Outcomes of the 2019 Global Survey Sensitivity Analysis of Future Meteorological Service Delivery to Aviation

Commission for Aeronautical Meteorology
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Commission for Aeronautical Meteorology
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PREFACE

Nearly all Members of WMO have designated responsibility to provide regulated aeronautical meteorological services in accordance with ICAO Annex 3 to the Convention on International Civil Aviation. ICAO Annex 3 is reproduced by WMO as Technical Regulations (WMO-No. 49), Volume II. The ICAO and WMO requirements are fulfilled by States/Members at a national level usually through their national meteorological and hydrological service (NMHS) or by another entity (or entities).

Today, in a majority of cases, aeronautical meteorological service provision is fulfilled by NMHSs. However, a 2016/2017 global survey conducted by the Commission for Aeronautical Meteorology (CAeM) – published by WMO as AeM SERIES No. 1 – identified that this majority was declining as other entities, including private sector enterprise, compete for and engage in the provision of meteorological service for international air navigation. The domain of the NMHS as the sole or de facto provider of the ICAO/WMO regulated services at a national level no longer holds for an increasing number of States/Members.

At the sixty-ninth session of the WMO Executive Council (EC-69) held from 10 to 17 May 2017, the Council held a one-day Special Dialogue on the future of aeronautical meteorological services. The Special Dialogue placed emphasis on how the needs and expectations of aviation users for meteorological service were evolving from a product-centric to a data-/information-centric approach and an increasingly regionalized and globalized approach to service delivery enabling a globally interoperable, harmonized air traffic management system of the future – as portrayed in the Global Air Navigation Plan (GANP) of the International Civil Aviation Organization (ICAO). EC-69 considered what activities Members of WMO, in particular, need to undertake now and into the future to respond to the demands of the aviation community.

Through Resolution 42 (EC-69), Future of Aeronautical Meteorological Services, the Council requested, inter alia, the president of CAeM in collaboration with presidents of regional associations to develop a methodology and to conduct a sensitivity analysis of various scenarios of future meteorological service delivery to aviation, including the degree of engagement with private sector providers, in order to assess the possible impacts both on NMHSs as aeronautical meteorological service providers and on the resulting service quality levels. The analytical information to be obtained from such a sensitivity analysis was intended to inform WMO’s future planning of aviation-related activities. This 2019 global survey sensitivity analysis of future meteorological service delivery to aviation is in direct response to Resolution 42 (EC-69).

In my capacity as president of the Commission, I will work with other WMO technical commissions and the regional associations, as well as the Secretariat, to respond to the survey findings and to the needs and expectations of WMO Members. This will include further work on and updates to the long-term plan for aeronautical meteorology (LTP-AeM). The LTP-AeM looks to provide a framework upon which AMSPs of WMO Members specifically and the broader meteorology and aviation communities in general can plan a
progressive transformation from a conventional “product-centric” approach to a modern “information-centric” approach to service provision for aviation through to 2030 and beyond.

I would like to express my appreciation to all those WMO Members who took part in the survey. I also wish to acknowledge the kind support of Mr Michael Berechree and Mr Jun Ryuzaki, co-leads of the CAeM Expert Network on Meteorological Information Services and Governance (EN-ISG), as well as Mr Greg Brock, Acting Chief, and Mr Robert Rutledge, Seconded Expert of the Aeronautical Meteorology Division of the WMO Secretariat. Without everyone’s support and valuable contribution the conducting of this survey and the production of this report would not have been possible.

Ian Lisk
President, WMO Commission for Aeronautical Meteorology
May 2019
EXECUTIVE SUMMARY

The conducting, by CAeM, of this 2019 Global Survey Sensitivity Analysis of Future Meteorological Service Delivery to Aviation (hereinafter referred to as the ‘2019 Global Survey’ or ‘Global Survey’) is in direct response to Decision 42 (EC-69)\(^1\). The Global Survey was sent to all 192 Members of WMO on 25 January 2019 with an online questionnaire consultation period lasting from 1 February to 14 March 2019\(^2\).

The Global Survey supports a sensitivity analysis of various scenarios of future meteorological service delivery for aviation, including the degree of engagement of private sector providers, to assess possible impacts both on the national meteorological and hydrological services (NMHSs) as aeronautical meteorological service providers (AMSPs) and on the resulting service quality levels.

