Innovative complexity assessment to support future Capacity Management processes in TBO

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SESAR JOINT UNDERTAKING

9th SESAR Innovation Days

COTTON

Capacity management **O**ptimisation for **T**raject**T**ory based **O**peratio**N**s

Innovative complexity assessment to support future Capacity Management processes in TBO

E. Puntero Parla, D. Zheng, L. Zerrouki, A. Vidosavljevic, F. Gomez Comendador, et al.

COTTON Objectives:

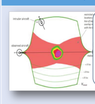
Develop trajectory-based **Complexity** Metrics more suitable to **Dynamic Airspace Configuration** (DAC) and **Flight Centric ATC** (FCA) mode of operations.

Optimise **Capacity Management** by incorporating **Trajectory Uncertainty** into their Demand and Capacity Balancing (DCB) tools.

Explore the **integration of DAC and FCA** solutions and the operational requirements for their common implementation.

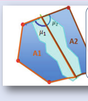
COTTON Enhanced Complexity Metrics

Solution Space



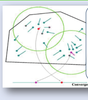
Aircraft manouvering space

Cognitive



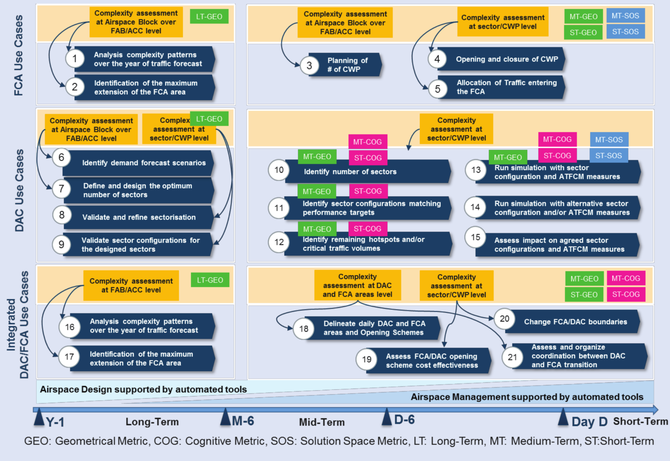
Mental abstraction of Traffic and Sector

Geometric



Aircraft Proximity and Convergence

COTTON Enhanced Capacity Management Use Cases (UCs)

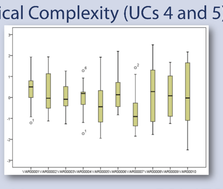


GEO: Geometrical Metric, COG: Cognitive Metric, SOS: Solution Space Metric, LT: Long-Term, MT: Medium-Term, ST:Short-Term

COTTON Validations

FCA in the Short-term

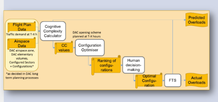
Impact of trajectory uncertainty in FCA short-term planning phase, using Geometrical Complexity (UCs 4 and 5)



Workload Measurement per FCA ATCo after allocation based on Geometric Approach

DAC in the Short-term

Optimisation of airspace configuration process in the short-term phase, using Cognitive Complexity (UCs 11 and 12).

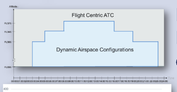


Simulation workflow

Overload detection based on percentile 90 of the predicted probabilistic complexity

Integrated DAC/FCA in the Medium-term

Capacity planning process emulation in medium-term phase, using Geometrical Complexity (UCs 3, 4, 10, 11, 12, 18 and 19).

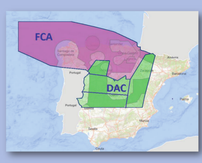


Dynamic DAC/FCA zones delineation

Complexity per flight level division

VALIDATION RESULTS

FCA	Allocation strategies based on COTTON Enhanced Complexity have showed a better balance of ATCo Workload.
DAC	DAC shows that the application of complexity metrics better adapted to a trajectory-based environment allows a sector configuration plan more adapted to the traffic demand, reducing the risk of imbalances.
Integrated DAC/FCA	DAC/FCA boundary delineation processes with the support of COTTON Enhanced Complexity is defined with sufficient level of detail to demonstrate its technical and operational feasibility and demonstrated a reduction of overloads.



Integrated DAC/FCA Complexity-based sector configuration

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