Agenda Item 1:   **Follow up to conclusions and decisions adopted by SAM/IG meetings and report on results of the Twelfth Air Navigation Conference (AN-Conf/12)**

**FOLLOW-UP TO RECOMMENDATIONS OF THE
TWELFTH AIR NAVIGATION CONFERENCE (AN-Conf/12)**

(Presented by the Secretariat)

SUMMARY

This working paper reports on the outcome of, and actions taken by, the Council of ICAO on the Twelfth Air Navigation Conference held in Montreal from 19 to 30 November 2012. The Conference agreed to a number of recommendations which call for further follow-up by ICAO, States, International organizations and Planning and Implementation Groups (PIRGs) as well as Stakeholders.

The proposed actions on the recommendations, which are analysed in the Appendix to this working paper, are presented in order that the Meeting considers the appropriate follow up actions at the applicable recommendation of the AN-Conf/ in order to be reflected at the Regional and national activities.

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1.   **INTRODUCTION**

1.1   The Twelfth Air Navigation Conference (AN-Conf/12), held in Montréal from 19 to 30 November 2012 dealt with six agenda items. The meeting was attended by a total of 1 032 participants from 120 Contracting States and 30 observer delegations.

2.   **ANALYSIS**

2.1   The Conference made fifty-six recommendations, often comprising a number of components, covering a variety of air navigation subjects. On 28 January 2013, the Air Navigation Commission reviewed and acted under delegated authority on forty-eight of the recommendations and proposed action by the Council on eight recommendations.

2.2   Subsequently, the Council on 1 March 2013 considered and approved the report of the AN-Conf/12, as presented by the Air Navigation Commission. In taking action recommended by the Commission, the Council confirmed ICAO's role in the follow up, and called upon States, international organizations, PIRGs and stakeholders to initiate action on specific recommendations as necessary.

2.3   The actions taken by the Commission under delegated authority and by the Council on the recommendations of the AN-Conf/12 are presented in the **Appendix** to this working paper. The scope of the follow-up action by planning and implementation regional groups (PIRGs) on the recommendations, in some cases, extends to States, International organizations and other stakeholders. This distinction becomes clear when the required follow-up to the recommendations of AN-Conf/12 are examined in the Appendix.

2.4   On the basis of the analysis of the Appendix, the meeting analyzes the applicable recommendation in order to be considered in the regional and national implementation activities. The recommendations considered are the following:

2.4.1   **Agenda Item 1:** Strategic issues that address the challenge of integration, interoperability and harmonization of systems in support of the concept of "one sky" for international civil aviation

2.4.1.1   Sixteen recommendations were made on this agenda item and the recommendations applicable for Regional and States consideration actions are:

> a) Global Air Navigation Plan; Framework for global planning; Recommendation 1/1
> b) Technology: Recommendations: 1/6, 1/7 and 1/8
> c) Spectrum: Recommendation: 1/14
> d) Metrics: Recommendation 1/16

2.4.2   **Agenda Item 2:** Aerodrome operations – improving airport performance

2.4.2.1   Six recommendations were made on this agenda item and the Recommendations 2/1 and 2/5 are applicable for Regional and States consideration actions.

2.4.3   **Agenda Item 3:** Interoperability and data – through globally interoperable system-wide information management (SWIM)

2.4.3.1   Nine recommendations were made on this agenda item and the recommendations 3/2, 3/4,3/5,3/6 and 3/8 are applicable for regional consideration actions.

2.4.4   **Agenda Item 4:** Optimum capacity and efficiency – through global collaborative ATM

2.4.4.1   Eight recommendations were made on this agenda item and the recommendations 4/1,4/2,4/3,4/5,4/6,4/7 and 4/8, are applicable for regional consideration actions.

2.4.5   **Agenda Item 5:** Efficient flight paths – through trajectory-based operations

2.4.5.1   Three recommendations were made on this agenda item and the recommendations and all the three recommendations 5/1, 5/2 and 5/3 are applicable for regional consideration actions.

