

eCoach as a Multi-Purpose Tool

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Even though eCoach is an ATC simulator for professional air traffic controller training, the tools included in the eCoach package makes it valuable for a variety of other purposes as well. Any [ANSP](#) will typically face a lot of challenges where eCoach can be of great value in risk reduction and cost savings.



Figure 1: Discussing Airport Operations in Low Visibility

In this e-book, we will present eCoach core concepts and how these can be utilized in unexpected areas, thus providing value far beyond the simulator use.

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Core Concepts

To better understand the remaining chapters, note that eCoach has some core building blocks:

1. Simulator: The eCoach simulator will transform exercise data into radar data streams and other simulated ATC data. The simulator pilot positions can adjust these data streams while the exercise is running.
2. ATC System: The eCoach ATC system will process and present the simulated ATC data coming from the simulator side.
3. 3D Tower presentation: This is an optional add-on to the system, which will also receive the data streams but present them as weather and traffic in a three-dimensional airport model.
4. Designer: This is stand-alone PC software which is not directly involved in the simulator's execution of exercises. It is used to define the aeronautical data (SIDs, STARs, taxiways, and so on) and the exercises to be run with the aeronautical data as environment or "ambient data". The Designer has the components mentioned above built-in, for test and verification of the data produced whether it is aeronautical data or exercises.

For more background information, see our blog article [What is an eCoach ATC Simulator?](#) or download our brochure [eCoach ATC Simulator](#).

The key purpose of this e-book is to show how the building blocks described above can be combined in various ways to support specific use cases. This way, the customer can achieve synergy effects and thus cost and time savings by using eCoach for several related purposes.

Use Cases

A use case in this blog article means a specific example of how eCoach can be used to achieve a goal. The obvious goal would be to educate candidate or certified air traffic controllers, but we will discuss a wide range of other possibilities less thought of. Each of the following chapters can be considered a separate use case. Note the nice side effect that when work is performed to achieve one use case, the outcome can often be used in other use cases for free!

Design New Airspace

For training, it is obvious that the candidate controller needs to train in an environment defined by aeronautical data, usually documented in an Aeronautical Information Package (AIP). However, exercises can be run on environments different from the current AIP.

Use Case Purpose:

- From time to time airspace needs to be adjusted to handle more traffic, deal with new noise restrictions, or for other reasons. eCoach allows such work to be performed at a single office desk, even at home. Simulated traffic can be put on top of the results, for immediate testing.

Input:

- Existing AIP (aeronautical) data, or
- Nothing – in order to produce new aeronautical data using eCoach.

Arrangements:

- One Designer license at an existing or new PC.
- Several large screens – e.g. 27 inches – should be attached to the PC.
- If a laptop is used with a docking station, the work can be performed virtually anywhere.

Work process:

- Import existing aeronautical data in AIXM or another format.
- The eCoach Designer contains a set of tools for efficient creation or adjustment of data.
- Test the results by using existing or new exercises.

Output:

- Adjusted or new aeronautical data.

See also our brochure [Airspace Planner](#).

Discuss Proposed New Airspace

For quality assurance, it is always good to discuss matters in a broader context and with several persons with various backgrounds.

Use Case Purpose:

- Make sure a proposed change in airspace fulfils requirements.

Input:

- New version of aeronautical data (output from Design New Airspace above).
- Specially prepared exercises to highlight various aspects about the new airspace.
- Qualified personnel.

Arrangements:

- One Designer license at an existing or new PC, e. g. bring a laptop to a meeting room or auditorium.
- Connect to a projector (see figure 1 above).

Work process:

- The author of the proposed new airspace starts the eCoach Designer and loads the new airspace while showing the results to the audience via the projector.
- The author starts an exercise to present and explain properties of the new airspace. A lot of tools are available, e.g. using pause/run, changing exercise speed, vectors, maps, zoom/pan, and so on. The traffic in the exercise can be fully automated so no piloting is necessary.
- The group will discuss the properties and possibly find improvements.
- Several exercises highlight different aspects to discuss.

Output:

- Quality controlled aeronautical data.
- A list of action items to follow up.

Test and Verify New Airspace

The eCoach data files (aeronautical data and exercises, ref. the previous use case) can be brought directly to a full-scale eCoach simulator installation where it can be tested. No changes to the files are needed.

Use Case Purpose:

- Make sure a quality controlled change in airspace will work in practice.

Input:

- New version of aeronautical data (output from use case above).
- Specially prepared exercises to highlight various aspects about the new airspace.
- Qualified personnel.

Arrangements:

- Provide training for sim pilots and test controllers so they are aware of the important aspects of the new airspace and the goals to achieve.
- Copy aeronautical files (i.e. eCoach configuration) and exercises directly from the Designer to the full-scale eCoach simulator.
- Run the exercises as regular training sessions, but with special test controller personnel.

