SIP/2004-WP22
Business case

INTERNATIONAL CIVIL AVIATION ORGANIZATION

MIDDLE EAST OFFICE

ICAO SPECIAL IMPLEMENTATION PROJECT (SIP)

WORKSHOP ON THE DEVELOPMENT OF BUSINESS CASE FOR THE IMPLEMENTATION OF CNS/ATM SYSTEMS

(CAIRO, 6 − 9 SEPTEMBER 2004)

BUSINESS CASE SOFTWARE

BRIEF DESCRIPTION

August 26, 2004

SOFTWARE DESCRIPTION

The CNS/ATM Database and Financial Analysis Computer System (DFACS) allows the air navigation services provider (ANSP) and the airspace users to evaluate and compare the various CNS/ATM implementation options from a financial perspective.

Main Modules

DFACS has four main modules:

1. The database manager
2. The Scenario manager
3. The integrated analysis
4. The report and chart manager

The first three modules have been developed but need to be tested and validated. The report and chart manager has yet to be developed.

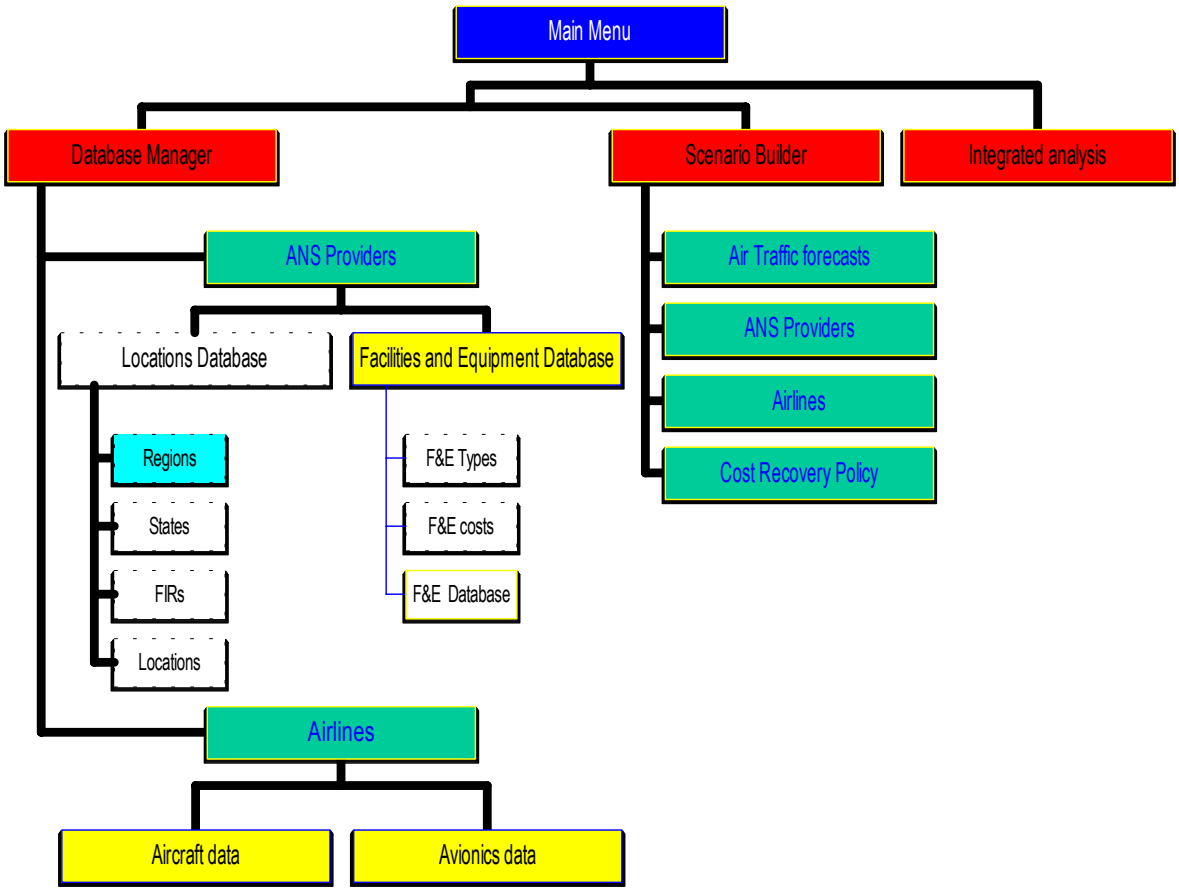

Figure: DFACS menu structure

The database manager

The database manager module helps the software user manage the data required for the construction and evaluation of CNS/ATM implementation scenarios. The data is classified into three segments:

1. The air navigation service provider
2. The airspace users
3. Air traffic forecasts

The air navigation service provider data

The data associated with the air navigation service provider is classified into two categories:

1. The locations data:
   - Regions
   - States with the corresponding region
   - FIRs with the corresponding States(s) and region
   - Locations (from the ICAO location indicator database) with the corresponding State or FIR.

2. The facilities and equipment data:
   - Facilities and equipment types (VOR, DME, PSR, etc.)
   - Facilities and equipment costs (acquisition, installation, maintenance and inspection, communication).
   - Facilities and equipment database: for each location, the list of all the facilities and equipment.

