Data Comm Flight Deck Human-in-the-Loop Simulation

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Previous Data Comm Tasks: NASA & Volpe

- Compile flight deck and air-ground Data Comm human factors issues
- Indicate methodologies that might be most appropriate to address issue
- Provide a prioritization of those issues
- Get feedback regarding prioritization of those issues from the FAA's Data Comm Office
- Consider HITL to address flight deck human factors issues

Previous Research/Operational Concerns

- Terminal area use of Data Comm may be required for NextGen clearance types
- Terminal area creates flight crew challenges when using Data Comm
  - Timing concerns for busy phase of flight
  - Heads-down issues
- Message length has been an issue for flight crews in voice and data comm (Lozito et. al, 2004)
- Autoload of data comm messages has indicated some loss of situation awareness (Logsdon et al., 1996)

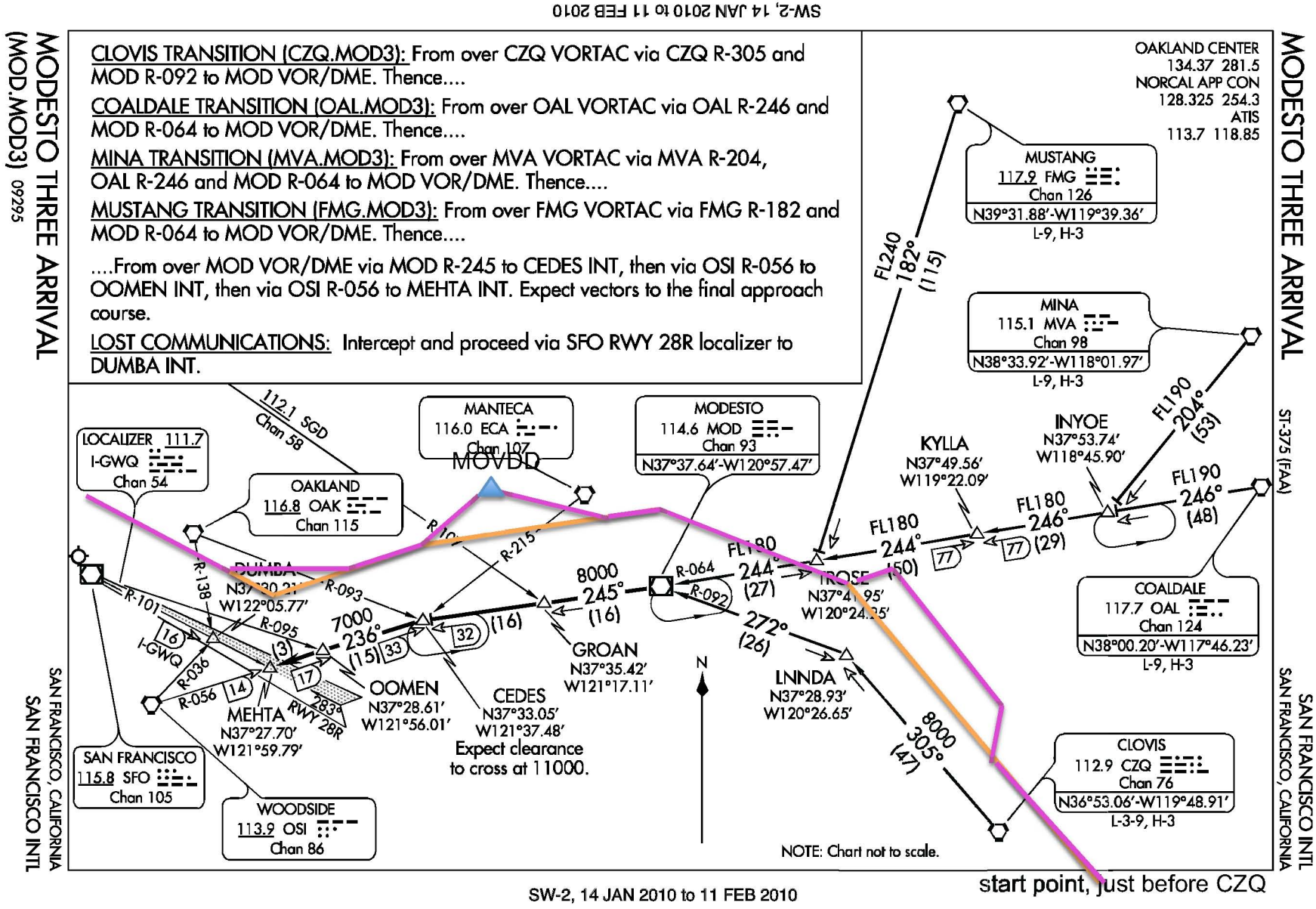
Research Questions

- What are the acknowledgment times and transaction times for the terminal area?
- What is the impact on message timing when comparing two small messages v. a longer concatenated message?
- What is the impact on crew errors (spoken errors and data entry errors) when comparing two small messages v. a longer concatenated message?
- What is the impact on the autoloading of message components when comparing two small messages v. a longer concatenated message?

Methods

- Boeing 747-400 Level D Certified Simulator
- SFO Terminal Airspace
- Current message set
- Participants will be current line pilots (CAs and F/Os)
- Controller as confederate
- Pseudopilot for background chatter
- Data Comm/Voice mix
- Short v. Long messages
- Subset of messages will be autoloadable (mostly route messages)

Example Scenario: Modesto 3 Arrival



start point, just before CZQ

Study Metrics

- Crew acknowledgment time
- Total transaction time
- Errors
  - Acceptance of erroneous clearance
  - Additional crew errors
- ATC queries
  - Voice
  - Data Comm (use of downlink or message log)
- Workload
  - NASA TLX
  - WAK
- Situation Awareness