

Cognitive Walkthrough with a Commercial Pilot for Preliminary Single Pilot Operations Experiment

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Introduction

History of the Commercial Cockpit

- 50 years ago – 5 crew members
15x accident versus today
- 1980s – 3 crew members
10x accident rate versus today
- Today – 2 crew members
Highest traffic density
- Future – 1 crew member?

Why a Single Pilot?

- \$\$\$ - Commercial airlines want it
- Changing role of pilots to becoming “monitors”
- Technology has been demonstrated with UAVs

My Task as an Intern

- Work directly with a subject matter expert (commercial pilot) to develop a cognitive walkthrough to examine the specific details of current cockpit verbal and nonverbal communication
- The results of this cognitive walkthrough were decisive in providing information for scenario development in Single Pilot Operations (SPO) studies.



Alignment with NASA Research

How Did I Assist in NASA Research?

My cognitive walkthrough helped to create challenging (computer based) scenarios for trained pilots. These scenarios will be used in an experiment to test cockpit operations in the following 3 conditions:

- Solo
- Beside a co-pilot
- With a co-pilot located in a different room

Purpose

To conduct a semi-structured interview with an experienced commercial and ex-military pilot to gather essential information that will be used in scenario development for future SPO experiments.

Methods

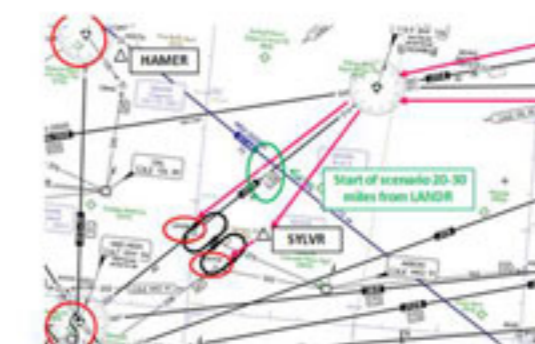
- Semi-structured interview
- Voice recorder
- Scenario Prototype

Example Questions

- For what would you rely on your co-pilot before and after receiving the holding instructions?
- What would be the first thing you would do when the airborne weather system fails?
- What would be your expectations of the ATCs during each phase of flight?

Results

- Prototypical Scenario and flowchart of events created as the basic template for future SPO experimental scenarios in the Flight Deck Display Research Laboratory at Ames
- Identified key verbal and nonverbal communication transference issues from current day to single pilot operations
- Recyclable Cognitive Walkthrough questions created



Future Work

- Perform Cognitive Walkthroughs and Task Analysis with multiple pilots in high-fidelity (777 simulator) and low-fidelity (desktop computers) environments to identify, reduce, and control differences between the two environments
- This will drastically reduce costs and improve efficiency in all future SPO studies