In examining the type/nature of AMSPs that exist at a national level, it was found that in two-thirds of WMO Members who responded to the Global Survey, the public sector NMHS is the sole designated provider of aeronautical meteorological services. In the remainder, two or more entities from the public and private sector are responsible for these services. Furthermore, the extent of formal consultations between those AMSPs and aviation users at a national, regional and global level was examined. It was found that while most have regular formal consultation with aviation users at the national level, the level of engagement was progressively less at the regional and global level, with a small majority rarely consulting with users at the global level.

The extent of awareness, amongst AMSPs, of the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (GANP) and its aviation system block upgrades (ASBU) methodology\(^3\) as well as its impacts on current and future aeronautical meteorological service provision was good, with an overwhelming majority of WMO Members who responded to the Global Survey indicating that they are aware. Correspondingly, implementation activities associated with ICAO GANP/ASBU are ongoing or are planned among those Members that are aware. However, a small minority of Members still have a complete lack of awareness of GANP/ASBU and its impact.

In reviewing the role of private sector AMSPs and satisfaction that legislative and oversight measures are in place, at a national level, to ensure the quality, consistency and accountability of services by private AMSPs, a majority of WMO Members who responded to the Global Survey expressed a satisfaction in the extent of relevant legislative and oversight. However, a small degree of dissatisfaction was noted in most WMO regions.

In assessing how likely it is, in the next 5 to 10 years, that the roles of the AMSPs will have to be rebalanced or otherwise adjusted to accommodate the introduction of

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\(^1\) The Abridged Final Report with Resolutions and Decision (Part I) and Progress Report (Part II) of EC-69 is available here.

\(^2\) An initial closing date of 28 February 2019 was extended by two weeks.

\(^3\) The GANP is published by ICAO as Doc 9750 and is available here. The GANP is ICAO’s highest air navigation strategic document and the plan to drive the evolution of the global air navigation system over the next 15 years and beyond. It also supports planning for local and regional implementation. The GANP is updated typically on a triennial basis.
regionalized and/or globalized meteorological service delivery models to support the needs of the international civil aviation community, a small majority of WMO Members who responded to the Global Survey indicated that a rebalancing or other adjustment was likely within the next 5 years, with an overwhelming majority indicating this was likely in the next 5 to 10 years.

With respect to the extent of preparedness of AMSPs to produce and disseminate, by 2020, meteorological information conforming to the ICAO meteorological information exchange model (IWXXM), either at the point of origin or through a third party, a majority of WMO Members who responded to the survey indicated that they are prepared. However, there are some Members, predominately in RA I (Africa) and RA III (South America), that are unprepared for this change.

For the degree of satisfaction that current cost recovery schemes in place at a national level for aeronautical meteorological service provision are suitable to sustain basic and underpinning meteorological infrastructure over the next 5 to 10 years, a majority of WMO Members who responded to the survey responded favorably. It is worth noting that RA I (Africa) and RA III (South America) were above the global average with respect to a dissatisfaction of current cost recovery schemes sustaining the infrastructure.

An overwhelming majority of WMO Members who responded to the Global Survey expressed satisfaction that WMO at a global level, through technical commissions, is supporting Members in the transformation of aeronautical meteorological service provision. Meanwhile, about one-quarter of WMO Members who responded to the Global Survey expressed dissatisfaction that WMO at a regional level, through regional associations, is supporting Members in the transformation of aeronautical meteorological service provision.

Finally, between one-half and two-thirds of WMO Members who responded to the Global Survey indicated that they have not yet developed a rigorous strategic plan, at a national level, for the design and evolution of aeronautical meteorological service provision, taking into account the EC-69 Special Dialogue or an analysis of their AMSPs.

The outcomes of this Global Survey will be used to inform WMO planning of aviation-related activities in the future.
1. INTRODUCTION

1.1. BACKGROUND AND RATIONALE

On 11 May 2017, the Sixty-Ninth Session of the WMO Executive Council (EC-69) held a Special Dialogue on the Future of Aeronautical Meteorological Services. The Special Dialogue was recognition of the importance of the evolving requirements for the provision of meteorological services for international air navigation given existing and foreseen changes within the civil aviation sector over the coming decade or more and the perceived impacts of change on aeronautical meteorological service provision.

Through a keynote address, presentations and panel discussions, the Special Dialogue stimulated strategic thinking to assist the Executive Council to chart a path for WMO Members to address the challenges that lay ahead and to promote new approaches to ensure that the delivery of meteorological services to aviation users by national meteorological and hydrological services (NMHSs) and other aeronautical meteorological service providers (AMSPs) will be sustained at the required level of performance, quality and cost effectiveness.

