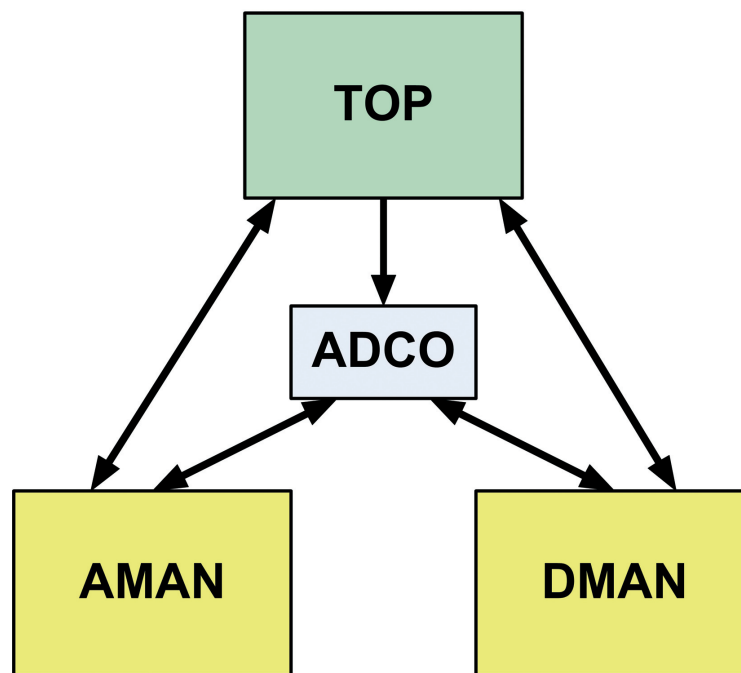


Layered Planning for Total Airport Management

Total Airport Management (TAM) is a vision for the integrated airport management of the future. It transforms the airport into a performance based node of the air transport network. Airside and landside operations are pro-actively managed based on a dynamic Airport Operations Plan (AOP) with a tactical to strategic look-ahead horizon. The AOP is jointly created and adapted within the Airport Operations Control Centre (APOC) by airport stakeholder agents under full awareness of airline priorities and constraints. TAM is integrating existing approaches like Airport-CDM, xMAN and A-SMGCS into one holistic concept.



Layered Planning is the approach to a modular, scalable Total Airport Management. The core is the Airport Operations Plan (AOP), which comprises Performance Targets, Flow Targets, Resource and Flight Event Target Times and Static and Dynamic Constraints. The AOP is generated by the Airport Stakeholders jointly in Airport Operations Control Centre (APOC). It offers a seamless tactical to strategic look-ahead, enabled by dynamic, repetitive planning.

The AOP will be semi-automatic generated by the Total Operations Planner (TOP) in the APOC, in coordination with Arrival, Departure and Turn-around Management in Tactical Operation Centres (ACC, Approach, Tower, Apron, AOC) and by AMAN-DMAN Coordination (ADCO) controlled via Flow Targets by TOP.

Total Operations Planner (TOP)

The Total Operations Planner (TOP) is the core planning system within the Airport Operations Center (APOC), supporting the stakeholders to create and adapt a joint Airport Operations Plan (AOP).

- Features
 - Based on On-Time-Preferred-Serve Principle
 - Detection of Capacity-Demand Mismatch
 - Optimization of
- Sequence of Operations Strategy Changes
- Allocation Flows to Resource Availability
- Integrated Multi-RWY-Arr.-Dep.-Schedules
 - Evaluation against First-Come-First-Serve
- Benefits
 - Up to 20% more Departure Punctuality during Capacity Shortfalls without additional Throughput Compromises
 - Support Airport Stakeholders to develop joint Airport Operations Plan (AOP) within the Airport Operations Control Center (APOC)
- History of Development
 - DLR developed first Instance (CLOU) with DFS, FRAPORT, Lufthansa in LUF0III project, funded by German Ministry of Economics
 - Next Generation under development at DLR

Traffic Monitor

Traffic Monitors are the means to analyse and evaluate airport performance online with respect to several key performance indicators.

- Features
 - Analysis of Capacity, Demand, Flow & Queues for entire Airport as well individual Resources
 - Measuring Impact on Punctuality
 - Statistical Evaluation (e.g. Taxi Times)
 - Visualisation
- Benefits
 - Airport Performance Supervision
 - Improving Airport Operations Strategies via Tool-supported Best-Practice-Approach
 - Potential to predict Critical Situations
 - Post-Analysis of Changes at Airports

- History of Development

DLR “Flow Monitor” for DFS in 1993

- DLR “Verkehrsmonitor” for FRAPORT 2003
- Next Generation under development at DLR, Total Airport Performance Assessment System (TAPAS)

Arrival Manager (AMAN)

Arrival Manager are tactical controller assistance systems, optimizing the air traffic flow from entering the TMA to touch down.

- Features

- Scheduling based on vector optimisation, considering multiple criteria, like throughput, arrival delay and noise exposure level
- Trajectory-based guidance supporting timely landings
- Consideration of user-preferred on-board FMS-trajectories

- Benefits

- Enhancement of capacity, efficiency and predictability of arrival operations
- Enables improved mixed-mode operation
- Enables CDA and noise abatement procedures and routes

- History of Development

- Operational prototype for DFS “COMPAS” (Frankfurt and Munich) in 1980s
- Operational prototype for DFS “4D-Planer” (Frankfurt) in 1990s
- DLR “4D-CARMA” as next generation, operational prototype since 2003

Departure Manager (DMAN)

Departure Manager are tactical controller assistance systems, optimizing the air traffic flow from the gate to the departure runway.

- Features

- Optimum, dynamic scheduling of departures
- Consideration of actual traffic situation, aircraft performance and flight plan data, separation constraints, controller preferences
- Interface to TOP for pre-tactical targets and confirmed off-block times

- Benefits

- Enhancement of throughput, efficiency and CFMU-slot compliance
- Reduction of workload and environmental impacts (noise and emissions)
- Support of mixed-mode operation
- Improved predictability of departure operations (DPI-Messages)

- History of Development
 - Prototype for “darts”, World-Wide First DMAN, operational at Zurich
 - Development of DLR/Eurocontrol DMAN (2002-2006)

Arrival-Departure-Coordination (ADCO)

Tactical Arrival-Departure Coordination (ADCO) ensures optimized collaboration of AMAN and DMAN to make full use of runway resources.

- Features
 - Enhanced arrival departure coordination for mixed-mode operations or interdependent arrival and departure runways
 - Automatic, fuzzy-rule based arrival gap tailoring taking into account both actual traffic situation and demand for inbound and outbound traffic
 - Interface to TOP to Flow Targets
- Benefit
 - Enhancement of throughput, efficiency and CFMU-slot compliance
 - Concept facilitates step-wise implementation of Controller Decision Support Tools
- History of Development
 - Tool development and concept evaluation in LUF0III project funded by German Ministry of Economics

AT-One combines the strength of NLR and DLR in ATM Research

DLR

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