2.4.6   **Agenda Item 6:** Future directions

2.4.6.1   Fourteen recommendations were made on this agenda item and the recommendations applicable for Regional and States consideration actions are:

> a) Implementation – regional approach: Recommendation 6/1
> b) Implementation – general: Recommendation 6/3
> c) Human factors: Recommendation 6/4
> d) Global Navigation Satellite System: Recommendations 6/6,6/8, and 6/9
> e) Navaids: Recommendation 6/10
> f) Regional performance framework – alignment of air navigation plans and regional supplementary procedures: Recommendation 6/11
> g) Prioritization and categorization of aviation system block upgrade modules: Recommendation 6/12

3.   **ACTION BY THE MEETING**

3.1   In light of the above, the meeting, on the basis of its analysis of the Appendix, is invited
to:

a) note the outcome of the AN-Conf/12; and
b) analyze the applicable recommendations of the ANCONF 12 presented in section 2
    and Appendix of this working paper in order to establish the appropriate follow up
    actions.

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APPENDIX

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/1 – The draft Fourth Edition of the Global Air Navigation Plan (Doc 9750, GANP) That States: a) agree in-principle, with the replacement of the introduction by the high level policy principles as shown in the appendix and inclusion of other proposed improvements made at this Conference, into the updated draft Fourth Edition of the GANP;	a): Noted.	a) and c): Develop and review the new draft version of the GANP taking into account AN-Conf/12 recommendations.	a) Note
b) should have the opportunity to provide any final comments on the updated draft GANP to ICAO before it is considered by the ICAO Assembly in 2013; That ICAO:	b): Approved validation process of the new draft version of the GANP as proposed by the ANC.	b): Noted.	b) Note
c) include the key air navigation policy principles presented in the appendix under "Global Air Navigation Plan" into the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP);	c): Approved as part of the GANP approval.	-	c) to g): Note
d) develop financial policies which support efficient acquisition and implementation of global air navigation services infrastructure and aircraft equipage;	d): Requested Secretary General to take appropriate action.	d): Contribute to the definition of financial policies.	

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e) taking a total systems and performance-based approach, create a Standards and Recommended Practices development plan for the aviation system block upgrades including the establishment of agreed global priorities between the different blocks and modules; f) define a stable and efficient process for endorsement by the 38th Session of the ICAO Assembly, for updating the GANP that ensures stability in module timelines for any future updates; and g) ensure that the nature and status of the planning information in the various documents pertaining to the GANP are consistent and complete and allow due account to be taken of the inputs from ATM research, development and deployment programmes.	e) to g): Noted.	e) to g): Approved and include in the Air Navigation work programme.	
Recommendation 1/2 – Implementation That ICAO: a) through its regional offices, provide guidance and practical assistance to States and regions and subregions when they decide to implement individual blocks or modules of the aviation system block upgrades; b) establish a group and improved mechanism for interregional cooperation to ensure harmonization of air traffic management; and c) assist States and regions in training and capacity-building towards implementation of the relevant modules of the aviation system block upgrades.	a) to c): Noted.	a) to c): Consider including into the Air Navigation work programme and requested the Secretary General to take appropriate action.	a) to c): Note.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/3 – Guidance on business cases That ICAO complete the development of guidance material on business case analysis, adopting such appropriate guidance material that may be already available or under development.	Approved and requested the Secretary General to take appropriate action.	Contribute to the definition of business cases and related guidance.	Note
Recommendation 1/4 – Architecture That ICAO: a) develop, for inclusion in the first update of the GANP after the 38th Session of the ICAO Assembly, a global ATM logical architecture representation in support of the GANP and planning work by States and regions; and b) develop a breakdown of the logical architecture of the ground system to the level needed to best address the global interoperability issues.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) and b): Note.