Work process:

- Aeronautical data expert(s) can be present in the simulator while the exercises are being run, to verify that the new airspace “behaves” as expected.
- Recordings can be made and brought back to office for further investigations in the Designer.

Output:

- Verified aeronautical data.

Train Controllers in New Airspace

Before new airspace is put into operation, it is necessary to train the operational controllers in the new environment.

Use Case Purpose:

- Ensure smooth transition to new airspace without problems.

Input:

- New version of aeronautical data (output from use case above).
- Specially prepared exercises to highlight various aspects about the new airspace.
- Qualified instructor personnel.
- Controllers that will use the new airspace operationally.

Arrangements:

- Provide training for controllers so they are aware of the important aspects of the new airspace and the goals to achieve.
- Use the eCoach simulator as it was set up for the previous use case.
- Run the exercises as regular training sessions, with controllers as trainees.

Work process:

- Regular simulator training, but with focus on new airspace.

Output:

- Trained controllers, ready to manage air traffic in the new airspace.

Publish New Airspace

There are usually procedures in place for publishing new aeronautical data in a standard official way. However, sometimes it can be wise to go a little further to make sure all aspects and all stakeholders are well taken care of. Some options can be as follows:

- Take screen shots or videos directly from eCoach Designer and publish via the ANSP's web pages, together with other explanatory material.
- Screen dumps of traffic situations including vectors etc. can be included in reports or educational material for illustration.
- Give conference lectures to a larger crowd using eCoach Designer in an auditorium. The presentation can show simulated traffic in the new airspace, to highlight aspects of new traffic patterns etc. The crowd can e.g. be airline company representatives like chief pilots.
- Discuss the new airspace as described above in "Discuss Proposed New Airspace", but this time with a decided airspace and with stake holders as meeting participants.

Investigate Airport Operations

Note that the above use cases together create a workflow, in this case with **new airspace** as a subject:

1. Develop using Designer at a single office desk.
2. Discuss the results using Designer in a meeting room with projector.
3. Test the results using the same files in an eCoach simulator.
4. Train the involved controllers using the same facilities as when testing.
5. Educate the masses by
 - a. Making material public on web – material can be created with the Designer.
 - b. Giving lectures.
 - c. Arranging meetings.

The same workflow can be followed with **airport operations** as subject. The eCoach Designer is used to design new airspace, but also to design an airport with buildings, lighting, parking stands, pushback procedures, taxiways with holding positions, runway entries/exits, and so on. Development or changes to an airport can be subject to the same workflow, where exercises can be made to investigate (i.e. simulate) ground traffic patterns (vehicles and aircraft) under circumstances like:

1. Adjusted procedures for low visibility conditions.
2. Change of speed restrictions and/or spacing on final to achieve optimal ground flow.
3. Parking stands utilization, including pushback procedures and blocking of taxiways.
4. Rush hour conditions with special events happening, like
 - a. Snow removal procedures with convoys.
 - b. Failure in various types of equipment.
5. Introduction of new de-icing platforms.
6. Testing new operational procedures for missed approach.
7. And so on and so on.