Upon the conclusion of the Special Dialogue, the Executive Council formulated Decision 42 (EC-69) which, inter alia, requested the president of the Commission for Aeronautical Meteorology (CAeM) to develop a methodology and conduct a sensitivity analysis of various scenarios of future meteorological service delivery for aviation, including the degree of engagement of private sector providers, to assess possible impacts both on the NMHSs as AMSPs and on the resulting service quality levels, where such analytical information can be used to inform WMO planning of aviation-related activities in the future.

The conducting, by CAeM, of this 2019 Global Survey Sensitivity Analysis of Future Meteorological Service Delivery to Aviation (hereinafter referred to as the ‘2019 Global Survey’ or ‘Global Survey’) is in direct response to Decision 42 (EC-69).

The Global Survey was sent to all 192 Members of WMO on 25 January 2019 with an online questionnaire consultation period lasting from 1 February to 14 March 2019.

1.2. SCOPE

The 2019 Global Survey addressed the following areas:

(1) Type/nature of AMSPs that exist at a national level;
(2) Extent of formal consultations between AMSPs and aviation users at a national, regional and global level;
(3) Extent of awareness amongst AMSPs of the International Civil Aviation Organization (ICAO) Global Air Navigation Plan (GANP) and its aviation system

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4 The Abridged Final Report with Resolutions and Decision (Part I) and Progress Report (Part II) of EC-69 is available here.
5 An initial closing date of 28 February 2019 was extended by two weeks.
block upgrades (ASBU) methodology⁶ as well as its impacts on current and future aeronautical meteorological service provision;

(4) Extent, amongst AMSPs, of implementation activities associated with ICAO GANP/ASBU;

(5) Extent of satisfaction that legislative and oversight measures are in place, at a national level, to ensure the quality, consistency and accountability of private sector AMSPs;

(6) Opinion on how likely it is, in the next 5 to 10 years, that the roles of the AMSPs will have to be rebalanced or otherwise adjusted to accommodate the introduction of regionalized and/or globalized meteorological service delivery models to support the needs of the international civil aviation community;

(7) Extent of preparedness of AMSPs to produce and disseminate, by 2020, meteorological information conforming to the ICAO meteorological information exchange model (IWXXM);

(8) Extent of satisfaction that current cost recovery schemes in place at a national level for aeronautical meteorological service provision are suitable to sustain basic and underpinning meteorological infrastructure over the next 5 to 10 years;

(9) Extent of satisfaction that WMO is doing what it can at a global level (through technical commissions) and at a regional level (through regional associations), with the resources that it has at its disposal, to support Members and their AMSP(s) in the transformation of meteorological service for international air navigation; and

(10) Extent to which WMO Members have:
   (a) Analyzed the outcomes of the EC-69 Special Dialogue;
   (b) Conducted a SWOT analysis (strengths, weaknesses, opportunities, threats) of their NMHS and/or other AMSP(s); and
   (c) Developed a strategic plan, at a national level, for the design and evolution of aeronautical meteorological service provision.

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⁶ The GANP is published by ICAO as Doc 9750 and is available here. The GANP is ICAO’s highest air navigation strategic document and the plan to drive the evolution of the global air navigation system over the next 15 years and beyond. It also supports planning for local and regional implementation. The GANP is updated typically on a triennial basis.
2. RESPONSE RATE

Between 1 February and 14 March 2019, the Global Survey yielded a total of 58 complete responses from the 192 Members of WMO, as illustrated in Table 1 below. This equates to a global response rate of 30%. Responses were received from developed, developing and least developed countries across all WMO Regions.

Table 1. Number of complete responses from Members grouped according to WMO Regional Association.

<table>
<thead>
<tr>
<th>WMO RA</th>
<th>No. of replies received</th>
<th>No. of WMO Members in the RA</th>
<th>Response rate by WMO RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>12</td>
<td>53</td>
<td>23%</td>
</tr>
<tr>
<td>II</td>
<td>13</td>
<td>34</td>
<td>38%</td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>12</td>
<td>42%</td>
</tr>
<tr>
<td>IV</td>
<td>4</td>
<td>22</td>
<td>18%</td>
</tr>
<tr>
<td>V</td>
<td>6</td>
<td>22</td>
<td>27%</td>
</tr>
<tr>
<td>VI</td>
<td>18</td>
<td>49</td>
<td>37%</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>192</td>
<td>Average 30%</td>
</tr>
</tbody>
</table>

As Figure 1 below illustrates, the response rate, percentage-wise, across the WMO regions was mixed.

