



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





MODELLING FROM EEC TO ERC

- ◆ 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





TRANSITION IN 2003 FROM EEC TO ERC

- ◆ 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.



ATM Master Plan...

- ◆ 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

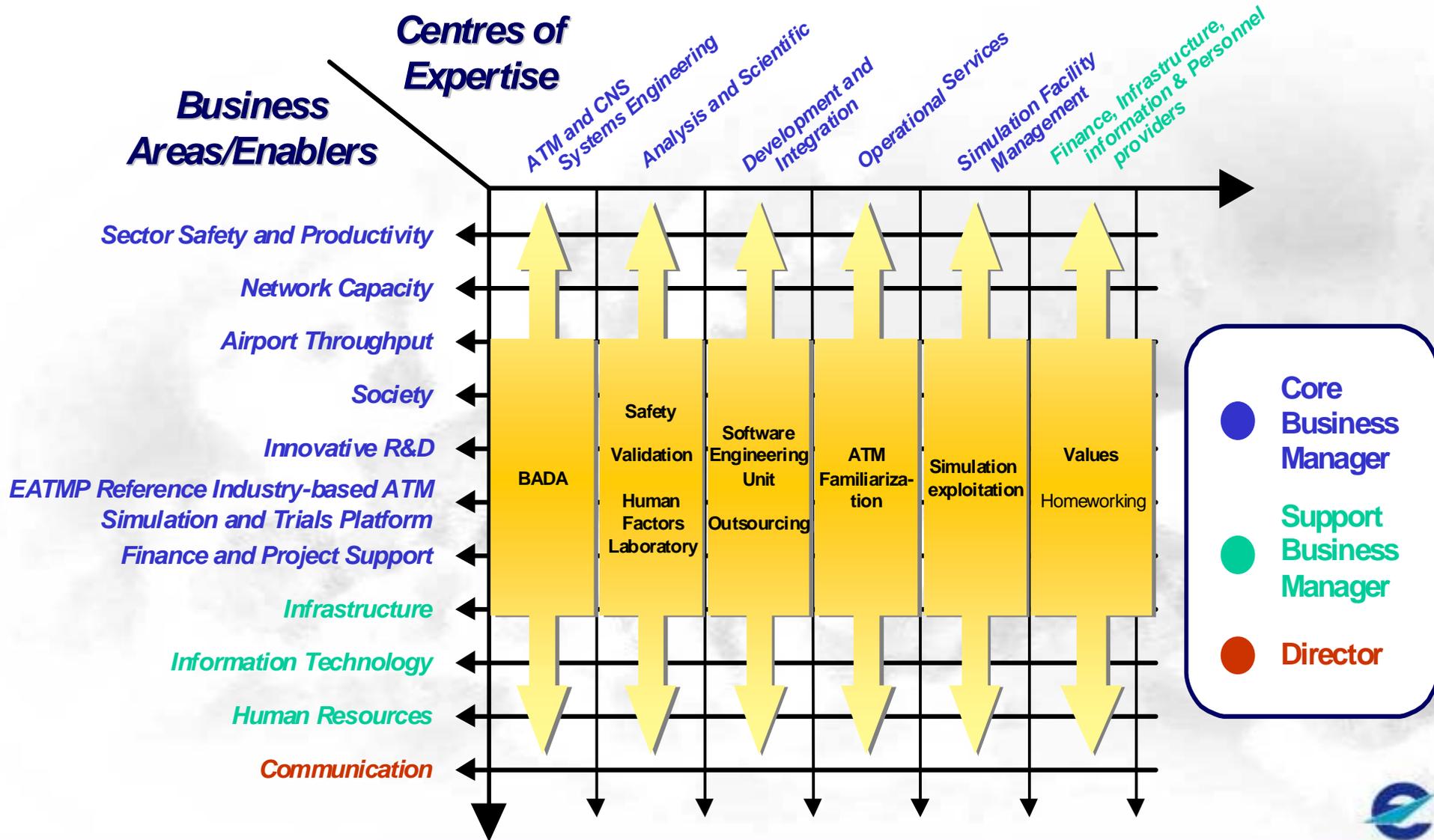
- To resuscitate Innovation in the European ATM R&D
- To assess the possible use in ATM of emergent technologies
- To propose innovative concepts for ATM.

◆ 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



- ◆ 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/O, 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)



MODELLING NEEDS FOR NCD

Network Capacity and Demand

- ◆ Consolidation of current tools in an homogeneous framework
- ◆ Needs for advanced modeling (rather than simulators)
 - Representation of all systems components (A/O, Ground, ATFM, ATC, Pilot, ATCO)
 - Ability to model new concepts/functions
 - Taking constraints into account (economic behavior, ...)
- ◆ Level of modeling
 - Macroscopic
 - Region Wide





MODELLING NEEDS FOR APT

Airport Throughput

- ◆ 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