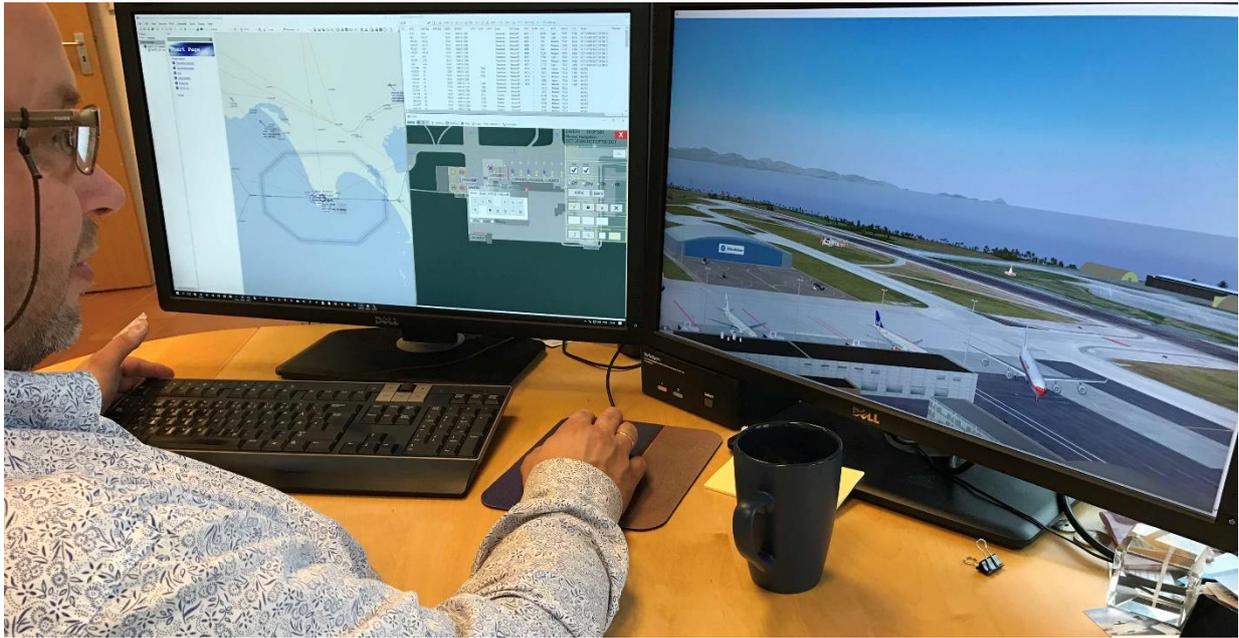


Figure 2: Investigating Airport Operations Using eCoach Designer at Home Office

When selecting cases like the above, a systematic approach should be used. E.g. address the most serious incident reports, the greatest obstacle for airport capacity under various circumstances, the most work intensive circumstances, the currently worst safety hotspots, and try to find ways to make improvements. Then investigate proposed solutions for improvement using eCoach in the workflow described above.

Plan Airport Construction Projects

To build a new airport or make significant changes to an existing one are major undertakings. Risk reduction is imperative. To be able to manage the complexity, the project will often be divided in phases. For each phase, gates are permanently closed or opened, pushback procedures are changed, traffic flows are changed, and so on. These are ideal matters for eCoach:

Use Case Purpose:

- Ensure smooth transition to the airport layout in a new phase of construction.

Input:

- New version of aeronautical data, in this case airport related data.
- Specially prepared exercises to highlight various aspects about the new construction phase.
- Qualified personnel like creators of plans, operations management, project management, controllers currently operational at the airport to change.

Arrangements:

- This use case is applicable like described in the workflow above.
- All phases can be prepared and investigated before the first phase is even started!

Work process:

- Project plans are used as input to a single office desk and converted into eCoach aeronautical data and exercises (see Figure 2).
- Results are discussed in meeting room or auditorium (see Figure 1).
- Most promising plans are further evaluated full scale in an eCoach simulator.
- Project personnel are informed about the plans in meeting room or auditorium (see Figure 1).

Output:

- Maximum risk reduction in the project.
- Input to a variety of reports like safety assessment, risk assessment, financial, timing, operational plans, and so on.
- High level of understanding among the project's stakeholders.

See also our [blog article](#) about this topic.

Classroom Teaching

In previous chapters, we have discussed how eCoach can be used to illuminate various aspects of airport and/or airspace layouts by using a projector in a meeting room or auditorium (see Figure 1). The exact same method can be used for regular teaching purposes.

Use Case Purpose:

- Educate an audience in ATC related matters.

Input:

- Aeronautical data definitions, currently in operation or not.
- Simulator exercises for eCoach.
- The above stored on a laptop with eCoach Designer (see Figure 2).
- Meeting room or auditorium with projector(s).
- Skilled teacher.
- Motivated audience.

Arrangements:

- Connect the laptop to the projector.
- Start eCoach Designer and present exercises with moving traffic exposing key aspects of the subject to teach.

Work process:

- The teacher can pause/run the exercise, change speed, zoom in and out, and so on to highlight key aspects.
- eCoach runs like any other PC program, so other programs are simultaneously available:
 - PowerPoint presentations
 - Web pages
 - Videos
- The teacher can use all available matters to provide a mind-blowing presentation, especially in an advanced auditorium with several projectors available at the same time.

Output:

- Enthusiastic audience with a lot of new knowledge.

Better Utilization of Human Resources

As you might have thought while reading the above, the use of human resources is as low as possible:

1. A single person is working at a flexible location to plan, develop, and test
 - a. Aeronautical data for airspace and/or an airport
 - b. Exercise data containing traffic (aircraft and vehicles), weather, etc.
2. The results can be used without change in a meeting room or an auditorium for discussions. In this case, it is normal to freeze the situation for discussion, run fast to better see the flow, etc.
3. Possibly after adjustments at the office desk, the results can be brought to a full-scale simulator for testing under realistic circumstances. In this case the exercises are run at normal speed from start to end.
4. Recordings can be investigated at the Designer or in the simulator.

