

Foreseen MET capability (MET information provided, Met phenomena)	Phases of flight that will benefit							Support to ATM		Meteorological data information (data source, coverage, resolutions, forecast range, update frequency) (next 5 or 10 years)	Meteorological data information (data source, coverage, resolutions, forecast range, update frequency) (next 10-15 years)	Performance measures
	Strategic planning	Pretactical planning	Tactical planning	Departure	Inflight	Arrival	Post-flight	Expected Performance or Operational Improvement (2)	Support to ATM Concept Component (1)			
<b>Improved nowcasting</b>  Use of high resolution observational data such as weather radar and satellite data for ingestion into high resolution model, and blending with mesoscale NWP model outputs to improve short term forecasts, including:  (a) movement and intensity changes of thunderstorms and significant convection (b) convective induced phenomena like wind gusts and tornado (c) convective activity types (d) lightning risk (e) CB			✓	✓	✓	✓		Operational improvement in negotiated trajectories. A key conditioner for such a negotiation process is to stay clear from areas with hazardous or unfavourable weather and to have knowledge on these phenomena upfront in the negotiation process. Improved prediction of medium to large scale convective areas with potential hazards such as severe turbulence, severe icing, strong up and downdraft, hail, lightning is a typical phenomenon will facilitate the trajectory negotiation process which enhance aviation safety. Short range terminal weather forecasts in support of terminal area operation and capacity forecasts and enhance safety.	AOM, DCB, AO, TS, CM	<b><u>NWP component in blending with nowcast</u></b> Horizontal resolution : 1 - 2km Vertical levels: 60 or more Update frequency: 1-3 hour Time period: T+0 - T+ 9 hour Time interval of forecast products: ~30 min  Rapid update, short period forecasts for tactical planning	<b><u>NWP component in blending with nowcast</u></b> Horizontal resolution : 500 m - 1 km (or better) Vertical levels: 80 or more Update frequency: 1 hour or shorter Time period: T+0 - T+ 15 hour Time interval of forecast products: below 30 min  Rapid update, short period forecasts for tactical planning	
<b>Improved windshear alerting</b>  Use of meteorological equipment, such as use of short-range LIDAR and microwave radiometers, to improve windshear monitoring and alerting				✓		✓		Improvement in windshear alerting. Better monitoring on small-scale windshear features such as building-induced windshear.	AUO, AOM	Increase in horizontal resolution to 75 m.		
<b>Increase resolution of NWP models, microphysics processes and data assimilation techniques</b>  To improve forecast of weather hazards incl. significant convection and thunderstorms, for terminal and aerodrome areas			✓	✓	✓	✓		Improvements in weather information lead to better data concerning the extent, time period and severity of weather impacts on airspace, which will maximize the the use of available airspace, fewer re-routes, less variability in associated traffic management.	AOM, DCB, AO, TS, CM	<b><u>Storm-scale/mesoscale NWP model</u></b> Horizontal resolution: 1 - 2 km Vertical levels: 60 or more Update frequency: 1 - 3 hours Time period : T+0 - T+30 hours Time interval of forecast products : 15 - 30 min  To improve forecast of mesoscale and convective phenomena using higher resolution model. Increased update frequency and time interval of model forecasts for enhancements of NWP component in blending with nowcast products.	<b><u>Storm-scale / mesoscale NWP model:</u></b> Horizontal resolution : 500m - 1 km (or better) Vertical levels: 80 or more Update frequency: 1 hour or shorter Time period: T+0 - T+ 48 hours Time interval of foreast products : 10 - 15 min  To improve forecast of mesoscale and convective phenomena using higher resolution model. Increased update frequency and time interval of forecast products for enhancements of NWP component in blending with nowcast products.	

Improved ensemble modelling	✓ ✓ ✓ ✓	Probabilistic weather forecasts in support of making greater use of congested/constrained TCA and airspace and risk management	AOM, DCB, AO, TS, CM	<b>Provision of probablistic forecasts</b>  Horizontal resolution : 15-30 km (based on global NWP model EPS) Vertical levels: 50 or more Update frequency: 12 hour Time interval of forecast products: 3 hour Time period : T+0 - T+240 hour  EPS forecasts are used for development of probablistic guidance on confidence of a particular forecast outcome or representation of the range of possible forecast scenarios.	<b>Provision of probablistic forecasts</b>  Horizontal resolution : 10-20 km (based on global and regional NWP model EPS) Vertical levels: 60 or more Update frequency: 6/12 hour Time interval of forecast products: 1 hour (regional) / 3 hour (global) Time period : T+0 - T+72 hour (regional) / T+336 hour (global)  EPS forecasts are used for development of probablistic guidance on confidence of a particular forecast outcome or representation of the range of possible forecast scenarios.	
Provide level of uncertainty / confidence of the forecast products	✓ ✓ ✓ ✓ ✓	Support ATM decision-making and risk management in CM, AOM, TS, AO, DCB	AOM, DCB, AO, TS, CM	Real-time verification to provide information on confidence level/uncertainty of the forecast products		
Translation of weather information to weather constraints and aerodrome threshold events. The output correlates to ATM impact (e.g. capacity, airspace blockage)	✓ ✓ ✓ ✓	Support ATM decision-making in CM, AOM, TS, AO, DCB Weather translation combined with ATM impact leads to more consistent evaluations of weather constraints, which in turn will allow users to plan trajectories that are more likely to be acceptable by stakeholders. Fewer reroutes, less contingency fuel than is felt necessary today, resulting in lower fuel burn	AOM, DCB, AO, TS, CM	Correlation between weather and impact (e.g. airport capacity and flight time error). This require both MET and ATM community to work together to achieve the goal.		More sophisticated verification methods include verification of weather impact to ATM (e.g. evaluation of flight delay, reduction of airspace capacity, blockage).
Assessability of MET information by stakeholders including pilots onboard	✓ ✓ ✓ ✓	Lead to increased situational awareness by pilots, AOCs and ANSPs, enabling avoidance of hazardous weather conditions, improve safety	AOM, DCB, AO, TS, CM		More MET information uplink to cockpit, e.g. EFB. New standard of MET information content, format and exchange (WXXM, information coming from Information Managment initiatives, such as SWIM ...)	

Notes :

(1) ATM Concept Components, from Manual for FF-ICE Doc. 9965  
Airspace Operations and Management: AOM  
Aerodrome Operations : AO  
Demand and Capacity Balancing : DCB  
Traffic Synchronization : TS  
Airspace User Operations : AUO  
Continuous Descent Operations : CDO  
Service Delivery Management : SDM

(2) Ref. to ANC block upgrade plan for Integrated Weather Information - modules B1 and B3

(3) A-HD = Aerodrome, High Density traffic. A-LD = Aerodrome, Low Density traffic. TCA-HD = Terminal Control Area, High Density traffic. TCA-LD = Terminal Control Area, Low Density traffic. ER-HD = En Route, High Density traffic. ER-LD = En Route, Low Density traffic.