In modern airspace systems, serious safety incidents – near mid-air collisions, category A and B runway incursions, dangerous losses of separation and other close calls – are rare and, in their circumstances and causes, often extremely complex. Because of this, it can be difficult for ANSPs to amass datasets of the size and consistency needed to accurately identify the safety issues underlying these types of incidents.

Nevertheless, that is precisely what ANSPs must do to develop thoroughly informed and effective risk mitigation strategies.

In late 2015, at the CANSO Global ATM Safety Conference in Punta Cana, Dominican Republic, a significant step towards addressing this challenge was taken when CANSO officially endorsed a globally harmonised approach to risk analysis. As Steve McMahon, Deputy Vice President for the US Federal Aviation Administration’s (FAA) Safety and Technical Training Service Unit, explains: “Risk analysis processes are important because they allow us to objectively measure, improve and communicate safety performance.”

Based on EUROCONTROL’s Risk Analysis Tool (RAT) and the FAA Risk Analysis Process (RAP) – which are themselves practically identical methodologies – the approach relies on hard data to uncover an incident’s causal and contributory factors and to quantify its level of risk. The RAT/RAP promises not only to help individual ANSPs better understand and address weaknesses in their airspace systems, but to help CANSO do the same at the regional and global levels.

Fine tuning

After more than a decade of development, revision and fine-tuning by some of the best minds at EUROCONTROL and the FAA, the RAT/RAP represents the most sophisticated yet easy-to-use approach to risk analysis available to ANSPs.

Applicable to airborne, surface, and maintenance-related incidents, it brings together two critical elements of risk analysis; subject matter expertise and a systematic scoring tool.

Using the available investigatory materials, a panel of subject matter experts – which can include controllers, pilots, human factors specialists, and other stakeholders – conducts an analysis of the incident. The scoring tool, which is basically a questionnaire with weighted answer fields, guides their analysis.

In its current form, the tool requires only a series of standardised inputs to capture and depict relationships between actions, consequences and risk.

Because different kinds of incidents demand different analysis parameters, EUROCONTROL and the FAA have developed a number of tool interfaces.

- More than one aircraft
- Aircraft-aircraft-tower
- Aircraft with ground movement
- One aircraft
- ATM Specific Occurrence

Incidents involving two or more aircraft (e.g., separation minima infringements); such incidents involve airborne aircraft in airspace with defined separation minima.

Incidents involving an encounter between two aircraft under tower control, including situations in which both aircraft are airborne, both aircraft are on the ground, or one aircraft is airborne and one is on the ground. Any incident involving an active runway is scored using this interface.

Incidents involving an encounter between an aircraft and a vehicle; aircraft could be on the ground or airborne.

Incidents involving only one aircraft (e.g., an airspace infringement, a level bust, a loss of separation with ground and/or obstacles); near-Controlled Flight into Terrain incidents are assessed with this interface.

Incidents involving a technical (maintenance, engineering or other infrastructural) problem that affects the provision of safe air traffic management services.
To encourage as many ANSPs as possible to participate, CANSO has arranged to make the process template and an accessible version of the software tool available to any Member hoping to get started.

The RAT/RAP works by cataloguing each safety incident according to its severity, an evaluation of how close the incident came to becoming an accident, and its likelihood of recurrence. These two dimensions of an incident’s risk are then assigned a quantitative value that, when combined with a descriptive taxonomy, allows analysts to aggregate and compare datasets reflecting similar or related incidents.

The RAT/RAP’s taxonomy is as important as the risk model. Its purpose is to ensure that the incidents under analysis are described according to a uniform system. This ensures the results are organised, searchable and analysable.

For each incident, the panel selects a series of descriptive phrases from a syntactically structured list. These phrases capture the details of the incident and its context. This information is vital to those responsible for developing and implementing appropriate mitigation strategies. The culmination of this approach is a collection of organised, consistent data that can help ANSPs, or indeed any organisation with access to the data, find and prioritise safety issues.

While individual ANSPs are likely to benefit from the data consistency that comes simply from implementing a single, systematic approach to safety analysis, the real potential of the programme hinges on a willingness to share data.

By agreeing to share data, ANSPs stand to dramatically increase the pool of safety data at their disposal and thus improve the soundness of their safety-critical decisions. Sharing the data with CANSO expands that pool even further, opening the possibility of identifying safety issues that arise not only within, but between ANSPs.

“The adoption of the common risk analysis methodology will enable CANSO to transform global air navigation service provision event analysis,” says McMahon. “Over the next two to three years, we will see an entirely new suite of international safety performance metrics and the adoption of programmes similar to the FAA’s Top 5 globally.”

**Consistent data**

Once enough ANSPs opt to share RAT/RAP data, CANSO plans to supplement or replace several of its current safety performance metrics, including its loss of separation metrics and its runway incursion metrics. In both of these areas, the RAT/RAP will provide more refined and consistent data than those currently submitted by ANSPs.

Eventually, RAT/RAP data may also support the development of Safety II metrics, which are intended to measure an airspace system’s ability to conduct operations safely under varying conditions. It will also support the development of new leading indicators and new international safety benchmarks.

The number of RAT/RAP users globally is already impressive, with most of the 41 EUROCONTROL member States, the FAA, Air Traffic and Navigation Services South Africa, Airservices Australia and AirNav Indonesia among the ANSPs using it as their standard method of risk analysis.

As Chumnan Ruechai, Acting Vice President (Office of Safety and Standards), AEROTHAI – one of the most recent adopters of RAT/RAP – remarks: “AEROTHAI sees the RAT/RAP as best practice developed by subject matter experts. The techniques and user-friendly interface offered by the tool are highly valued among our investigation teams, assisting especially in in-depth analysis and the identification of underlying contributing factors. Not only does the tool reinforce the credibility of our investigation process among staff and related stakeholders, but also it makes it possible to benchmark the organisation’s safety performance among CANSO Members.”

**Deeper view**

If ANSPs agree to share their RAT/RAP results with CANSO, the insights and services that CANSO can deliver to all its members is expected to increase significantly. The more expansive the list of participants, the deeper and more thorough the view of global aviation safety the RAT/RAP can provide.

Of course, CANSO understands that not all ANSPs will have the personnel or fiscal resources to implement a fully-fledged version of the RAT/RAP. In an effort to encourage as many ANSPs as possible to participate, CANSO has arranged to make the process template and an accessible version of the software tool (e-tokai.net) available to any Member hoping to get started.

CANSO recommends that members begin by evaluating airborne loss of separation events and, as they become more familiar with the process, gradually expand their efforts to include surface events and technical failures. It should also be noted that more experienced ANSPs may be available to provide guidance, where needed, to those just starting with the RAT/RAP (see contact details below).

Throughout Europe and at select ANSPs worldwide, the RAT/RAP has already proved a highly effective means of generating the broad, objective datasets needed to make smart safety decisions.

With this endorsement, CANSO hopes that many more ANSPs will adopt the RAT/RAP and reap the benefits. As the preferred method of risk assessment, the RAT/RAP represents an important step forward in shaping global safety standards and enhancing collaboration among ANSPs around the world.

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