To bring the idea of maximum human resources utilization even a step further, two factors are of interest:

1. eCoach Scalability
2. Remote Operations

Scalability

The eCoach system is scalable in several aspects:

1. The Designer is stand-alone, meaning that several people can have an individual license each. Results can be exchanged among the users, allowing work on different aspects at the same time. Obviously, more licenses can be added at any time.
2. The simulator's number of working positions can be expanded at any time. Also, a working position can be used as simulator pilot or controller – this is selectable at any time without any physical change to the position.
3. The 3D presentation part can be completely skipped, or added at various levels:
 - a. To the Designer installation (see Figure 2).
 - b. Using TV screens in horizontal or vertical arrangement, with selectable width (180 – 360 degrees).
 - c. Using projectors in a cylindrical room.
4. A simulator Voice Communication System is an optional component. If included, it provides full radio and telephone capabilities including recording and playback synchronized with the simulated traffic.

For a broader presentation, see for example the brochure “eCoach ATC Simulator” in the [Downloads](#) section at our [website](#).

Of course, several instances of eCoach can be installed at different geographical locations. This will allow each site to perform autonomous work, but it will also allow remote operations:

Remote Operations

In eCoach, both traffic data and voice data can be transmitted over the internet. This allows for specialization and cooperation. For example, consider an ANSP owning the following eCoach equipment:

1. Designer licenses installed on various specialists' job PCs, possibly laptops with docking station both at work and at home office. This would allow less travel to work if admitted by employer. The specialists would be able to cooperate by exchanging eCoach and other types of files, and even run exercises over the internet for discussion purposes.
2. One site has a 2D eCoach installation, for airspace development.
3. Another site has a 3D eCoach installation, for airport development. TV screens are used to limit space need and cost. A certain minimum of 2D working positions are also included.
4. An outsourced training center is available for full-scale simulations. (The center can serve several customers, not only our ANSP.) This center is used for formalized controller training, and verification of solutions developed at the locations mentioned above.

Add the remote operations aspect to this, and a large range of use cases appear:

1. Explore new solutions at the local site, but get help from simulator pilots at the outsourced training center. I.e. run the exercises at the local site, but in the session, talk to the pilots located elsewhere. Observe the traffic at the local simulator.
2. Combine approach/ACC airspace and airport operations into larger scenarios run in concert across the internet.
3. For final, full-scale run, travel to the center. All preparations would already be taken care of simply by sending in eCoach files.
4. And so on.

The idea behind this is to limit travel for valuable human resources. Local equipment availability combined with human specialist resources and more equipment accessible over internet provides maximum flexibility and minimum need to take controllers out of their planned work schedule.

Use an Existing ATC System for Training

One site can obviously have more than one eCoach installation. To elaborate further on the previous chapter: It is possible to connect an eCoach simulator to an existing ATC system. This means that all the above in this document is true, also allowing training or investigations including the same ATC equipment as used operationally or to be deployed.

See our [blog article](#) about this topic.

Select New ATCO Candidates

Finding the right candidates to be air traffic control officers of the future can be a major challenge. Also in this context eCoach can be used.

Use Case Purpose:

- Finding the right candidates for ATCO education.

Input:

- Simulator exercises for eCoach, specially made to expose important candidate capabilities.
- eCoach Designer software installed at a laptop computer.
- A crowd of candidates at some site.
- An ATC specialist acting as sensor.

Arrangements:

- The sensor travels to the site where the crowd of candidates is.
- eCoach is connected to a large screen (e.g. 27 inches).

Work process:

- The sensor gives common information to the crowd, using classroom teaching use case.
- After this, the sensor picks one candidate at the time and starts up an exercise in a separate room.
- The candidate looks at the screen and exposes his skills to the sensor.
- The sensor makes a judgement of the candidate's capabilities.

Output:

- A selected crowd of ATCO candidates, ready to start an education program.

Summary

This e-book is generic and applicable for any ANSP or company dealing with ATC issues. It describes how the various components of eCoach can be used individually or in concert to solve ATC related tasks. Since such tasks are often connected to each other, a workflow is suggested as a pattern to solve different tasks in a common way: Develop, discuss, test, verify, publish and educate.

Hopefully, this e-book helps you to see your challenges in a broader context, where eCoach might help you as well as your colleagues and business partners.

We would very much like to hear about your challenges, and we might be able to help you. If you feel like it, please do send us a few words about your thoughts. If you want price estimates, please include indications about what you want to solve, what equipment you anticipate and in what numbers. We will give you our comments and price estimates without any charges.

For further information and illustrations, please have a look at our [web site](#) including [blog](#) and [downloads](#). Hopefully you will find information that will help you out in your efforts.

About Edda Systems

Edda Systems was established in Norway in 2005 by technical and ATC experts from many years in operational air traffic control. Our eCoach ATC Training Simulator and associated products are in daily use in small to large installations in several parts of the world.



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