A single platform for network planning

The SAAM & NEVAC tools were merged into a single stand-alone desktop application, called NEST, used by the EUROCONTROL Network Manager and national Air Navigation Service Providers (ANSPs) for airspace structure design and development, for capacity planning and post operations analysis, for strategic traffic flow organisation, for scenario preparation for fast and real-time simulation and for ad-hoc studies at local and network level.

NEST offers an intuitive, planner-orientated interface with a low barrier to entry for new users. It is a powerful scenario-based modelling engine, capable of running a broad range of complex, operationally-relevant analysis and optimisation functionalities.

NEST can be used locally at the level of Area Control Centres (ACC) or airports and also globally for strategic planning at network level. NEST can process and consolidate large quantities of data spanning multiple years, but also allows the user to drill down into the detail and analyse and observe 10-minute periods of data.

Default datasets for NEST: consolidated pan-European airspace and route network, traffic demand and distribution as well as STATFOR traffic forecasts are provided by EUROCONTROL at the end of each AIRAC cycle. All this data can be downloaded from the Demand Data Repository (DDR) web site.

Modelling

NEST is scenario based: users can make changes to the original dataset or reference scenario to model an unlimited number of different operational planning options. Future projects can be selected and combined as required using the layer system.

- Traffic demand can be based on past data, or increased according to the selected traffic forecast.
- 4D trajectories can reflect actual flight trajectories, or be regenerated on customised route networks, according to shortest, cheapest or optimum routeings.
- 3D airspaces, sector capacities and configurations, as well as the route network, restrictions, and flight level constraints can be edited.
- Impacts of airspace changes on sector capacities can be estimated using built-in workload calculations.
- Traffic volumes monitored for regulation can be refined by adjusting captured flows.
- The number of available controllers can be adjusted to model scenarios such as degraded operations at reduced capacity.
- NEST can optimise opening schemes according to available resources
- NEST can identify bottlenecks and the related causes. Solutions can then be proposed and evaluated.
- NEST can model free route operations in a given area and analyse the possible benefit.
Simulation algorithms

**Future traffic samples**  
NEST can generate future traffic samples using traffic growth forecasts provided by STATFOR. Airport capacities and curfews can be used to constrain traffic growth.

**4D traffic distribution**  
NEST can calculate 4D flight trajectories for a given route network, taking into account aircraft performance data, route restrictions and flight level constraints, SID & STAR and military area opening times. The traffic can be distributed via shortest, cheapest (using route charges) or optimum (using overloads) routes.

**Configuration optimiser**  
NEST can propose an optimum operational opening scheme according to controller availability, sector configurations and sector/TV capacities. The model balances working time and overloads, based on a customisable optimisation strategy.

**Regulation builder**  
NEST automatically calculates the period and capacity required to smooth detected overloads. The model can be customised to mimic operational behaviours.

**Delay simulation**  
NEST can calculate ATFM delays over an entire day for any scenario, taking into account the network effect.

Analysis

**Queries**  
Traffic queries allow users to capture and visualise 4D trajectories according to various filters, including departure/arrival airport, navigation points, route segments, crossed sectors, aircraft operator and aircraft type.

**Charts**  
Graphs can be generated to illustrate and compare airspace loads, entry rates, occupancy counts, conflicts, traffic mix, complexity, saturation, overload, delays etc.

**Performance indicators**  
Global indicators including route length extension for flight efficiency, fuel consumption, capacity baselines, ATFM delay, route charges, CO$_2$ and NOx emissions can be evaluated individually or combined to provide composite indicators. Large quantities of data spanning multiple years can be evaluated, allowing users to detect trends or carry out detailed analysis.
Reports
All analysis data can be exported in the form of customised reports which can also be fed into external tools or templates for further analysis. NEST is provided with ready-to-use study templates and can automate frequently used tasks and dynamically create new data computing activities.

Analysis tools
- 3D density cells can be displayed on the 3D map
- Network effects can be analysed when restrictions or regulations are applied locally

Visualisation / Presentation
NEST provides a suite of data visualisation features including tables, charts and fully integrated capabilities for creating 2D/3D presentations and 4D time-based animations. A “real 3D” stereo mode is also provided for use with stereoscopic technologies (polarised screen and glasses).

Customised movies can be recorded, including titles, labels, bitmaps, airspace, traffic pictures and time-based animations. The result can also be presented or recorded in standard “avi” format.

Import / Export
Scenario data can be exported as a single excel file or multiple text files: any changes made to these files in external editors can be easily imported back into the current scenario.

Alternatively, changes can be made to an individual scenario by importing data directly from another scenario, allowing changes to be copied onto new datasets as they become available.

Data can be exported in a range of formats for external simulators such as RAMS and IPAS.

Use case overview
- Free Route Concept
- Flexible Use of Airspace (FUA)
- Terminal Airspace development
- Strategic network operations planning
- Functional Airspace Block (FAB) studies
- London Olympics, Football championships and other major events
- Network operations contingency plans
- Development of new versions of the ATS route network
- European Capacity Planning Process at local and network level
- Fast and real time simulation scenario preparation
- Pre-validation of some SESAR Concepts
- Environment studies for the European Commission
Further information

contact
NEST@eurocontrol.int

Network Management
Razvan Bucuroiu
Head of Operations Planning
Tel: + 32 2 729 36 48
Razvan.bucuroiu@eurocontrol.int

Thierry Champougny
OPS Performance Plan
Tel: +32 2 729 33 93
Thierry.champougny@eurocontrol.int

Stephanie Vincent
OPS Performance Plan
Tel: +32 2 729 34 07
Stephanie.vincent@eurocontrol.int

Vincent Martin
Technical Manager of NEST Development
Tel: +32 2 729 31 74
Vincent.martin@eurocontrol.int

Links:
www.eurocontrol.int/ddr
www.eurocontrol.int/airspace
www.eurocontrol.int/capacity