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## MET – ATM Integration

- Global Air Navigation Plan (GANP)
- Aviation System Block Upgrade (ASBU)

**WMO Aeronautical Meteorology Scientific Conference**  
6 – 10 November 2017, Toulouse, France

**Peter Lechner**

*Chairman, ICAO Meteorology Panel,  
Chief Meteorological officer, Civil Aviation Authority of New Zealand*

**Neil Halsey**

*Meteorology Panel Secretariat  
Technical Officer, ICAO*



## The Value of MET information

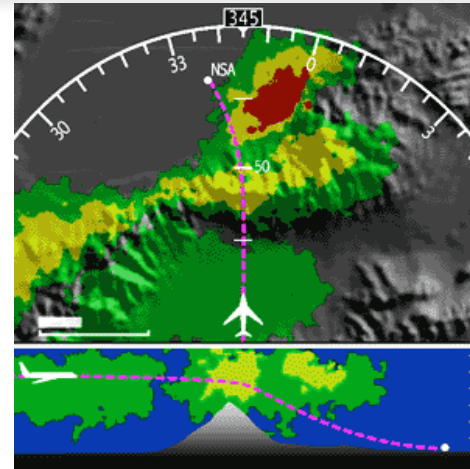
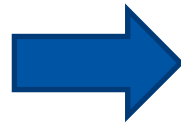
The annual accounting value of meteorological information for global aviation is around **US \$30 Billion**

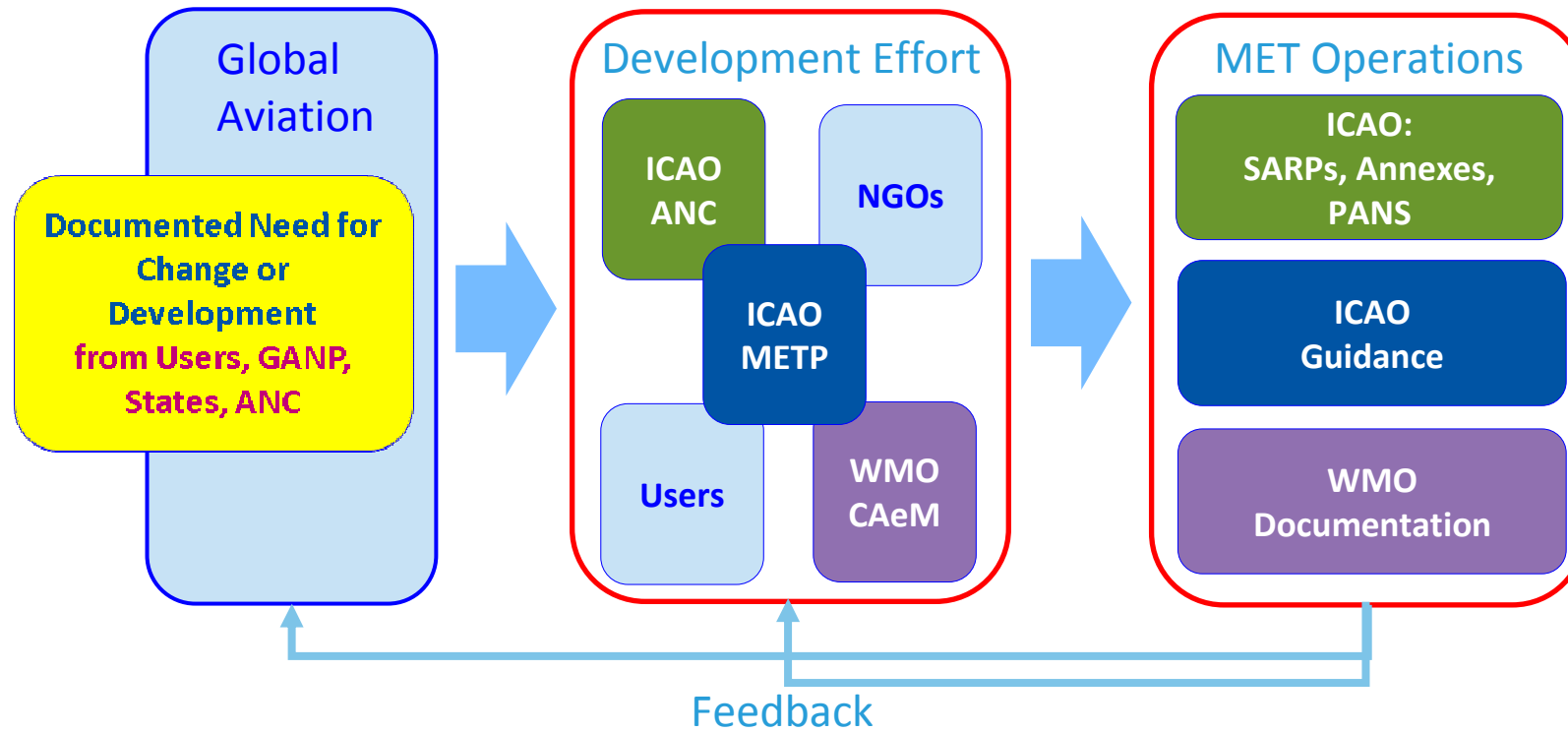
- Extrapolated pro-rata from UK figures.
- Global airline turnover in 2016 was US\$709 Billion
- Global GDP Contribution in 2012 was US\$2.4 Trillion



