Aena efficiently manages 48 airports through a Network Management Centre designed and delivered by Indra

The operation of 48 airports with 2.5 million operations per year and serving as main access to Europe from Central and South America has been streamlined and simplified thanks to the Network Management Centre.

A countrywide airport network would process millions of operations every year, most of them following recurring flight schedules. Several stakeholders participate heavily in this process: Airports, Airlines, Ground Handlers, Air Traffic Control, Meteorology and Flow Management Control. Other stakeholders are only involved occasionally: Media, Civil Aviation, Government Ministries or Emergency Services.

Each stakeholder is an independent agent, each seeking to maximise profit through a different set of resources not necessarily shared. Every agent relies on a different set of data, has a different worldview and holds a different set of assumptions and objectives. In short, they do not share the same point of view.

But there’s something they all have in common: each and every agent can be the cause of a delay which will affect other agents, ultimately degrading the efficiency of the airport network.

Delays begin in a single operation at a specific airport, but they can quickly propagate through the network. The “butterfly effect” of unpredictable outcomes increases the potential of dire consequences, especially if there are bottlenecks present in the system.

Consequences will be most manageable depending on the visibility of the whole system to the operational managers of the various stakeholders. People, infrastructures and systems must be carefully aligned to deliver and display the right information on time to generate an effective response. A set of operating procedures have to be designed for the NMC and the related control centres.

The main objective of a Network Management Centre is to coordinate a whole network of interdependent airports with the provision of holistic real-time vision.

Improving the operational efficiency through a centralised, global approach such as the NMC, greatly outperforms any performance enhancement achieved through the improvement of the individual system components. The NMC provides key performance indicators to measure the benefits.

The Network Management Centre collects data from all available connected systems, spanning the operations of the whole set of stakeholders. This permits every level of detail to be examined, from the big picture to a specific event. At the same time, all the relevant information is provided to affected stakeholders, assisting and aligning them in order to manage a specific event before it gets out of hand.

The NMC is also responsible for supporting the Crisis Management Team shall the situation require it.

Aena’s Network Management Centre’s design revolves around two main rooms: the operations room and the crisis room. The systems provided included an Events Management System, the Flight Monitoring System as well as the management of historic information and the communication network underpinning all systems.

CASE STUDY

**The Aena Network** includes 48 airports of different sizes, in two continents, moving 203 million passengers and 2.4 million operations in 2008. Aena is one of the five leading flight service providers in Europe with over two million controlled flights per year in 7 control centres and 3 FIRs.

**Aena’s NMC** is the first Management Centre dedicated to coordinating a network of Airports. Its main functions are to provide a single holistic vision of flight operations, also detecting and managing incidents, taking corrective actions following defined and optimised procedures.

Aena’s NMC is the first Management Centre dedicated to coordinating a network of Airports. Its main functions are to provide a single holistic vision of flight operations, also detecting and managing incidents, taking corrective actions following defined and optimised procedures.

Aena’s NMC is the first Management Centre dedicated to coordinating a network of Airports. Its main functions are to provide a single holistic vision of flight operations, also detecting and managing incidents, taking corrective actions following defined and optimised procedures.

Aena’s NMC is the first Management Centre dedicated to coordinating a network of Airports. Its main functions are to provide a single holistic vision of flight operations, also detecting and managing incidents, taking corrective actions following defined and optimised procedures.

Aena’s NMC is the first Management Centre dedicated to coordinating a network of Airports. Its main functions are to provide a single holistic vision of flight operations, also detecting and managing incidents, taking corrective actions following defined and optimised procedures.
Aena’s Network Management Centre includes an Operations Room with control positions and a Crisis Management Room as well as additional services and technical support positions.

The NMC collects operational information from many different information systems, whether internal - such as Flight Plans and Slot Management, AODBs, RMSs and Aeronautical Information Services - or external - such as Weather Information, Aircraft registrations and Flow Management notifications.

The operational procedures were defined with the airport and ATM processes in mind, putting into place the mechanisms to ensure that every event would have an unambiguously defined response.

The Operations Real Time Monitoring System is an information system built into the NMC which follows the whole airplane processes end-to-end.

The FMS is continuously tracking all the operations in the network and comparing estimated with actual times. If an event is detected, the system is able to assess the consequences of the downstream propagation of the event, issuing an early warning and suggesting courses of action. The traffic prognosis is consistently improved. The system builds from previous experiences improving its predictive capability.

The system is also capable to efficiently propagate the event information to the affected parties. No communication between them is necessary as the NMC acts as a central hub that keeps them all instantaneously updated with the right information. Laborious efforts to manually update the stakeholders are fully avoided, and thus costs are lowered.

Operational delay reporting helps stop delay propagation and allows us to reuse resources to make up for other previously delayed operation cancelling its impact or even to advance another operation before its scheduled time, again freeing resources.

The usage of resources and overall capacity are optimised as rescheduled sequences have a reduced impact on the whole system. The available capacity is thus more efficiently used. The constraints are better managed as punctuality improves.

The Incident Management System provides an up-to-date database containing all incidents occurred in the network. Whenever an incident happens it is automatically reported to the NMC. There the “emergency level” is evaluated and corrective actions are taken. If necessary, the Crisis Management Team is summoned. Within the NMC they will access a wealth of information enabling evidence-based crisis management.

Events are not seen and classified locally but from a global perspective. Multiple reporting of the same event is avoided generating a single official report.

The NMC provides Aena with a streamlined and integrated vision of what’s happening in its airport network, offering top management and stakeholders performance indicators, live dashboards and reports on the health of the network.

Results from actions taken can be monitored, constraints and bottlenecks can be tracked and preventive actions can be taken in advance.

Benefits for airports:
- Minimising the impact of changes to third parties.
- Real time scheduling gets closer to planned schedule.

Benefits for air navigation:
- Maximum usage of existing capacity.
- Reutilisation of last-minute unused capacity.
- Real-time changes in sequencing without loss of units or safety.
- Better congestion planning and management.

Benefits for airlines & handlers:
- Capacity to recover time in unpunctual situations.
- More efficient usage of fleet and resources, protecting rotations.

Benefits for the airport network manager:
- Visualising indicators and status in real time.
- Bottlenecks identification and management.
- Information-based crisis and emergency management.
- More accurate forecasting of future resource needs.
- Overall, a better service to all stakeholders and an increased ability to prove the value generated by the network management of the airports.

Readym for the future:
- Indra’s design is ready to evolve to future E.U. SESAR and U.S. NextGen requirements, supporting Layered Planning Process, SVIM, CDM, new navigation procedures, Network Operations Plan and their new end-to-end integrated operational indicators.