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7 Where RA I is Africa, RA II is Asia, RA III is South America, RA IV is North America, Central America and the Caribbean, RA V is South-West Pacific, and is RA VI is Europe.
3. METHODOLOGY AND ANALYSIS OF THE RESPONSES

The 2019 Global Survey was communicated to WMO Members through Circular letter reference 00858/2019/WDS/AEM/Global Survey\(^8\) dated 25 January 2019. The Circular letter included a Concept Note providing, amongst others, the background, methodology, participation, duration and reporting expectations.

The 2019 Global Survey was conducted via an online questionnaire using SurveyMonkey from 1 February to 14 March 2019. It was conducted in English only.

The 2019 Global Survey was more limited in scope compared with the 2016/2017 Global Survey, both in respect of the number of questions and the duration.

Each question in the 2019 Global Survey contained a statement (or statements) to which the WMO Member was expected to indicate their degree of agreement taking into account their national circumstances and professional opinion.

Only one completed response was required per WMO Member. Multiple responses were not accepted.

The results of the 2019 Global Survey were collated and analyzed, by the WMO Secretariat with the assistance of a CAeM Expert Network\(^9\), on a global and a regional basis. As such, the results cannot be attributed to an individual Member and individual responses have not been published.

The following section presents the findings and observations of the Global Survey, aggregated on a global and regional basis.

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**IMPORTANT NOTE.**

It is worthwhile to note that the 30% global response rate to the 2019 Global Survey was significantly lower than the 92% response rate to the 2016/2017 CAeM Global Survey on Aeronautical Meteorological Service Provision (AeM SERIES No. 1 refers).

As a consequence, a degree of caution should be exercised when considering the findings, observations, conclusions and recommendations stemming from the 2019 Global Survey.

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\(^{8}\) English version available here. French, Spanish and Russian language versions also available.

\(^{9}\) Expert Network on Aeronautical Meteorological Information Services and Governance (EN-ISG).
4. FINDINGS AND OBSERVATIONS

QUESTION 1
What types of aeronautical meteorological service provider (AMSP) exist in your country?

FINDINGS 1

Composition of respondents to the 2019 CAeM global survey

- Public sector NMHS only
- Private sector NMHS only
- Public sector non-NMHS only
- Private sector non-NMHS only
- Combination public and private sector, (NMHS, non-NMHS and/or other entity, e.g. military)
OBSERVATIONS 1

- In two-thirds of WMO Members who responded to the survey, the public sector **NMHS is the sole designated provider** of aeronautical meteorological services
  - This figure is comparable with the findings of a 2016/2017 CAeM global survey on aeronautical meteorological service provision (*WMO Publication AeM SERIES No. 1* refers)

- In one-quarter of WMO Members who responded to the survey, aeronautical meteorological service provision comprises **two or more entities** from the **public and private sector**
  - RA III (South America) possessed the broadest demographic (public/private mix), RA IV (North America, Central America and Caribbean) the narrowest
**QUESTION 2**

EC-69 identified that continuous dialogue between meteorological service providers and aviation stakeholders at all levels (national, regional, global) was a crucial factor in responding to the ongoing and foreseen changes in the global air traffic management system and the related changes in meteorological service provision.

*How frequently does the AMSP(s) in your country conduct formal consultations with aviation stakeholders at a national, regional and global level?*

Note. – Formal consultations at a regional and global level may include those undertaken through WMO subsidiary bodies such as CAeM and Regional Associations and ICAO subsidiary bodies such as METP and PIRGs

**FINDINGS 2**

*Frequency of formal consultation between AMSPs and aviation users*

- **GLOBAL**
  - Rarely (less than once per year or never): 55%
  - Regularly (at least once per year): 45%

- **REGIONAL**
  - Rarely (less than once per year or never): 39%
  - Regularly (at least once per year): 61%

- **NATIONAL**
  - Rarely (less than once per year or never): 22%
  - Regularly (at least once per year): 78%
OBSERVATIONS 2

- Of the WMO Members who responded to the survey, **formal consultations** between AMSPs and aviation users are **more frequent at the national level** compared with those at a regional and global level
  - At a **national level**, engagement with users was **above the global average** in RA II (Asia), RA V (SW Pacific) and RA VI (Europe)
  - At a **regional level**, engagement with users showed a **high degree of variance** across the WMO Regions
  - At a **global level**, engagement with users was **below the global average** in RA III (South America) and RA IV (North America, Central America and Caribbean)
**QUESTION 3**

EC-69 understood that a comprehension of ICAO’s Global Air Navigation Plan (GANP) and its aviation system block upgrades (ABSU) methodology was a crucial consideration for the future integration of meteorological information into the air traffic management decision-making processes in support of trajectory-based operations.