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## The MET Revolution







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**METEOROLOGY PANEL**



The METP shall collaboratively determine operational requirements for aeronautical MET service provision as an enabling function for a future globally interoperable air traffic management system, and identify solutions, in coordination with WMO, to effectively and efficiently fulfil the requirements through sound scientific and/or technological capabilities.

- 28 Independent expert members
- ~ 50 Advisers to the experts
- METP meets formally on 18 month cycle
- Working Groups and Work streams meet at least annually
- Frequent teleconferences to co-ordinate work

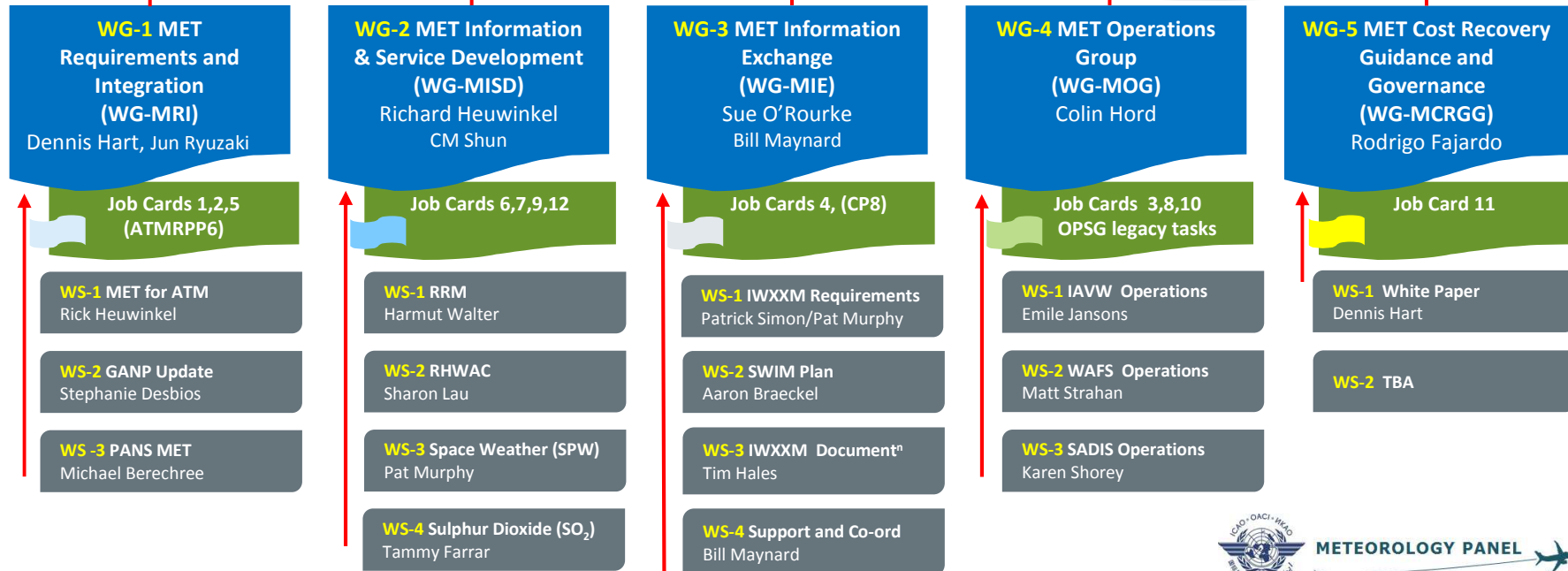
# ICAO Air Navigation Commission

## Meteorology Panel

(comprising individual Experts – not State representatives)

Peter Lechner  
Bill Maynard

METP Management Group  
Co-ordination work



METEOROLOGY PANEL

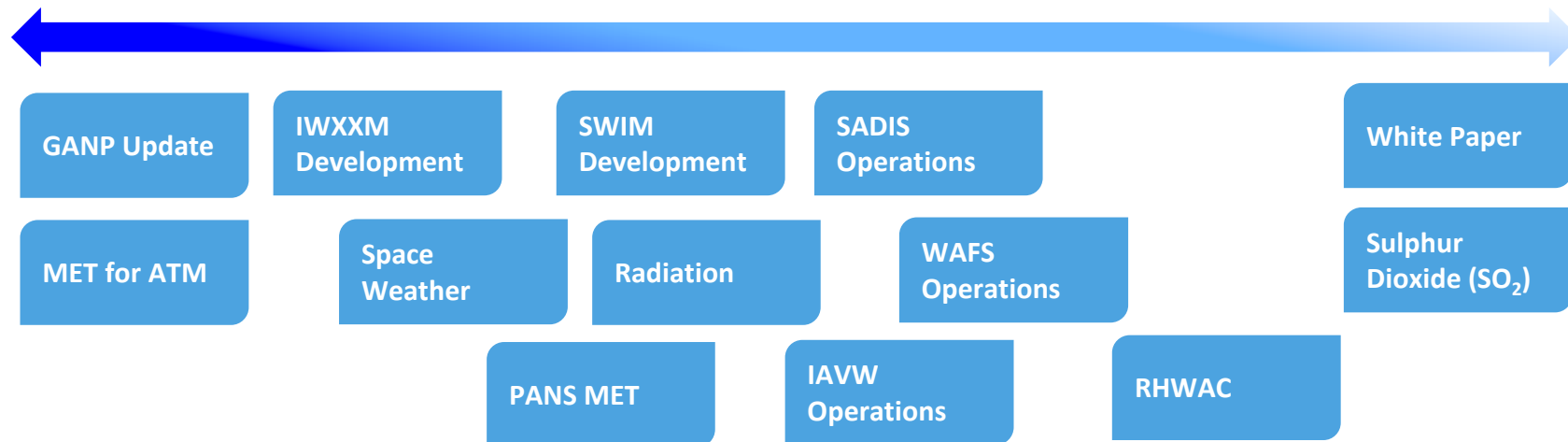




# METP work streams related to GANP

**GANP Drivers**

**Other Drivers**





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# Global Air Navigation Plan (GANP)







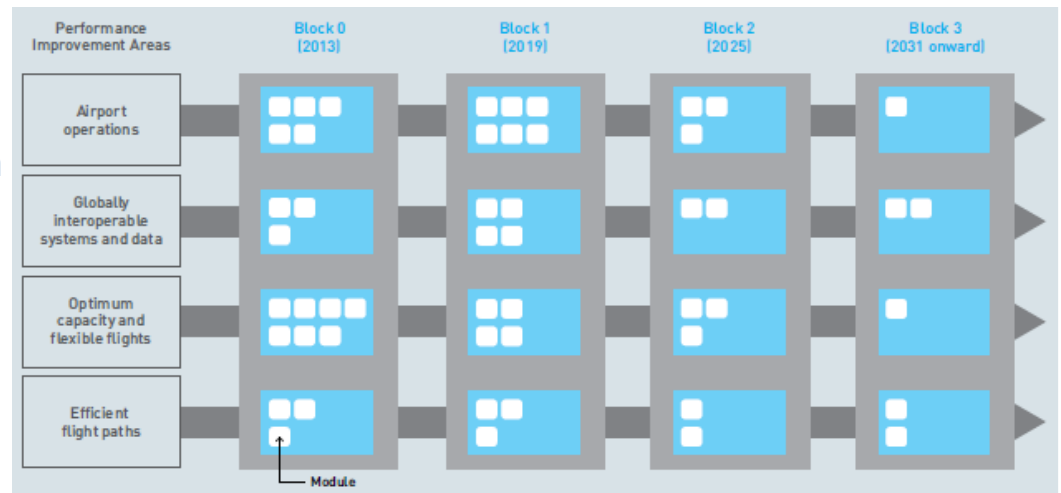
## Global Air Navigation Plan (GANP)