Recommendation 1/5 – Time reference accuracy That ICAO define the accuracy requirements for the future use of a time reference and to prepare the necessary amendments to Standards and Recommended Practices.	Noted.	Approved and include in the Air Navigation work programme	Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/6 – Data communications issues That ICAO: a) organize a multidisciplinary review of air traffic control communication requirements and issues; and b) review the operation, management and modernization of a regional digital network technical cooperation project and other similar regional experiences with the aim that this efficient practice can be adapted for use in other ICAO regions; That States: c) explore multi-modal solutions when appropriate to overcome transition issues; and d) anticipate and accelerate the migration of air traffic management communication systems towards more efficient technologies to timely service the aviation system block upgrade modules.	a) and b): Noted. c) and d): Noted.	a) and b): Approved and include in the Air Navigation work programme. c) and d): Approved and requested the Secretary General to bring to the attention of States.	a) and b): Note c) and d): States to take appropriate action
Recommendation 1/7 – Automatic dependent surveillance — broadcast That States: a) recognize the effective use of automatic dependent surveillance — broadcast (ADS-B) and associated communication technologies in bridging surveillance gaps and its role in supporting future trajectory-based air traffic management operating concepts, noting that the full potential of ADS-B has yet to be fully realized; and	a) to c): Noted.	a) to c): Noted and requested the Secretary General to bring to the attention of States.	a) to b): Note.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
b) recognize that cooperation between States is key towards improving flight efficiency and enhancing safety involving the use of automatic dependent surveillance — broadcast technology; That ICAO: c) urge States to share automatic dependent surveillance — broadcast (ADS-B) data to enhance safety, increase efficiency and achieve seamless surveillance and to work closely together to harmonize their ADS-B plans to optimize benefits.			c) States to share ADS-B data to enhance safety, increase efficiency and achieve seamless surveillance and to work closely together
Recommendation 1/8 – Rationalization of radio systems That ICAO and other stakeholders to explore strategies for the decommissioning of some navigation aids and ground stations, and the rationalization of the on-board communications, navigation and surveillance systems while maintaining safety and coordinating the need for sufficient system redundancy.	Noted.	Approved and include in the Air Navigation work programme.	States and IOs explore strategies for the decommissioning of some navigation aids and ground stations, and the rationalization of the on-board CNS systems, while maintaining safety.
Recommendation 1/9 – Space-based automatic dependent surveillance — broadcast That ICAO: a) support the inclusion in the Global Air Navigation Plan, development and adoption of space-based automatic dependent surveillance — broadcast surveillance as a surveillance enabler; b) develop Standards and Recommended Practices and guidance material to support space-based automatic dependent surveillance — broadcast as appropriate; and c) facilitate needed interactions among stakeholders, if necessary, to support this technology.	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/10 – Automatic dependent surveillance — self-organizing wireless data networks That ICAO consider the use of self-organizing wireless data networks based on VDL Mode-4 technology taking into account: a) possible technical advantages; b) whether it satisfies any unmet operational need; and c) its impact of forward and retro-fit on the global air transport fleet.	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.
Recommendation 1/11 – Automation roadmap That ICAO: a) develop a global roadmap for the evolution of ground air traffic management automation systems in line with aviation system block upgrade implementation; and b) develop performance-based system requirements for air traffic management automation systems so that: 1) where necessary these systems are interoperable across States and regions; and 2) the function and operation of these systems will result in consistent and predictable air traffic management system performance across States and regions.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) to b): Note.

