PLAN OF THE PRESENTATION

- Tools used at the EEC for modelling
- ATM Master plan and work program
- New organization for ERC
- Future needs per Research area
- Conclusions
EEC modelling in the following domains
- ATM, En route then TMA
- ATM + Airport
- ATM + Airport + ATFM
- ATM + Airport + ATFM + Environment

Short/medium term objectives

Orientated to evaluation and implementation
- Organizational type simulation studies
- Some new concept/tools simulations
MODELLING TOOLS

- **RAMS, CAPAN**
  - Airspace analysis, controller workload analysis
- **SIMMOD**
  - Airport modelling, not supported at the EEC from 2001
- **TAAM**
  - Airport and terminal airspace modelling (from 2000)
- **AMOC, COSAAC, WOODSTOCK**
  - Capacity planning, Air traffic flow management analysis, complexity assessment and benchmarking
- **LMI-Net, PAMELA**: Economic analysis
- **ENHANCE**
  - Environmental studies
Work program divided into

- 3 main threads supporting the European Master Plan derived from ACARE and other EC initiatives
  - Sector Safety and Productivity
  - Network, Capacity and Demand
  - Airport throughput
- Two other Research activities
  - Safety, Society, Economy
  - Innovative Research
- Two key elements of methodology
  - Safety
  - Validation
Sector Safety and Productivity (SSP Research area)

- Delivers integrated packages of elements according to the master plan timeframes. In terms of …
  - Detailed operational scenario
    - Prototypes and demonstrators
  - Validation (safety, economics etc)
    - Modelling -> Hum in loop -> RT sim -> pre-op trials
- Sector Package 1
  - ASAS package 1, basic data link, arrival management, conflict detection and resolution
- Sector package 2
  - ASAS package 2, advanced datalink, departure management
Network Capacity and Demand, NCD Research area

- Three major areas:
  - Airspace Management: Optimised route network, Functional Blocks of Airspace,
  - Network Management: optimisation of the traffic flow management in Europe using better interoperability of systems, implementation of a more stringent Flow Management (contracts between Central Flow Management Unit and Airlines),
  - Tactical Traffic Management: to implement on a European basis Traffic optimisation measures (Traffic balancing on alternate routes, Sequencing of flows between Control centres,…), using better Air/Ground interoperability.
Airport throughput APT Research area

- Will concentrate on the capacity issues facing Airports and their immediate environments.

- Five main areas
  - Airspace issues
  - Runway utilization
  - Ground movements
  - Landside items
  - Collaborative airport
◆ Innovative R&D **INO** Research area
  ➔ To resuscitate Innovation in the European ATM R&D
  ➔ To assess the possible use in ATM of emergent technologies
  ➔ To propose innovative concepts for ATM.

◆ **Society Society Economy SSE** Research area
  ➔ Understanding Society’s expectations and concerns (trade-offs between safety, environment, economic development and cost),
  ➔ Economic behaviour of transport actors (Airlines, ATSP, Airports, Passengers).
ERC Organisation

Centres of Expertise

Business Areas/Enablers

- Sector Safety and Productivity
- Network Capacity
- Airport Throughput
- Society
- Innovative R&D
- EATMP Reference Industry-based ATM
- Simulation and Trials Platform
- Finance and Project Support
- Infrastructure
- Information Technology
- Human Resources
- Communication

ATM and CNS
- Systems Engineering
- Analysis and Scientific Integration
- Operational Services
- Simulation Facility Management
- Finance, infrastructure, personnel providers

BADA
- Safety Validation
- Human Factors Laboratory
- Software Engineering Unit
- Outsourcing
- ATM Familiarisation
- Simulation exploitation
- Values

Core
- Business Manager

Support
- Business Manager

Director
◆ Consolidation of current tools into a homogeneous framework
◆ SSP needs a full set of facilities from models though to pre-operational real-time platforms.
◆ Modeling
  ➔ Representation of all systems components (A/0, Ground, ATFM, ATC, Pilot, ATCO, ACAS), but focused to sector elements (<20mins).
  ➔ Ability to model control/feedback loops and element interactions.
  ➔ Ability to model new/legacy functions and scenarios
  ➔ Ability to measure/compare performance in terms of capacity, safety, economics – including risk modeling.
◆ Level of modelling
  ➔ Detailed control theory modelling
  ➔ Scenario modelling
  ➔ Sector performance overview (safety, economics, capacity)
Consolidation of current tools in an homogeneous framework

Needs for advanced modeling (rather than simulators)

- Representation of all systems components (A/0, Ground, ATFM, ATC, Pilot, ATCO)
- Ability to model new concepts/functions
- Taking constraints into account (economic behavior, …)

Level of modeling

- Macroscopic
- Region Wide
Needs of advanced modeling of:

- Airspace, runway utilization
  - Terminal airspace, Landing/Departure procedures, accurate aircraft behavior on trajectories
- Ground Movements
- Landside
- Collaborative Airport
- Meteorology
  - Nowcast
- Global Efficiency of the airport
MODELLING NEEDS FOR SSE
Safety Society Economy

- Needs to model precise aircraft behavior
  - high number of representative aircraft/models with precise engine fit
  - possibility to represent different aircraft configurations (flaps, gear,...)

- Simulation of ground movements to/from stands included

- Output 4d radar-like trajectories with high time resolution

- Such modeling capability could be interfaced with our existing models:
  - ENHANCE European Harmonised Aircraft Noise Contour Modelling Environment
  - ALAQS Air Local Air Quality Service
  - STBEC SOURDINE II Thrust Based Emissions Calculator
  - AEM
MODELLING NEEDS FOR INO

- Short reaction for a new development
- Ability to model new concepts/functions
- Flexibility
CONCLUSIONS

- Need for advanced modelling
- Major requirement flexibility
- Macro and Microscopic levels
- ERC in a transition phase
- Strategy to be developed