*To what extent is the AMSP(s) in your country aware of the ICAO GANP and its ABSU methodology and its impact on current and future aeronautical meteorological service provision?*

**FINDINGS 3**

**OBSERVATIONS 3**

- **An overwhelming majority** (92%) of WMO Members who responded to the survey **are aware** (to a greater or a lesser extent) of the ICAO **GANP and its ASBU** methodology as well as its impact on current and future service provision

- **A minority** (8%) of WMO Members who responded to the survey, however, possess a **complete lack of awareness**,  
  - RA I (Africa), RA II (Asia) and RA IV (North America, Central America and Caribbean) possessed the highest frequency of Members in this category
**QUESTION 4**

To what extent is the AMSP(s) in your country actively undertaking or planning to undertake implementation activities associated with the ICAO GANP and its ASBU methodology?

**FINDINGS 4**

**OBSERVATIONS 4**

- An overwhelming majority (91%) of WMO Members who responded to the survey are **actively undertaking or planning to undertake implementation activities** associated with the ICAO GANP/ASBU
  - RA V (SW Pacific) and RA IV (Europe) possessed the highest frequency of Members **actively undertaking** implementation activities

- A minority (9%) of WMO Members who responded to the survey, however, are **not actively undertaking** implementation activities and are **not planning to undertake** implementation activities
  - RA I (Africa) and RA IV (North America, Central America and Caribbean) possessed the highest frequency of Members in this category
  - In the preceding question (Q3), some Members in RA II (Asia) indicated that they were unaware of GANP/ASBU. However, in this question (Q4), all RA II respondents indicated that they are actively undertaking or are planning to undertake implementation activities. This discrepancy is caused by how some Members inconsistently responded to the survey questions.
**QUESTION 5**

EC-69 considered that the growth of the private sector in meteorological information and service provision would need relevant legislative and oversight measures to ensure quality, consistency and accountability.

*How satisfied are you that legislative and oversight measures are in place, at a national level, to ensure quality, consistency and accountability of private sector AMSP(s) in your country?*

**FINDINGS 5**

**OBSERVATIONS 5**

- **Where private sector AMSPs exist at a national level**, a majority of WMO Members who responded to the survey expressed a *satisfaction* in the extent of relevant *legislative and oversight* measures to ensure quality, consistency and accountability of the AMSP’s meteorological information and services.
  - A small degree of dissatisfaction was, however, expressed in a majority of the WMO regions
QUESTION 6
EC-69 recognized that the regionalization and globalization of meteorological service for international air navigation were concepts necessary to support the requirements of the air traffic management community, and that the realization of regional systems (for example, a regional hazardous weather advisory system) would require a rebalancing of the roles of current AMSPs.

In the next 5 to 10 years, in your opinion, how likely is it that the roles of the AMSP(s) in your country will have to be rebalanced or otherwise adjusted to accommodate the introduction of regionalized and/or globalized meteorological service delivery models to support the needs of the international civil aviation community?

FINDINGS 6
OBSERVATIONS 6

• **Within the next 5 years**, a small majority (59%) of WMO Members who responded to the survey indicated that a **rebalancing or other adjustment was likely** to accommodate the introduction of regionalized and/or globalized aeronautical meteorological services
  – RA II (Asia), RA IV (North America, Central America and Caribbean) and RA V (SW Pacific) were above the global average in this regard

• **Within the next 5 to 10 years**, an overwhelming majority (85%) of WMO Members who responded to the survey indicated that a **rebalancing or other adjustment** was likely to accommodate the introduction of regionalized and/or globalized aeronautical meteorological services
  – A small minority (15%) of WMO Members believe a rebalancing or other adjustment will be unlikely within the next 5-10 years
QUESTION 7
EC-69 recognized that the integration of meteorological information into the system-wide information management environment of the future global ATM system was a main priority for Members in the next couple of years.

How prepared are the AMSP(s) in your country to produce and disseminate, by 2020, meteorological information conforming to the ICAO meteorological information exchange model (IWXXM)?

Note. – The production and dissemination of meteorological information in the IWXXM format may be performed at the point of origin by the AMSP or at a third party (e.g. regional OPMET data bank or regional OPMET centre)

FINDINGS 7
OBSERVATIONS 7

- Of the WMO Members who responded to the survey, a majority (80%) are prepared for the implementation of IWXXM at the point of origin
  - A majority are also prepared for the implementation of IWXXM by a third party

- RA I (Africa) and RA III (South America) were above the global average in respect of being unprepared for the implementation of IWXXM at the point of origin or by a third party
QUESTION 8

EC-69 acknowledged that the implementation of the meteorological elements of the ICAO GANP/ASBU was seen as a massive effort by Members in the years to come and would necessitate an intense capacity development programme and increased levels of awareness on the implications and impact of the changes, in particular for least developed countries (LDCs) and small island developing States (SIDS). EC-69 therefore emphasized the importance of fair cost recovery schemes in order to sustain basic and underpinning meteorological infrastructure.