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/12 – Development of the aeronautical frequency spectrum resource That States and stakeholders: a) recognize that a prerequisite for the deployment of systems and technologies is the availability of adequate and appropriate radio spectrum to support aeronautical safety services; b) work together to deliver efficient aeronautical frequency management and "best practices" to demonstrate the effectiveness and relevance of the industry in spectrum management; c) support ICAO activities relating to the aviation spectrum strategy and policy through relevant expert group meetings and regional planning groups; and d) support Assembly Resolution A36-25 and the requirement for sufficient State representation of aviation interests at World Radiocommunication Conferences (WRCs) and relevant International Telecommunication Union WRC preparatory meetings;	a) to d): Noted.	a) to d): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	a) to d): PIRGs, States and IO to take appropriate action

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
That ICAO: e) develop and implement a comprehensive aviation frequency spectrum strategy to be referenced to the Global Air Navigation Plan (GANP), which includes the following objectives: 1) timely availability and appropriate protection of adequate spectrum to create a sustainable environment for growth and technology development to support safety and operational effectiveness for current and future operational systems and allow for the transition between present and next generation technologies; 2) demonstrate efficient use of the spectrum allocated through efficient frequency management and use of best practises; and 3) clearly state in the strategy the need for aeronautical systems to operate in spectrum allocated to an appropriate aeronautical safety service; f) establish timelines and methodologies to complement the GANP planning objectives with a frequency spectrum strategy; g) continue to allocate adequate resources with a far-sighted approach to its work programmes regarding aviation spectrum challenges; h) consider a methodology to enable ATM stakeholders to effectively share ICAO material on aviation frequency spectrum as a common guidance for securing the aviation position at World Radiocommunication Conferences; and	e) to i): Noted.	e) to i): Approve and include in the Air Navigation work programme.	e) to i): Note.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
i) consider structuring the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies* (Doc 9718) by using a web-based platform as appropriate, to further support States in their implementation of the spectrum strategy.			
Recommendation 1/13 – Potential use of fixed satellite service spectrum allocations to support the safe operation of remotely piloted aircraft systems That ICAO support studies in the International Telecommunication Union Radio Communication Sector (ITU-R) to determine what ITU regulatory actions are required to enable use of frequency bands allocated to the fixed satellite service for remotely piloted aircraft system command and control (C2) links to ensure consistency with ICAO technical and regulatory requirements for a safety service.	Noted.	Approved and include in the Air Navigation work programme.	Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 1/14 – Long-term very small aperture terminal spectrum availability and protection That: a) ICAO and Member States not support additional international mobile telecommunications spectrum allocations in the fixed satellite service C-band spectrum at the expense of the current or future aeronautical very small aperture terminal networks; and b) ICAO and Member States pursue this matter in the International Telecommunication Union Radio Communication Sector (ITU-R) and during the World Radiocommunication Conference (WRC-15), with a coordinated proposal to promote a solution where the international mobile telecommunications spectrum allocation does not compromise the availability of the aeronautical very small aperture terminal networks.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme and request the Secretary General to take appropriate action.	a) and b): States to take appropriate action for a long-term VSAT spectrum availability and protection.
Recommendation 1/15 – Performance monitoring and measurement of air navigation systems That ICAO: a) establish a set of common air navigation service performance metrics supported by guidance material, building on existing ICAO documentation (e.g. Manual on Global Performance of the Air Navigation System (Doc 9883) and the Manual on Air Navigation Services Economics (Doc 9161)); b) promote the development and use of "leading safety indicators" to complement existing "lagging safety indicators" as an integral and key component to drive improvement in performance and in the achieved management of risk; and	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) and c): Note.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
c) encourage the early and close involvement of the regulator and oversight bodies in the development, proving of concepts and implementation of the aviation system block upgrades and regional programmes.			
Recommendation 1/16 – Access and equity considerations That States: a) ensure, as part of the aviation system block upgrade implementation, the principles of access and equity are included in all airspace modernization and redesign efforts; and b) detail how they will monitor the service providers to ensure that they are providing fair, equitable, and efficient access to all aviation services including general aviation.	a) and b): Noted.	a) and b): Noted and requested the Secretary General to take appropriate action and bring to the attention of States and Stakeholders.	a) and b): States to ensure the principles of access and equity are included in all airspace modernization and redesign efforts and detail how they will monitor the service providers to ensure that they are providing fair, equitable, and efficient access to all aviation services including general aviation.
Recommendation 2/1 – ICAO aviation system block upgrades relating to airport capacity That the Conference: a) endorse the aviation system block upgrade modules relating to airport capacity included in Block 1 and recommend that ICAO use them as the basis of its standards work programme on the subject; b) agree in principle to the aviation system block upgrade modules relating to airport capacity included in Blocks 2 and 3 as the strategic direction for this subject; c) recommend that the ICAO Council supports the implementation of the APEX in Safety Programme and asks the Secretary General to continue ICAO participation in safety reviews and sharing of relevant safety information, as provided for in the Memorandum of Cooperation between ACI and ICAO;	c): Noted	c): Noted.	c) Note

