ATC SIMULATION: A CONTROLLER-LED APPROACH

Does ATC simulation need to be as realistic as possible, with large-scale simulators? Or is it better to be as realistic as necessary, but continually adapted and adjusted around user needs? **Juan Antonio Lombo Moruno** describes a lighter approach to ATC simulation that retains the operational benefits, plus some other benefits.

KEY POINTS

- **Flexibility in simulation design and development is as important as cutting-edge technological features.**
- **ATCOs must be involved in simulation design and development from the beginning to create a system tailored to their actual training needs.**
- **The ATC Training Division at ENAIRE has been responsible for creating a new training system called Gammasim.**
- **Gammasim was designed and developed with and by controllers to provide an easy and flexible software solution to cope with unit training, refresher training, and conversion training remotely, for tower, en-route, and approach simulation environments.**
- **The approach allows adaptation to feedback from all stakeholders.**

One of the challenges for any ANSP in ATC training is to cope with the increasing simulation demand for:

- unit training
- refresher training for ATCOs
- conversion training (new ATC tools, airspace and procedure changes).

Simulation is an essential part of this training. There are benefits for the learning process, before, during and after on-the-job-training (OJT), and it gives students more self-confidence. As an instructor, observing students in simulated conditions means that you can test different scenarios for specific traffic, weather, or special circumstances. Additionally, since the simulator instructor is not responsible for the operational working position in a live traffic situation (unlike the OJTI), it is possible to focus on monitoring competency.

Besides practising ATC technical skills (phraseology, separations, vectors, clearances), ATC simulation is mainly about the non-technical skills, because the key part of the learning process is how we interact with pilots and colleagues. Simulation design needs be able to control the development of training sessions regarding interaction among people (instructors, trainees, and pseudopilots), the definition of exercises, and conditions for adequate observation of trainee competency.

The trouble with ATC simulation systems is that major investments are usually required. This is not only for the acquisition of new devices but also for the technical support needed for maintenance, implementation of new scenarios or features, as well as airspace and procedure updates. Furthermore, when you are dependent on a technological supplier, it is difficult to adapt your system to your evolving needs.

So we must assess the benefits and drawbacks of selecting either a high-fidelity system (full-replica hardware and software), or a flexible software solution. It might be more effective to focus on the objectives by creating a sense of realism, instead of searching for the perfect re-creation of the system hardware and features.

"Controllers led the design and development of the simulator from the outset to create a system that fits their training needs."