How satisfied are you that the current cost recovery scheme in place at a national level for aeronautical meteorological service provision is suitable to sustain basic and underpinning meteorological infrastructure over the next 5 to 10 years?

FINDINGS 8

<table>
<thead>
<tr>
<th>Extent of satisfaction of current national cost recovery scheme to sustain basic and underpinning meteorological infrastructure over the next 5 to 10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissatisfied</td>
</tr>
</tbody>
</table>

OBSERVATIONS 8

- Where a national cost recovery scheme is currently in place for aeronautical meteorological service provision, a majority (three-quarters) of the WMO Members who responded to the survey are satisfied that the scheme can sustain basic and underpinning meteorological infrastructure over the next 5 to 10 years.

- RA I (Africa) and RA III (South America) were above the global average in respect of a dissatisfaction with current cost recovery schemes sustaining the infrastructure.
QUESTION 9
EC-69 recognized that WMO has a clear role to play in providing guidance and raising awareness of Members to the different scenarios and use cases which will emerge in the transition to a globally interoperable, harmonized air traffic management system of the future.

How satisfied are you that WMO is doing what it can at a global level (through technical commissions) and at a regional level (through regional associations), with the resources that it has at its disposal, to support Members and their AMSP(s) in the transformation of meteorological service for international air navigation?

FINDINGS 9

Extent of satisfaction with WMO support to the transformation of aeronautical meteorological service provision

<table>
<thead>
<tr>
<th>REGIONAL LEVEL (THROUGH REGIONAL ASSOCIATIONS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissatisfied</td>
<td>26%</td>
</tr>
<tr>
<td>Satisfied</td>
<td>74%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GLOBAL LEVEL (THROUGH TECHNICAL COMMISSIONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissatisfied</td>
</tr>
<tr>
<td>Satisfied</td>
</tr>
</tbody>
</table>

Extent of satisfaction that WMO, at a global level through technical commissions, is supporting Members in the transformation of aeronautical meteorological service provision

GLOBAL AVERAGE

RA I

RA II

RA III

RA IV

RA V

RA VI

Dissatisfied

Satisfied
Feedback where *dissatisfaction* was expressed (edited highlights):

- Insufficient WMO resources available to the aeronautical meteorology domain.
- Approach is often reactive rather than proactive.
- Inconsistent and/or inefficient efforts by WMO Members to support the ongoing transformation.
- Lack of guidelines feeding from TCs to RAs to support implementation.
- Lack of clarity in exactly what needs to be done, by when and by whom.
- Insufficient training initiatives, training aids, awareness events, information sharing, etc. in the regions.
- Need to increase support to Members/NMHS to participate in regional meetings.
- Priority should be given to assisting those Members most in need, especially those in developing or least developing countries.
- Lack of an implementation plan for aeronautical meteorology at a regional level.
- More capacity development needed.

**OBSERVATIONS 9**

- **An overwhelming majority** (94%) of WMO Members who responded to the survey expressed *satisfaction* that WMO at a **global level through technical commissions** is supporting Members in the transformation of aeronautical meteorological service provision

- **About one-quarter** of WMO Members who responded to the survey expressed *dissatisfaction* that WMO at a **regional level through regional associations** is supporting Members in the transformation of aeronautical meteorological service provision
  - The expressions of *dissatisfaction* were highest in RA III (South America) and RA V (SW Pacific)
QUESTION 10
Through Decision 42 (EC-69), Members were urged to analyse the outcomes of the Special Dialogue, including through the conducting of a SWOT (strengths, weaknesses, opportunities, threats) analysis of their NMHSs, and to consider developing their own plans taking into account national stakeholder requirements for aeronautical meteorological service provision, global and regional plans and trends.

(a) Have you analyzed the outcomes of the EC-69 Special Dialogue on the future of aeronautical meteorological service provision?

(b) Have you conducted a SWOT\textsuperscript{10} analysis of your NMHS and/or other AMSP(s)?

(c) Have you developed a strategic plan, at a national level, for the design and evolution of aeronautical meteorological service provision?