- Doc 9750 – GANP, 5<sup>th</sup> edition, 2016.
- Rolling 15+ year strategic direction.
- Leveraging existing technologies.
- Anticipating future developments based on State/industry agreed objectives.
- Long-term vision to ensure continuity and harmonization with modernization programmes.
- Objective is to increase capacity and improve efficiency of the global civil aviation system whilst improving or at least maintaining safety.



# Aviation System Block Upgrades (ASBU)

- Modules & associated Technology Roadmaps cover communications, surveillance, navigation, information management and avionics.
- Designed to be used by the Regions/sub-Regions/States when to help achieve harmonization and interoperability by their consistent application across the Regions and the world.
- Not all ASBU Modules are to be applied around the globe.



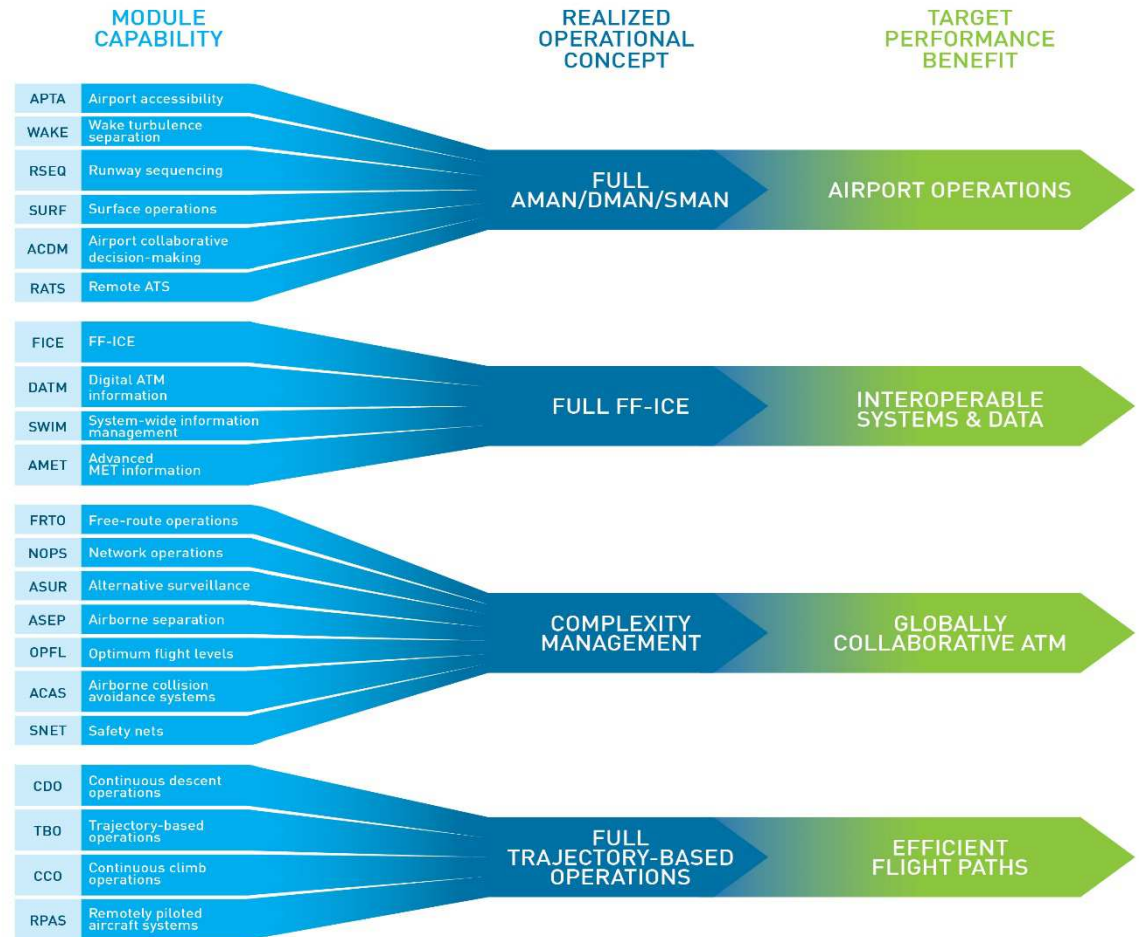
# GANP Modules

Operational Thread

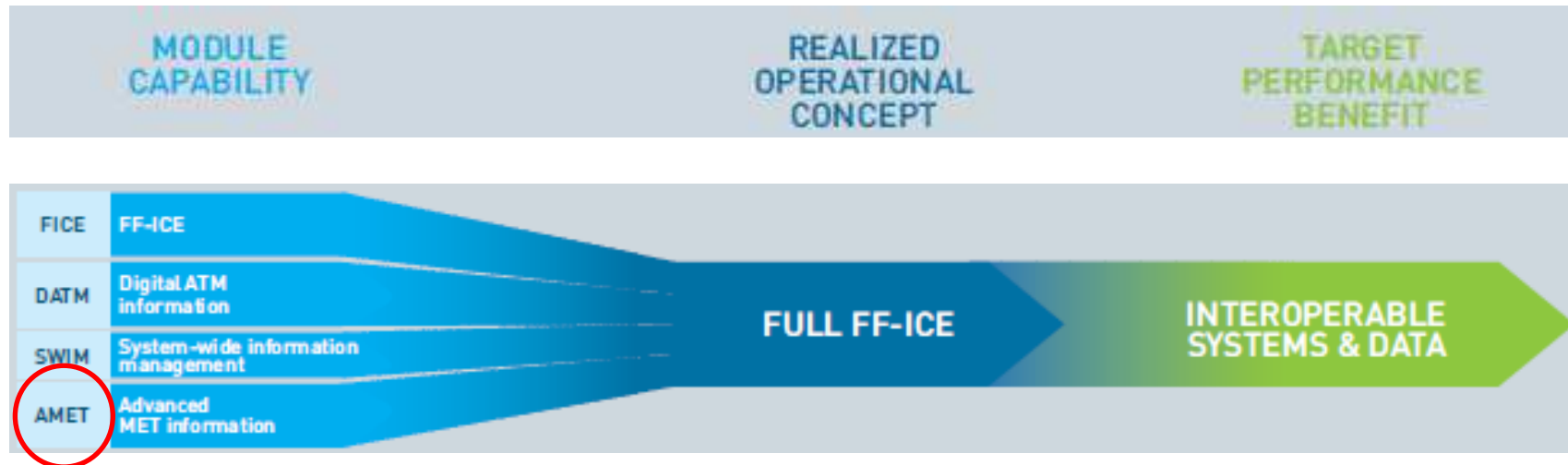
Enabler Thread

Operational Thread

Operational Thread



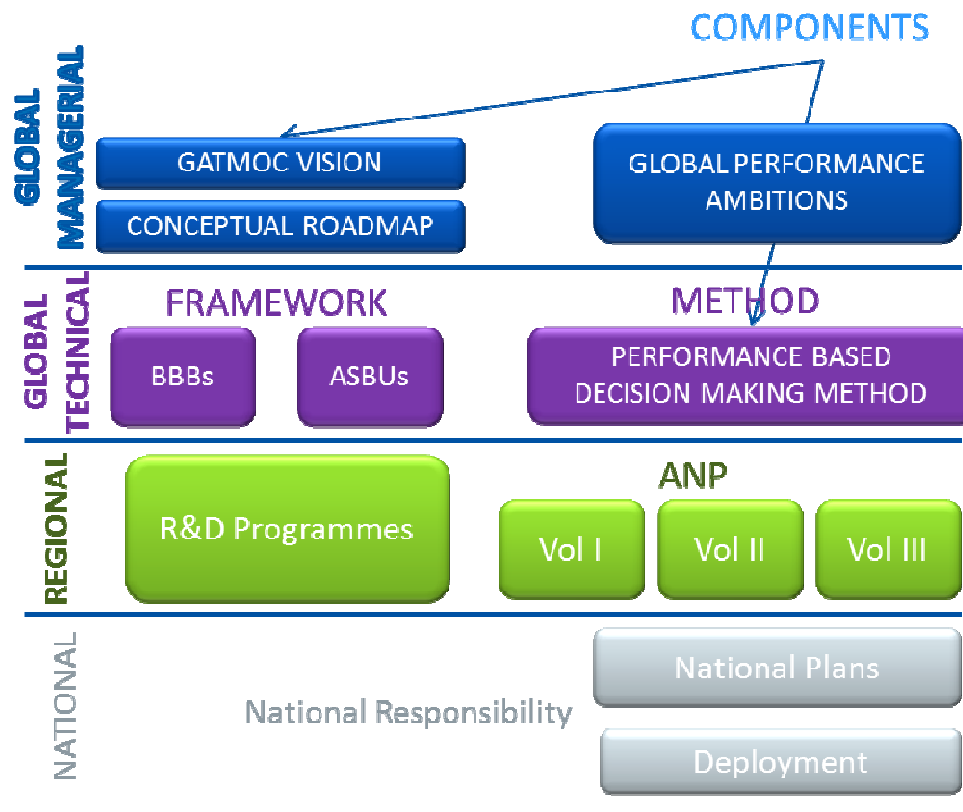
# Advanced MET Information (AMET)



**Performance Improvement Area 2: Globally interoperable systems and data – through globally interoperable system-wide information management**

Block 0	Block 1	Block 2	Block 3
<p><b>B0-FICE</b>  <b>Increased interoperability, efficiency and capacity through ground-ground integration</b>                      Supports the coordination of ground-ground data communication between ATSUs, based on ATS interfacility data communication (AIDC) defined by ICAO Document 9694.