The airspace users

The data associated with the airspace users is also classified into two categories:

1. The aircraft and traffic data: contains the base year traffic by aircraft type in terms of aircraft numbers, movements and hours flown as well the average aircraft operating cost per hour.
2. The avionics data: contains the list of avionics with their associated costs (acquisition, installation, maintenance, telecommunication).

Air traffic forecasts

Air traffic forecasts are prepared separately (DFACS does not include a traffic forecast module), but have to be input to DFACS. The forecasts should be provided in the form of annual growth rates of aircraft numbers (fleet), movements and hours flown by aircraft type and by timeframe (begin year and end year). The analysis period can be divided into multiple timeframes (which can be of one year or more).

The Scenario manager

A scenario is composed of a set of decisions that the CNS/ATM systems implementation planner makes. The software user can create as many scenarios as he wants. There is no limit to number of scenarios he can create, except that of the storage capacity.

A scenario includes the selection of a homogeneous ATM area, the current (conventional technology) equipment covered, the ANSP and airspace user implementation parameters, the flight efficiency assumptions, the cost recovery policy parameters and the ANSP planning decisions concerning the current (conventional technology) equipment and the new technology equipment.

Selection of a homogeneous ATM area and the current equipment covered

A homogeneous area can be a State, several States, a region or the whole world. The scenario may cover all the current (conventional technology equipment), the navigation equipment only, the communications equipment only, the surveillance equipment only, or even an equipment type or a set of equipment types.

ANSP implementation parameters

These parameters define period covered by the analysis, the date on which CNS/ATM is expected to be operational, the transition period, the default equipment life cycle to be used in case the life cycle is not provided in the equipment database, the maximum stretching period (the maximum period during which an equipment can be used without refurbishment after the end of its life cycle), the maximum refurbishment period (the maximum period an equipment can be used after refurbishment), the default installation date to be used in case an equipment installation date is not provided, the discount rate (the rate to be used in the determination of the NPV of cash flows).

Airspace user implementation parameters

These parameters include the begin date and end date of CNS/ATM avionics implementation by the airspace users, as well the method to be adopted in the determination of an annual implementation rate. The implementation can be uniform (each year an equal proportion of aircraft is equipped and at the end of the implementation period, the total fleet is equipped).

Flight efficiency assumptions

The implementation of CNS/ATM systems will lead to a reduction in airspace users flight time through the provision of more direct routes. The reduction however might not be constant over the implementation period. The reduction rate (in per cent) is therefore provided with a begin date and an end date.

Cost recovery policy parameters

The ANSP has to choose the cost recovery policy parameters which include a begin date, an end date, a targeted profit margin as well as the cost of capital to be applied. These parameters are needed for the calculation of the user fees required to cover the costs incurred by the ANSP in the implementation of CNS/ATM systems.

ANSP planning decisions concerning the current (conventional technology) equipment

Based on the selected homogeneous ATM area and current equipment covered by the scenario, a list of all such equipment within the homogeneous ATM area is made by the software. For each equipment, the ANSP planner has the following options:

- Replace at the end of life cycle
- Keep with refurbishment until CNS/ATM is implemented
- Don't replace at the end of life cycle
- Don't include in the analysis.

An option has to be assigned to each equipment in the list.

ANSP planning decisions concerning the new technology equipment

The ANSP planner has also to make decisions on the new technology to be implemented. For each equipment, he has to specify the location and the installation date.

The Integrated Analysis

The integrated analysis is carried out for a scenario and covers the revenues and expenditures cash flows associated with the implementation of CNS/ATM systems for both the air navigation service provider and the airspace users. The output of this analysis is the following:

- Expenditures cash flows
- Revenues cash flows
- Net Present Value (NPV) of cash flows
- Benefit to Cost ratio
- Pay-back period
- Net return

Some charts are also provided:

Total

- Traffic growth
- Total ANSP expenditures
    - Communications costs
    - Navigation costs
    - Surveillance costs
    - ATM costs

- Total Airspace users' expenditures
    - Communications costs
    - Navigation costs
    - Surveillance costs
    - ATM costs
- Total ANSP revenues
- Airspace user efficiency benefits

By location

- Communications costs
- Navigation costs
- Surveillance costs
- ATM costs

The report and chart manager

The report and chart manager or generator should allow the user to produce reports and charts using date from the locations and equipment database, from the scenarios database and from the output of the integrated analysis.

The following reports are suggested:

1. The list of current technology equipment by location, by FIR, by State and by region.
2. The list of equipment types and their associated costs
3. Summary of the traffic forecasts
4. Summary of the analysis default parameters
5. List of the scenarios created by the software user
6. Scenario detailed definition/description (by scenario)
7. Detailed yearly expenditures (by location and by equipment type) for the air navigation service provider
8. Detailed yearly revenues for the air navigation service provider
9. Detailed yearly expenditures for the airspace users
10. Detailed yearly revenues for the airspace users

The following charts are also suggested:

1. Chart illustrating the traffic forecasts in terms of aircraft movements and flight hours;
2. Chart illustrating airspace user benefits in terms of flight time reduction in terms of hours saved and in monetary terms
3. Chart illustrating airspace users expenditures
4. Chart illustrating air navigation services providers expenditures
5. Chart illustrating air navigation services providers revenues

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