Innovative complexity assessment to support future Capacity Management processes in TBO

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COTTON
Capacity management Optimisation for TrajectOry based OperatioNs

Innovative complexity assessment to support future Capacity Management processes in TBO

COTTON Objectives:
- Develop trajectory-based Complexity Metrics more suitable to Dynamic Airspace Configuration (DAC) and Flight Centric ATC (FCA) mode of operations.
- Optimize Capacity Management by incorporating Trajectory Uncertainty into their Demand and Capacity Balancing (DBCB) tools.
- Explore the Integration of DAC and FCA solutions and the operational requirements for their common implementation.

COTTON Enhanced Complexity Metrics
- Solution Space
- Aircraft maneuvering space
- Cognitive
- Mental abstraction of Traffic and Sector
- Geometric
- Aircraft Priority and Convergence

COTTON Enhanced Capacity Management Use Cases (UCs)
- DAC
- FCA
- DAC/FCA
- DAC/FCA

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.

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