</p>	<p><b>B1-FICE</b>  <b>Increased interoperability, efficiency and capacity through FF-ICE, Step 1 application before departure</b>                      Introduction of FF-ICE step 1, to implement ground-ground exchanges before departure using common flight information reference model, FIXM, XML and the flight object.</p>	<p><b>B2-FICE</b>  <b>Improved coordination through multi-centre ground-ground integration (FF-ICE, Step 1 and flight object, SWIM) including execution phase</b>                      FF-ICE supporting trajectory-based operations through exchange and distribution of information including execution phase for multicentre operations using flight object implementation and interoperability (IOP) standards.</p>	<p><b>B3-FICE</b>  <b>Improved operational performance through the introduction of Full FF-ICE</b>                      Data for all relevant flights is systematically shared between air and ground systems using SWIM in support of collaborative ATM and trajectory-based operations.</p>
<p><b>B0-DATM</b>  <b>Service improvement through digital aeronautical information management</b>                      Initial introduction of digital processing and management of information, by the implementation of AIS/AIM making use of AIXM, moving to electronic AIP and better quality and availability of data.</p>	<p><b>B1-DATM</b>  <b>Service improvement through integration of all digital ATM information</b>                      This module addresses the need for increased information integration and will support a new concept of ATM information exchange fostering access via internet-protocol-based tools Exchange models such as AIXM, FIXM, IWXXM and others relate their concepts to the AIRM fostering convergence, re-use, and collaborative alignment.</p>	<p><b>B2-SWIM</b>  <b>Enabling airborne participation in collaborative ATM through SWIM</b>                      Connection of the aircraft as an information node in SWIM enabling participation in collaborative ATM processes with exchange of data including meteorology.</p>	
	<p><b>B1-SWIM</b>  <b>Performance improvement through the application of system-wide information management (SWIM)</b>                      Implementation of SWIM services (applications and infrastructure) creating the aviation intranet based on standard data models, and internet-based protocols to maximize interoperability.</p>		
<p><b>B0-AMET</b>  <b>Meteorological information supporting enhanced operational efficiency and safety</b>                      Global, regional and local meteorological information provided by world area forecast centres, volcanic ash advisory centres, tropical cyclone advisory centres, aerodrome meteorological offices and meteorological watch offices in support of flexible airspace management, improved situational awareness and collaborative decision-making, and dynamically-optimized flight trajectory planning.</p>	<p><b>B1-AMET</b>  <b>Enhanced operational decisions through integrated meteorological information (planning and near-term service)</b>                      Meteorological information supporting automated decision process or aids, involving meteorological information, meteorological information translation, ATM impact conversion and ATM decision support.</p>		<p><b>B3-AMET</b>  <b>Enhanced operational decisions through integrated meteorological information (near-term and immediate service)</b>                      Meteorological information supporting both air and ground automated decision support aids for implementing immediate weather mitigation strategies.</p>