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That ICAO: d) include, following further development and editorial review, the aviation system block upgrade modules relating to airport capacity in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP);	d): Noted.	d): Approved and include in the Air Navigation work programme.	d) Note
e) States and service providers ensure that airport capacity, including relevant airport planning and operational issues, are addressed and accounted for when planning for air traffic management capacity and system performance;	e): Noted.	e): Approved and include in the Air Navigation work programme, and requested the Secretary General to take appropriate action.	e) States and service providers ensure that airport capacity issues are addressed and accounted for when planning for air traffic management capacity and system performance;
f) work with the Airports Council International (ACI) and other interested parties on guidance material to promote the globally-harmonized implementation of airport collaborative decision-making, including best practices and global technical standards; and That States:	f): Noted.	f): Approved and include in the Air Navigation work programme.	f) Note
g) according to their operational needs, implement the aviation system block upgrade modules relating to airport capacity included in Block 0.	g): Noted.	g): Approved and requested the Secretary General to bring to the attention of States and Stakeholders.	g) Note
Recommendation 2/2 – Development of ICAO provisions for remotely operated air traffic services That ICAO provide: a) updates on additional guidelines for surveillance and air and ground communications systems; b) requirements for the use of sensors and display technologies to replace visual observation to air traffic in the provision of air traffic services; and c) requirements for air traffic services (ATS) personnel and flight crew training, ATS personnel licensing and related procedures for remotely operated air traffic services.	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 2/3 – Security of air navigation systems That ICAO: a) seek the support of States and stakeholders to complete its work in developing a robust, secure aeronautical telecommunication network; and b) establish, as a matter of urgency, an appropriate mechanism including States and industry to evaluate the extent of the cyber security issues and develop a global air traffic management architecture taking care of cyber security issues.	a) and b): Approved and include in the Security work programme.	a) and b): Approved and include in the Air Navigation work programme.	a) to b): Note
Recommendation 2/4 – Optimized management of wake turbulence That ICAO: a) accelerate the implementation of new ICAO wake turbulence categorization systems and to pursue development of dynamic wake turbulence separation provisions with supporting implementation guidance; b) support the continuation of the cooperative work on-going addressing the static pair wise separation, with a view to having revised global provisions in place in advance of Block 1 timescales; and c) develop the wake vortex flight safety system (WVSS) concept description along with a proposed system architecture with the possibility for WVSS to be included in the aviation system block upgrade Modules B1-70, B2-70, B1-85 and B2-85.	a) to c): Noted	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 2/5 – Performance-based navigation for terminal and approach operations implementation That States and stakeholders: a) urgently implement, where appropriate, performance-based navigation for terminal and approach operations in accordance with Assembly Resolution A37-11; b) urgently adopt efficient operations approval procedures and support the mutual recognition of other States' operational approvals; c) share their best practices including required navigation performance authorization required implementation initiatives as well as relevant flight operational safety assessment documentation with other States; d) determine operational requirements in support of their airspace concept in accordance with the processes described in the *Performance-based Navigation (PBN) Manual* in order to select the appropriate PBN specification; e) including regulators, airport authorities, air navigation service providers, commercial operators, General Aviation and the military, work together at all levels and in close coordination to ensure successful performance-based navigation implementation;	a) to g): Noted.	a) to g): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	a) States and IOs urgently implement, where appropriate, PBN for terminal and approach operations in accordance with Assembly Resolution A37-11; b) States and IOs urgently adopt efficient operations approval procedures and support the mutual recognition of other States' operational approvals; c) States and IOs share their best practices d) States and IOs determine operational requirements in support of their airspace concept in accordance with the processes described in the *PBN Manual* e) States and IOs work together at all levels and in close coordination to ensure successful PBN implementation;

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f) international organizations and industry continue to provide resources to support ICAO with the development of provisions, guidance and training material in support of performance-based navigation implementation; and g) States, when considering performance-based navigation routes arriving at and departing from airports, should ensure that air navigation service providers and aircraft operators involve airport operators from the outset so that they may consult fully with local communities in order to avoid adverse noise impact on those communities.			f) IOs provide resources to support ICAO with the development of provisions, guidance and training material in support of PBN implementation g) States, when considering PBN routes arriving at and departing from airports, should ensure that air navigation service providers and aircraft operators involve airport operators from the outset so that they may consult fully with local communities in order to avoid adverse noise impact on those communities
Recommendation 2/6 – Development of ICAO provisions for performance-based navigation for en route terminal and approach operations That ICAO study and make appropriate additions where required to the ICAO provisions, including: a) required navigation performance authorization-required departure navigation specification; b) the application of performance-based navigation standard terminal arrival routes for en route independent simultaneous approaches; c) assessment of the need for ICAO provisions on the use of ground-based augmentation system to append standard instrument arrival and standard instrument departure procedures to approach and landing trajectory; d) development of separation minima to support all performance-based navigation specifications and which will also allow for operations where mixed performance requirements are in effect;	a) to g): Noted.	a) to g): Approved and include in the Air Navigation work programme.	a) to g): Note.