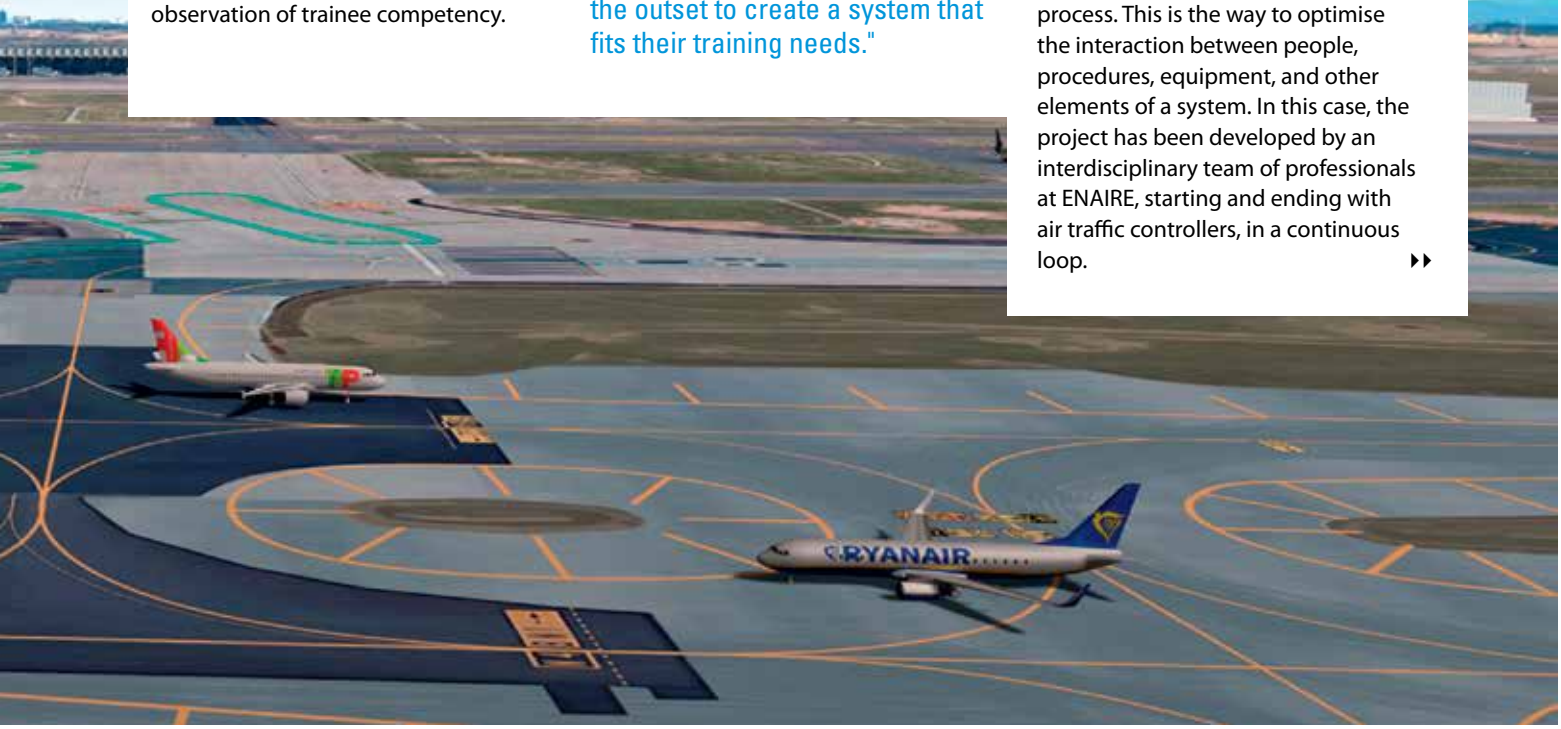
User-led design

ENAIRE has faced the challenge of this increasing demand for simulation from a new perspective: controllers led the design and development of the simulator from the outset to create a system that fits their training needs.

We have started this project with controllers as a cornerstone because they are the ones who really understand:

- the most important aspects of the training objectives
- what actually works at each stage of training
- the necessary features to be developed
- the effectiveness of the exercises
- controllers´ feedback.

Human factors in design (ergonomics) has long emphasised the need for users to be at the centre of a design process. This is the way to optimise the interaction between people, procedures, equipment, and other elements of a system. In this case, the project has been developed by an interdisciplinary team of professionals at ENAIRE, starting and ending with air traffic controllers, in a continuous loop. ▸▸



Gammasim

The ATC Training Division at ENAIRE has been responsible for creating a new training system called Gammasim, where all these concepts have been applied.

The main objectives for the simulator were:

- quality tower, en-route, and approach simulation
- an easy to use and flexible system to cope with training needs
- focus on unit training, refresher training, and conversion training
- software solution, enabling remote use
- quick scenario implementation.

After some months of research and development, Gammasim became a reality. It is currently implemented in several units such as LEMD or LEBL, where it is being used for unit, refresher, and conversion training.

GAMMASIM FEATURES

The main features in the last updated version are:

- easy operation
- controllers and pilots can join the simulation from any location with a computer connected to the web
- one tool serves all ratings: independent or simultaneous tower, approach and en-route simulations
- realistic 3D scenarios based on an efficient development using aerial photographs and animated 3D models of all aircraft types (airliners, general aviation, helicopters, military) and vehicles
- visual effects (engine fire, different weather conditions, propeller movements…)
- virtual tower systems
- electronic flight strips or advanced flight progression management without flight strips
- voice over internet protocol communications
- simulation of degraded modes of operation
- user-friendly pseudopilot interface.

GammaSim

The stakeholders

The system is in a continuous development cycle involving several stakeholders.

This simulator has been developed by controllers with previous computing and engineering experience. The rest of the support team consists of engineers, computing staff and pseudopilots.

The team is located at the headquarters and is led by an operational ATCO who developed the first software version of the simulator. Additional ATCOs are involved in design, exercise development and training management.

Engineers and computing staff are in charge of maintenance, feature updates, scenarios and exercise computing.

Pseudopilots have received training designed by ATCOs, and they are permanently in contact with the development team, influencing the design as users of the system.

ATCOs and instructors are the main users of the tool, and provide feedback to the heads of local training

departments, who send the feedback to the team at HQ, thus closing the loop.

Besides pure training uses, the system can also be used by airspace designers and incident investigation users (ATCOs and engineers), who also give feedback for improvement.

Benefits

By operating the new system, we have achieved the following benefits:

- internal development by ATCOs, engineers, computer staff and virtual pilots
- no external acquisition costs or support contract
- technological autonomy and immediate operational scalability for further development and features
- internal support (maintenance, updates, exercises, scenarios)
- total adaptability and quick response to feedback request
- high performance focused on the controllers' training needs
- additional uses besides training, such as airspace design and incident investigation.

It is widely recognised by controllers as a useful training aid, providing successful operational results, and is economically sustainable.

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INTERLAB: SUPPORTING NON-TECHNICAL SKILLS TRAINING

EUROCONTROL is now able to support training in non-technical skills via a simulation platform called INTERLAB.

The simulation platform is based on an unfamiliar activity so that everyone will be on equal ground. It reproduces the main components of air traffic control and piloting, including communication, team management, task coordination, and workload management. The operational environment is not ATC, but it does include some of the same constraints: complexity, fuzzy data, imperfect procedures, emerging situations, and time pressure.

With the INTERLAB platform, important interpersonal skills are analysed and trained under the various constraints. You and your team work out your own goals, plans, and strategies in a challenging but energising context. Problem solving is improved via multiple perspectives.

The INTERLAB sessions mix simulations with interactive classes, behavioural measurement, feedback sessions, and group discussions. INTERLAB requires a facilitator that acts as a trainer, observer and coach to generate self-reflection and discussion. Through engaging and fun simulations, participants learn about themselves, and how they work in teams.

Mutual trust is exercised and strengthened. Different personalities are integrated. The participants leave the INTERLAB session with field-tested behaviour they can implement immediately in operations

Demonstrations and sessions can be planned in ANSP premises.

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