12 senior undergraduate aerospace students from all concentrations

• Students assigned to positions on the team that reflect their aerospace concentration
• Operates 30 CRJ-200s, including the CRJ-200 simulator

• Approximately 80 flights in a 3-hour simulation

• Services 16 airports throughout the southeast region of the United States
  • Includes Nashville, Jacksonville, Atlanta, Knoxville, Miami, Memphis
Operation of the NASA FOCUS Lab

• NASA FOCUS Lab staff implements real-world scenarios ("triggers") that vary in difficulty into a simulation

• Students must coordinate and communicate to resolve the "trigger" as a team

• Triggers must be resolved by a team in a safe, legal, and efficient manner

• NASA FOCUS Lab staff evaluates the "solution"

• Trigger not handled legally, safely, and/or efficiently = downstream consequences
Importance of the NASA FOCUS Lab

• Prepares MTSU’s aerospace students for working in the aviation industry by enhancing their knowledge and skills

• One-of-a-kind simulation

• Plays a significant role in the Aerospace Department’s accreditation

• Helps establish MTSU as an aerospace research institution
The Problem

• 50% of the NASA FOCUS Lab staff is comprised of graduate and undergraduate students who play specific and important roles in the operation of the lab and will be graduating within two years.

• Lack of written informational and procedural documents that explain how to successfully operate the NASA FOCUS Lab.
“NASA FOCUS Lab Operations Manual”
“NASA FOCUS Lab Operations Manual”

- Comprised of six chapters:
  - Chapter I – Background Information
  - Chapter II – NASA FOCUS Lab Startup and Shutdown Procedures
  - Chapter III – Administrative Roles
  - Chapter IV – Troubleshooting Procedures
  - Chapter V – Maintenance on the NASA FOCUS Lab Equipment and Website
  - Chapter VI – NASA FOCUS Lab Terms to Know
Chapter I – Background Information

- Provides information about:
  - Creation of the NASA FOCUS Lab
  - History of the NASA FOCUS Lab
  - Purposes of the NASA FOCUS Lab
  - Importance of the NASA FOCUS Lab
  - Universal E-Lines
    - Overview, values, goals, etc.
Chapter II – NASA FOCUS Lab Startup and Shutdown Procedures

- Provides procedures on how to turn on, prepare, and shut down:
  - Each position’s computer or iPad
  - The NASA FOCUS Lab webcam
  - The NASA FOCUS Lab microphone
  - Computer Sciences Corporation (CSC) equipment
CSC Equipment
Chapter III – Administrative Roles

- Provides procedures on how to perform the tasks required of each NASA FOCUS Lab administrative role
  - NASA FOCUS Lab Administrator
  - Crew Scheduling Coordinator
  - Flight Operations Data (FOD) 2 Coordinator
  - Maintenance Expert
  - Weather Expert
Chapter III – Administrative Roles (cont.)

- Each administrative role is divided into:
  - Overview
  - Quick Guide
  - Duties Required Before the Start of a Simulation
  - Duties Required During a Simulation
  - Duties Required After a Simulation
Chapter IV – Troubleshooting Procedures

- Procedures provided on how to fix the errors that occur on:
  - The NexSim Frasca program (simulation program)
  - Computer Sciences Corporation (CSC) equipment
  - Communication network between the CRJ – 200 simulator and specific positions in the NASA FOCUS Lab
  - Computers
  - Each position’s program
Chapter V – Maintenance on the NASA FOCUS Lab Equipment and Website

• Procedures are given in detail on how to perform maintenance on the:

  • NexSim Frasca program (simulation program)
  • NASA FOCUS Lab PowerPoint
  • Computers
  • Each position’s program
  • NASA FOCUS Lab website
Chapter VI – NASA FOCUS Lab Terms to Know

• Provides specific aviation terms, abbreviations, and acronyms that are used throughout the operations manual

• For example:

  • MEL – Minimum Equipment List
  • DST – Daylight Saving Time
  • Zulu time
Process

• Six methods

1. Institutional Review Board (IRB) approved interview process
2. Personal knowledge and experience
3. Simultaneously recorded and performed procedures
4. Took pictures of three specific procedures
5. Research
6. Weekly meetings with my thesis advisor
Conclusions

The NASA FOCUS Lab Operations Manual will help:

- Sustain the quality of the NASA FOCUS Lab for future MTSU aerospace students
- Prevent critical mistakes from being made by current and future NASA FOCUS Lab staff members
- Provide continuity when the staffing turnover does occur
Questions?