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e) advanced use of performance-based navigation to support aviation system block upgrade modules; f) continued development of provisions, guidance and training material in support of performance-based navigation implementation; and g)　develop and make available the minimum qualification requirements for personnel to attend performance-based navigation procedure design training.			
Recommendation 3/1 – ICAO aviation system block upgrades relating to performance improvement through the application of system-wide information management That the Conference: a) endorse the aviation system block upgrade module relating to performance improvement through the application of system-wide information management included in Block 1, and recommend that ICAO use it as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade module relating to performance improvement through the application of system-wide information management included in Block 2, as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to performance improvement through the application of system-wide information management for inclusion in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP).	c) Noted.	c) Approved and include in the Air Navigation work programme.	c) Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 3/2 – Development of a global system-wide information management concept That ICAO: a) undertake further work to develop a global system-wide information management concept for air traffic management operations and related ICAO provisions that may be necessary; b) at the appropriate time coordinate information management principles and performance-based information management; c) perform additional work on the global implementation of those principles and framework for all air traffic management information through the development of appropriate information management/system-wide information management concepts to be ready in 2014 for subsequent system development work in Block 1 and to include in its work programme, specific activities tailored at coordinating system-wide information management deployment at a local, regional and global level; d) update the information management/system-wide information management (IM/SWIM) working arrangements; That States and stakeholders: e) work together to demonstrate how system-wide information management capabilities and functions will meet the needs of the future air traffic management system.	a) to d): Noted. e): Noted.	a) to d): Approved and include in the Air Navigation work programme. e) Noted and requested the Secretary General to bring to the attention of States.	a) to d): Note. e) States and IOs work together to demonstrate how SWIM capabilities and functions will meet the needs of the future ATM

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Recommendation 3/3 – Development of ICAO provisions relating to system-wide information management That: a) under the leadership of ICAO, develop detailed technical specifications for system-wide information management in close collaboration with the aviation community; b) detailed technical specifications for system-wide information management should be open and rely on generic international standards to the extent possible; and c) ICAO undertake work to identify the security standards and bandwidth requirements for system-wide information management.	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.
Recommendation 3/4 – State and industry and industry support of system-wide information management a) industry support the transition towards system-wide information management by providing appropriate systems supporting automation and the exchange of all relevant air traffic management data in a globally standardized manner; and b) States and all relevant stakeholders contribute to further development and harmonization of performance-based information management. **Recommendation 3/5 – Operational performance through flight and flow – information for a collaborative environment** That the Conference: a) endorse the aviation system block upgrade module relating to flight and flow – information for a collaborative environment included in Block 1, and recommend that ICAO use it as the basis of its work programme on the subject;	a) and b): Note.	a) and b): Noted and requested the Secretary General to bring to the attention of States.	a) States and IOs support the transition towards SWIM b) States and IOs contribute to further development and harmonization of performance-based information management

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
b) agree in principle with the aviation system block upgrade module relating to flight and flow – information for a collaborative environment included in Blocks 2 and 3, as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to flight and flow – information for a collaborative environment for inclusion in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) investigate, as part of the post-implementation review of the FPL2012, proposals for the implementation of all performance-based navigation codes and other capabilities into the flight plan, having regard to an impact assessment including cost benefit analysis and other factors;	c) and d): Noted.	c) and d): Approved and include in the Air Navigation work programme.	c) and d): Note
e) convene a symposium, as soon as possible, where interested partners would develop an end-to-end advanced system demonstrations of new air traffic management concepts to support a common understanding of concepts such as SWIM, FF-ICE trajectory-based operations and collaborative decision-making;	e): To Review.	e): Noted.	e) : Noted.
That States: f) and industry work through ICAO to mature the flight and flow – information for a collaborative environment concept; g) support the development of a flight information exchange model; h) according to their operational needs, implement the aviation system block upgrade modules relating to improved operational performance through flight and flow – information for a collaborative environment included in Block 0.	f) to h): Noted.	f) to h): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	f) States and IOs work through ICAO to mature the FF-ICE for a collaborative environment concept; g) States and IOs support the development of a flight information exchange model; h) States according to their operational needs, implement the ASBU modules relating to improved operational performance through FF-ICE

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Recommendation 3/6 – ICAO aviation system block upgrades relating to service improvement through aeronautical information management as well as digital air traffic management information That the Conference: a) endorse the aviation system block upgrade module relating to service improvement through the integration of digital air traffic management information included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject; That ICAO: b) include, following further development and editorial review, the aviation system block upgrade modules relating to service improvement through digital aeronautical information management as well as integration of digital air traffic management information in the draft in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); That States: c) according to their operational needs, implement the aviation system block upgrade module relating to service improvement through digital aeronautical information management included in Block 0.	b): Noted. c): Note.	b): Approved and include in the Air Navigation work programme. c): Noted and requested the Secretary General to bring to the attention of States.	b) Note c) States, according to their operational needs, implement the ASBU module relating to service improvement through digital AIM