FINDINGS 10
(a) EC-69 Special Dialogue

\textsuperscript{10} Strengths, weaknesses, opportunities, threats.
(b) SWOT analysis

Extent to which WMO Members have conducted a SWOT [strengths, weaknesses, opportunities, threats] analysis of their aeronautical meteorological service providers

(c) National strategic plan

Extent to which WMO Members have developed a strategic plan, at a national level, for the design and evolution of aeronautical meteorological service provision

OBSERVATIONS 10

- Of the WMO Members who responded to the survey, between one-half and two-thirds have:
  - not yet reviewed the outcomes of the EC-69 (2017) Special Dialogue on the future of aeronautical meteorological services
  - not yet conducted a SWOT analysis of their aeronautical meteorological service providers
  - not yet developed a national strategic plan for the design and evolution of aeronautical meteorological services
## 5. CONCLUSIONS AND RECOMMENDATIONS

### USER CONSULTATION

#### CONCLUSION

A small but still significant number of WMO Members do not ensure regular (at least annual) formal consultations between AMSPs and aviation users at a national, regional and global level.

- Despite aeronautical meteorological service provision set against the backdrop of a requirement for the implementation of a quality management system (QMS).

#### RECOMMENDATION

All WMO Members should be encouraged to ensure formal consultations between aeronautical meteorological service providers (AMSPs) and aviation users regularly take place. Regulatory authorities should be involved in the discussions as/when necessary.

WMO Members should review relevant guidance, for example in:

- **WMO-No. 1100 (Guide to the implementation of QMS).**
- **ICAO Doc 9733 (Manual on coordination between ATS, AIS and MET)*.**

* Available from [ICAO publications](https://www.icao.int/publications/Pages/default.aspx)

### GANP/ASBU AWARENESS AND IMPLEMENTATION

#### CONCLUSION

While most WMO Members are aware of the ICAO GANP/ASBU (and its implications) and are undertaking associated implementation activities, a small and not insignificant number of WMO Members appear to be completely unaware and/or are not undertaking any form of implementation activities associated with GANP/ASBU.

#### RECOMMENDATION

All WMO Members, most especially those lacking an awareness of ICAO GANP/ASBU and its implications, should be encouraged to:

- review relevant online materials (WMO, ICAO* and others) pertaining to the ongoing modernization of the air transport system.
- actively participate in relevant regional and/or global meetings/events when held.
- seek twinning/mentoring opportunities with WMO Members that possess good awareness and are already involved in the modernization effort.

* For example, the [ICAO GANP Portal](https://www.icao.int/ganp/Pages/default.aspx)
### Private Sector Oversight and Engagement

**Conclusion**

Private sector AMSPs are in a minority compared with public sector AMSPs (especially NMHS). Notwithstanding, most but not all WMO Members are satisfied with the extent of relevant legislative and oversight measures to ensure quality, consistency and accountability of the meteorological information and services of the private sector AMSPs within their country.

**Recommendation**

Engagement between public sector and private sector should be encouraged within and across all WMO Members, fostering ‘win-win’ outcomes.

WMO Members may consider, if not already doing so, active participation in (WMO) discussions pertaining to the ‘global weather enterprise’, for example through Congress, Executive Council and other relevant fora.

### Service Delivery Evolution

**Conclusion**

Most but not all WMO Members recognize that over the coming years – more especially by the late 2020s – there will be a rebalancing or other adjustment of AMSPs to accommodate the foreseen introduction of regionalized and/or globalized aeronautical meteorological services.

**Recommendation**

All WMO Members with AMSPs (NMHS and/or non-NMHS, public and/or private) should proactively consider how the foreseen modernization of the air transport system over the next decade will impact upon their roles and responsibilities.

All WMO Members should be encouraged to actively overcome foreseen challenges and to harness foreseen opportunities in this regard.

### IWXXM Preparedness

**Conclusion**

While most WMO Members appear to be prepared for the implementation of meteorological information using the IWXXM schema either at the point of origin or by a third party, a small and not insignificant number of WMO Members appear to be completely unprepared.

- Despite the ICAO Annex 3/WMO-No. 49, Volume II requirements that already exist and that will become applicable in November 2020 and the supporting guidance

**Recommendation**

All WMO Members, most especially those that are unprepared for the implementation of IWXXM, should be encouraged to:

- review relevant online and other guidance materials (WMO and ICAO*) pertaining to IWXXM and its implementation.
- actively participate in relevant regional and/or global meetings/events when held.
- seek twinning/mentoring opportunities with WMO Members that possess a good understanding of IWXXM and are prepared for its implementation.

