Practical Considerations in Flight Training Evolution with SATCE

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Intro and Overview:

• Background
• Lessons Learned working with users and test pilots
• Technical challenges of integrating SATCE onto FFS
• Impact and benefits of SATCE system
What is SATCE?

- **Simulated Air Traffic Control Environment**
- “ATC for flight simulators”
- Encompasses interactions between student pilots and simulated controllers
- Also includes radio traffic or other aircraft in the environment
- Level D training without SATCE is sterile, akin to turning off visuals during IFR training
- SATCE can fit into multiple types of training: Ab initio, LOE/LOFT, MPL…
Recent SATCE Integrations

- Several military fixed-wing FFS
- Multiple CH-47 helicopter sims
- Level D FFS
- GA simulator
- A host of FTDs, mostly commercial fixed-wing Boeing and Airbus
- Part Task Trainers and other lower level devices
Lessons Learned

• There is guidance but no official certification method for SATCE
  – ICAO Doc 9625 4th Ed., Appendix A, Section 9
  – ARINC Spec 439A “Guidance for SATCE in FSTDs”
• No baseline of expectations for users (and providers!)
Lessons Learned

• Commands from ATC become can be subject to high subjectivity
  – Varying procedures and localizations that happen across the globe
• What is said and the vectors/routing provided become under interpretation
• Need instructor buy-in from the start
Getting Instructor Buy-In

• SATCE solution needs to:
  – Help the instructor
  – Cope with typical pilot speech and non-standard communication
  – Not require any pilot training beforehand
  – Fit into existing courseware
  – Present a simple interface for the instructor
  – Be repeatable yet dynamic
Dynamic Yet Repeatable

• Repeatable
  – Trainees need to be given consistent instructions
  – Experience cannot vary from pilot to pilot
  – Routing and patterns should be predictable

• Dynamic
  – Environment must correctly react to pilot action
  – E.g. -- if pilot turns too slowly, ATC issues correction to make up the distance and other aircraft must be shifted as a result
  – During approach vectoring and taxiing, small missteps by pilot can impact the whole environment
  – Scripting exactly what ATC should say and when is not realistic
Lessons Learned

• The ATC cannot become a distraction from training or it will be turned off
• Speech recognition is a frequent scapegoat, regardless of cause
• Allow for soft-failure – if student is struggling w/ prompts moving forward is more important
Join Existing Courseware

- Scenario and flight plan tools to help instructors define lessons
- Continuous evolution
  - Data updates
  - New airports and new equipment
  - Updated procedures, especially at large airports
  - New malfunctions and incidents based on real world accidents
Recommendations

• ATC domain is massive, determine what is needed to accomplish training goals
  – SATCE can be on PTT, FTD, and FFS for consistency through the MPL curriculum

• Provide a continuous relationship
  – At the right price

• End user should easily update and change scenarios without paying vendor for custom mods
Integration Challenges

• Communications system
• Generation of traffic and other entities
  – Visual system / Image Generator
  – TCAS
  – ADS-B
• SATCE needs knowledge of ownship (position, heading, transponder, etc…)
• ATIS and weather knowledge
• IOS and instructor tools
• ACARS and NextGen replacements
Integration – Visual System

• Multiple ways to communicate with IG: CIGI, DIS, vendor op codes, via host, etc…

• Different aircraft, different needs:
  – Accurate callsigns, liveries, and flight plans
  – Be able to taxi, takeoff, and land accurately
  – Ground clamping
  – Speed and acceleration by aircraft type

• Elevation modeling can vary from sim to sim, and airport to airport
Integration – Instructors

• Grading of what student said
• Full transcript of flight
• ATC “malfunctions”
• Triggered events like TACS or runway incursion
• Identify common communication issues
  – PTT usage
  – Poor mic handling
Recommendations

• Training centers and sim owners should consider getting SATCE interface up front rather than coming back to OEM for updates

• Be aware that a SATCE system interfaces with many of the simulator sub-systems

• Learn some of the tip/tricks that the military side has developed to deal with traffic and entities
Impacts & Benefits

• Current methods of training provide **variable experience**, some instructors are great at role playing ATC but it is not consistent across the board
• English as a second language students
• Improved comm. skills
• Cognitive loading on pilots more realistic
• Instructor workload reduced
Impacts & Benefits

• Comm. errors can help measure startle and surprise
• Hearing other traffic using perfect phraseology helps reinforce proper standards
• The business case for SATCE
  – How often are new pilots taken off the flight line because of their communication skills?
  – How many accident reports list communication problems?
  – What other hidden costs exist?
Any questions?

SATCE demos available!