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Recommendation 3/7 – ICAO provisions relating to service improvement through aeronautical information management as well as digital air traffic management information That ICAO: a) expedite the development of relevant Standards facilitating the transition of aeronautical information service to aeronautical information management and the implementation of system-wide information management taking into account the work accomplished in State programmes; and b) as a matter of urgency, to translate and make available the necessary Standards and guidance material to facilitate the global transition from aeronautical information service to aeronautical information management.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a)and b) :Note

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 3/8 – State actions relating to service improvement through aeronautical information management as well as digital air traffic management information That States: a) accelerate transition from aeronautical information service to aeronautical information management by implementing a fully automated digital aeronautical data chain; b) implement necessary processes to ensure the quality of aeronautical data and information from the origin to the end users; c) engage in intraregional and interregional cooperation for an expeditious transition from aeronautical information service (AIS) to aeronautical information management (AIM) in a harmonized manner and to using digital data exchange and consider regional or subregional AIS databases as an enabler for the transition from AIS to AIM; and d) review their NOTAM publication procedures, provide appropriate guidance to NOTAM originators and ensure adequate oversight of the NOTAM publication process is conducted.	a) to d): Noted.	a) to d): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	a) States accelerate transition from AIS to AIM by implementing a fully automated digital aeronautical data chain; b) States implement necessary processes to ensure the quality of aeronautical data and information from the origin to the end users; c) States /PIRGS /Regional implementation groups engage in intraregional and interregional cooperation for an expeditious transition from AIS to aeronautical information management AIM in a harmonized manner and to using digital data exchange and consider regional or subregional AIS databases as an enabler for the transition from AIS to AIM; and d) States review their NOTAM publication procedures, provide appropriate guidance to NOTAM originators and ensure adequate oversight of the NOTAM publication process
Recommendation 3/9 – Review of NOTAM system and development of options for replacement That ICAO initiate a review of the current NOTAM system, building further on the digital NOTAM activities, including the development of options for a replacement system that would enable web-based applications and compliant with the system-wide information management principles that are being developed for the air traffic management system.	Noted.	Approved and include in the Air Navigation work programme.	Note.

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Recommendation 4/1 – Efficient management of airspace and improved flow performance through collaborative decision-making That the Conference: a) endorse the aviation system block upgrade modules relating to network operations included in Block 1 and recommend that ICAO use them as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade modules relating to network operations included in Blocks 2 and 3 as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to network operations in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) include in its work programme the future standardization of all elements to support the collaborative decision-making process underlying the air traffic control (ATC)-air traffic flow management (ATFM) integration as well as of the technical exchanges between ATFM and ATC; e) develop and incorporate into the ICAO *Manual on Collaborative Air Traffic Flow Management* (Doc 9971) implementation guidance on Airport-CDM and provisions on air traffic flow management data exchange format including trajectory information;	c) to g): Noted.	c) to g): Approved and include in the Air Navigation work programme.	c) to g): Note.

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f) develop and execute global communications, roll-out and training plan for the ICAO *Manual on Collaborative Air Traffic Flow Management* (Doc 9971); and g) develop further provisions and guidance on flexible use of airspace principles for future use and in preparation for future 4D trajectory-based airspace management. That States: h) accelerate the implementation of collaborative decision-making processes in the provision of services at the regional level, being guided by the principles set forth in the *Manual on Collaborative Air Traffic Flow Management* (Doc 9971) and the *Manual on Flight and Flow – Information for a Collaborative Environment* (Doc 9965); i) according to their operational needs, implement the aviation system block upgrade modules relating to network operations included in Block 0.	h) and i): Noted.	h) and i): Noted and requested the Secretary General to bring to the attention of States.	h) States and PIRGs to accelerate the implementation of CDM i) States, according to their operational needs, implement the ASBU modules relating to network operations included in Block 0.
Recommendation 4/2 – ICAO aviation system block upgrades relating to ground surveillance using automatic dependent surveillance – broadcast/multilateration, air traffic situational awareness, interval management and airborne separation. That the Conference: a) endorse the aviation system block upgrade modules relating to interval management included in Block 1 and recommend that ICAO use them as the basis of its work programme on the subject; b) agree in principle to the aviation system block upgrade modules relating to airborne separation included in Block 2 as the strategic direction for this subject;			