# GANP 2019 – ASBU Framework



- **ASBU Block**
  - Specific concept of operations.
  - Deadline for an element to be available for implementation.
- **ASBU Thread**
  - Key feature area of the air navigation system. Operational, Enabler, Network/Infrastructure.
- **ASBU Element**
  - A specific operational improvement
- **ASBU Enabler**
  - Component (standards, procedures, training, technology,...)
- **ASBU Module**
  - A group of elements from a thread.



## GANP 2019 – AMET Module

- Meteorology is an **enabler** for the majority of the other Threads.
- Challenge is to ensure that **all the other ASBU threads** and related modules are able to fully articulate the requirements they have for MET information in the future.
- This means looking at the **MET information required**, rather than existing products.
- Information includes phenomenon/parameter and data characteristics such as severity, accumulation, intensity, probability of occurrence, confidence/uncertainty of forecasts and reliability, etc.
- Evolution driven by the transition to the **SWIM environment** and by the need for more **interoperability** allowing **integration of MET information** in ATM systems

# GANP 2019 – AMET Module

## **AMET Block 0:**

*Global, regional and local meteorological information to support flexible airspace management, improved situational awareness, collaborative decision-making and dynamically optimized flight trajectory planning.*

AMET-B0/1: Meteorological observation products  
AMET-B0/2: Meteorological forecast products  
AMET-B0/3: Meteorological advisory and warning products  
AMET-B0/4: Climatological and historical meteorological products  
AMET-B0/5: Dissemination of meteorological products

## **AMET Block 1:**

*Meteorological information supporting automated decision process or aids, involving meteorological information, meteorological information translation, ATM impact conversion and ATM decision support.*

AMET-B1/1: Meteorological observation information  
AMET-B1/2: Meteorological forecast information  
AMET-B1/3: Climatological and historical meteorological information  
AMET-B1/4: Meteorological information in SWIM



# GANP 2019 – AMET Module

## AMET Block 0: New capabilities

- Provision of additional observations. More automated observations. Higher temporal and spatial resolution for lightning, radar and satellite information.
- Greater resolution (spatial and temporal) of gridded WAFS information. ICE, TURB, CB WAFS. Improved visualization of meteorological forecast products.
- Improved visualization of meteorological advisory and warning products. VAA extended period forecasts. Increased VAAC domain.
- Commencement of the exchange of meteorological information using the ICAO Meteorological Information Exchange Model (IWXXM), being the conversion of Traditional Alphanumeric Code (TAC), using an IWXXM schema, into XML/GML.

## AMET Block 1: New capabilities

- Commencement of change from **product-centric to data-centric** information (parameters and phenomena, and their associated characteristics).
- Space weather information. Sulphur dioxide (SO<sub>2</sub>) services. Enhanced hazardous weather services.
- Climatological data. Climate change information.
- Meteorological information in ICAO Meteorological Information Exchange Model (IWXXM) form starts to **replace** traditional alphanumeric code (TAC) products. **Human-readable products will start to be derived from the IWXXM information** (rather than the other way around). The introduction of web services allows for progressive replacement of fixed line dissemination systems.



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THANK YOU