Simulated ATC Environments: Reducing Instructor Workload Through Next-Generation Technologies

AKA: *Stop Pretending You're An ATC Controller!*

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01

First A Quick History Lesson

Let's Put It Another Way:

Why Are Our Simulators The Way They Are Today?

A Brief History Of Flight Simulation: Part 1

ASTi

1930 - 1960

A few springs, bits of string, and electric pumps…

Focus on basic aviation skills: The aviator and mechanical integrity of the aircraft were the threat

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A
Brief
History
Of
Flight
Simulation: Part 2

1960 - 1980

Digital computing arrives, modeling fidelity becomes a 'thing'

Focus: Handling mechanical failure of the aircraft and aircraft systems, aircraft handling. For the most part the aircraft was the threat.

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A Brief History Of Flight Simulation: Part 3

1980 ~ now

The introduction of simulator standards (Level D, FTD Level 5, etc) and great leaps in computing technology.

But what has changed inside the box in 40 years?

Focus: Training to task, systematic failures and crew response. But is the aircraft really the threat now?

A Brief History Of Flight Simulation: Part 3.5

Mid-80's ~ now

After the Tenerife airport disaster (1977) significant changes in aviation occurred:
- Crew Resource Management (CRM)
- Global guidance for standard radio phraseology

But… the flight simulator remained virtually unchanged with a focus on training to task

The only tangible difference was the instructor was now required to role-play ATC

A New Dawn Approaches MPL/CBTA/AQP "EBT"

Today and Tomorrow?

New approaches to training:

- Multi-crew Pilot License (ab-initio to right-hand seat)

- AQP

- Competency-Based Training & Assessment

- Evidence-Based Training

Same simulators? Well, sort of…

What Are The Threats Today?

Line Operations Safety Audit (LOSA)

Many of you here will be far more familiar than I with LOSA and what value it brings to your organizations and how it helps you plan training.

However, just in case, LOSA looks at:

- Potential threats to safety;
- How the threats are addressed;
- The errors such threats generate;
- How flight crews manage these errors;
- Specific behaviours that have been known to be associated with accidents and incidents.

What is the #1 threat to operations today?

#1
ATC
(and other traffic)

How Do We Train This?

Today

Currently our simulators implement this…

How Do We Train This?

Today

But our flight crews deal with this!

Why The Empty Road Is Bad?

The human brain can only handle so much stimulus before it reaches saturation

One very experienced pilot I worked with called this "brain space"

If you train in a way that artificially provides the crew with additional brain space, will they react the same way when facing a real-world problem in the aircraft?

At
The
Core...

Simulated ATC Environment (SATCE)

Technology To The Rescue

"First true innovation in flight simulation in 40 years"

What is SATCE?

A System That Adds:
- Gate-to-gate automated ATC controllers
- Other traffic aircraft (visual and radio)

A System That Uses:
- Speaker independent speech recognition
- Aviation English-characterized text-to-speech
- Artificial Intelligence

A System That Provides:
- **Crew immersion**
- **Threat and workload management**
- Encourages correct use of radio phraseology
- **Releases Instructor from role-play tasking**
- Crew competency and evidence scoring

Why
SATCE
For
EBT?

The Core Premise
For
Evidence-Based Training

"Crews should be exposed to a wide variety of situations that may be faced in **line operations**."

Under EBT the following are the competencies that trainees are required to demonstrate and EBT instructor are required to be able to accurately assess:

- Application of procedures;
- Communication;
- Aircraft flight path management, automation;
- Aircraft flight path management, manual control;
- Leadership and teamwork;
- Problem solving and decision making;
- Situation awareness; and,
- Workload management.

Which One Is Closer To Line Operations?

This?

Or this?

Changing Track Momentarily: Recurrent Training Part 1

Let's Consider Costs?

With a recurrent training event (LOE) the curriculum development team must create an ATC script for the duration of the flight, taking into account any contingencies.

Based on one recent customer review, the time (and cost) to generate the ATC script can easily represent **50% of the effort to generate the entire event**

In this case, generating the script included flying an aircraft on a non-revenue flight over the proposed route specifically to validate the ATC script and timing of the radio calls.

Instructor Impact?

Changing Track Momentarily: Recurrent Training Part 2

Training the instructors to execute the script is time consuming.

But more importantly:

*"When running recurrent training in a simulator according to OPC/LPC or EBT, **the entire ATC workload falls on the instructor**, who already has significant tasking focused on observing crew performance. Remembering when to make the ATC calls, ensuring correct phraseology is used and monitoring the crew responses as correct, all contribute as **a distraction to the main function of the Instructor**."*

Part of the problem is that many times the ATC calls the instructor must make are at critical moments during the training exercise, where his attention would be more usefully focused on crew assessment.

The Case For SATCE

- A state of the art SATCE system can generate the entire script for a recurrent training event in a few minutes including diversions and alternate outcomes for SME review

- Specific training outcomes can be added to the ATC "script" as part of the SATCE lesson plan system

- ATC is now consistent for all participants and not reliant on Instructor role-playing ability

- Other traffic in the vicinity of the ownship adds **realism**, **immersion** and **workload** which is now much closer to the real-world

- TCAS and other-traffic related training events become realistic and coherent within the exercise

- Per EBT guidelines, the Instructor can now focus 100% on assessment

Final Thoughts

Some of you are probably sitting there thinking something along the lines of:

"If SATCE is such a critical system, why didn't I have one before now?"

1) The threat environment is changing. Traffic levels are increasing. As we have seen, ATC is now the number 1 threat in the operational environment.

2) Implementing a SATCE system is non-trivial, and in my opinion would have been impossible 10 years prior to now.

3) The regulatory framework doesn't require (or even address) SATCE, so you buy to the regulations, not to safety.

Thank you

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