* For example, ICAO Doc 10003 (Manual on the ICAO Meteorological Information Exchange Model) available from ICAO publications.
### COST RECOVERY SUSTAINABILITY

<table>
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<th>CONCLUSION</th>
<th>RECOMMENDATION</th>
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| While most WMO Members with a cost recovery scheme for the provision of aeronautical meteorological services are satisfied that the scheme can sustain basic and underpinning meteorological infrastructure into the next decade (2020s), a small and not insignificant number of WMO Members expressed dissatisfaction in this regard. | All WMO Members with a cost recovery scheme for the provision of aeronautical meteorological services should be encouraged to ensure that the scheme is sustainable through periodic review and update as necessary consistent with, in particular, WMO and ICAO guidelines including:  
  - **WMO-No. 904** (Guide to aeronautical meteorological services cost recovery: principles and guidance).  
  - ICAO Doc 9161 (Manual on ANS economics)*.  
  - ICAO Doc 9082 (Policies on charges for airports and ANS)*.  
  
  * Available from ICAO publications |

### WMO SUPPORT TO MEMBERS

<table>
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<tr>
<th>CONCLUSION</th>
<th>RECOMMENDATION</th>
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| Most WMO Members (a majority) are satisfied that WMO, through its technical commissions and regional associations, are adequately supporting their aeronautical meteorology needs.  
However, some WMO Members (a minority) are dissatisfied with the level of support, especially that given by the regional associations. | WMO should ensure that sufficient resources in aeronautical meteorology are available to support the needs of Members, especially but not exclusively those most in need (i.e. developing and least developed countries).  
WMO Constituent Bodies Reform in the next WMO financial period (2020-2023) should be harnessed as an opportunity to improve the efficiency and effectiveness of the Organization, its coordination with and support to Members on all matters, including aeronautical meteorology. |
<table>
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<tr>
<th>STRATEGIC PLANNING</th>
<th>RECOMMENDATION</th>
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<tr>
<td><strong>CONCLUSION</strong></td>
<td>All WMO Members should be encouraged to review the outcomes of the EC-69 Special Dialogue (2017) as well as other relevant global events and developments held since including:</td>
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| Many WMO Members have not reviewed the outcomes of the EC-69 Special Dialogue on the future of aeronautical meteorological services, not conducted a SWOT analysis of their AMSPs, and not yet developed strategic plans, at a national level, for the design and evolution of their aeronautical meteorological services | • WMO long-term plan for aeronautical meteorology (LTP-AeM)  
• ICAO Global Air Navigation Industry Symposium (GANIS/2)  
• WMO CAeM-16 Session and Technical Conference (TECO)  
• ICAO Air Navigation Conference (AN-Conf/13) |

with a view to proactively planning for and responding to the foreseen changes in aeronautical meteorological service requirements and capabilities.

To support strategic planning considerations, the long-term plan for aeronautical meteorology, in particular, provides a framework upon which AMSPs of WMO Members specifically and the broader meteorology and aviation communities in general can plan a progressive transformation from a conventional “product-centric” approach to a modern “information-centric” approach to service provision for aviation through to 2030 and beyond.
ANNEX

LIST OF ABBREVIATIONS AND ACRONYMS

Note. — The following list provides a decode of abbreviations and acronyms used in this publication. Some of the acronyms/abbreviations used are recognized internationally, others are not.

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AMSP</td>
<td>Aeronautical meteorological service provider</td>
</tr>
<tr>
<td>ASBU</td>
<td>Aviation system block upgrade (of ICAO)</td>
</tr>
<tr>
<td>CAeM</td>
<td>Commission for Aeronautical Meteorology (of WMO)</td>
</tr>
<tr>
<td>CR</td>
<td>Cost recovery</td>
</tr>
<tr>
<td>EC</td>
<td>Executive Council (of WMO)</td>
</tr>
<tr>
<td>Cg</td>
<td>World Meteorological Congress (of WMO)</td>
</tr>
<tr>
<td>GANP</td>
<td>Global Air Navigation Plan (of ICAO)</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
</tr>
<tr>
<td>IWXXM</td>
<td>ICAO Meteorological Information Exchange Model</td>
</tr>
<tr>
<td>NMHS</td>
<td>National meteorological and hydrological service</td>
</tr>
<tr>
<td>OPMET</td>
<td>Operational meteorological (information)</td>
</tr>
<tr>
<td>QMS</td>
<td>Quality management system</td>
</tr>
<tr>
<td>RA</td>
<td>Regional association (of WMO)</td>
</tr>
<tr>
<td>TC</td>
<td>Technical commission (of WMO)</td>
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<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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