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That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to airborne separation in the Appendices to the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) agree in principle to review the concepts and terminology of the "airborne separation" concepts involving controllers assigning tasks to flight crews, with controllers able to apply different, risk-based separation minima for properly equipped ADS-B IN aircraft; e) in the development of provisions, acknowledge the relationship between airborne separation and airborne collision avoidance system; f) modify aviation system block upgrade (ASBU) Module B2-85 to reflect d) and e), modify ASBU Module B2-101 to reflect f); and g) agree in principle to review the concepts and terminology supporting B2-85 "airborne separation" and amend the module accordingly.	c) to g): Noted.	c) to g): Approved and include in the Air Navigation work programme.	c) to g): Note.
That States: h) according to their operational needs, to implement the aviation system block upgrade modules relating to ground surveillance, improved air traffic situational awareness and improved access to optimum flight levels included in Block 0.	h): Noted	h): Noted and requested the Secretary General to bring to the attention of States.	h): States, according to their operational needs, to implement the ASBU modules relating to ground surveillance, improved ATSA and improved access to optimum flight levels included in Block 0.

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	COUNCIL	AIR NAVIGATION COMMISSION (ANC)	PIRGs/States/International Organizations (IO)
Recommendation 4/3 – ICAO aviation system block upgrades relating to airborne collision avoidance systems and ground-based safety nets That the Conference: a) endorse the aviation system block upgrade module relating to ground-based safety nets included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject; b) agree in principle to the aviation system block upgrade module relating to airborne collision avoidance systems included in Block 2, as the basis of the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to airborne collision avoidance systems and ground-based safety nets in the Appendices to the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) adopt a coordinated approach towards reviewing and developing as necessary Standards and Recommended Practices, Procedures for Air Navigation Services and guidance material for ground-based and airborne safety nets, taking into account careful evaluation and validations of the effects on safety and performance of downlinking airborne collision avoidance system (ACAS) Resolution Advisories (RAs) to controllers; e) when considering Standards and Recommended Practices for airborne collision avoidance system (ACAS) downlink, to emphasize the significant amount of training material already existing and the importance of increased pilot and air	c) to h): Noted.	c) to h): Approved and include in the Air Navigation work programme.	c) to h): Note.

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traffic controller training on the responsibilities and requirements to reacting correctly to ACAS RA events and then communicating; f) develop an ICAO Manual for Ground-based Safety Nets, which includes provision for tools for validation and certification of these; g) incorporate the new generation of airborne collision avoidance system (ACAS X) into its work programme; h) encourage the Federal Aviation Administration to work with other States with the capacity and capability to do so, in the development of new generation of airborne collision avoidance system (ACAS X); That States: i) according to their operational needs, to implement the aviation system block upgrade modules relating to airborne collision avoidance systems and ground based safety nets included in Block 0.	i): Noted.	i): Noted and requested the Secretary General to bring to the attention of States.	i): States to implement the ASBU modules relating to ACAS and ground based safety nets included in Block 0.
Recommendation 4/4 – Positioning and tracking over oceanic and remote areas, and flight data triggered transmission That ICAO: a) continue the evaluation of the necessary changes in the field of transmission of flight data, bearing in mind the cost associated with any of these changes as well as the need to improve search and rescue operations; and b) develop suitable proposals for the amendment of ICAO documents, as necessary.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) and b): Note.

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Recommendation 4/5 – Civil/military coordination/cooperation and sharing of airspace That States: a) planning and implementation regional groups, and ICAO to analyse the benefits that could be achieved through improved civil/military cooperation and sharing of the airspace serving international traffic flows and express the results of this analysis in terms of: 　1) capacity increases and reduction in routine delays as measured by traffic volumes on major traffic flows; 　2) document fuel savings and emission reductions through the use of the fuel savings estimation tools; and 　3) other additional benefits; b) based on the analysis made by States, planning and implementation regional groups, and ICAO, urge States to develop plans to implement improvements for the cooperative use of airspace related to the top areas of opportunity and establish concrete targets using tools already available for this purpose; c) in relation to international traffic flows, for each ICAO region urge the planning and implementation regional groups and their associated States to identify the top areas of opportunity that could benefit the most from improvements in civil/military cooperation and sharing of the airspace and develop concrete targets for improvement;	a) to c): Noted.	a) to c): Noted and request the Secretary General to bring to the attention of States.	a): PIRGs to analyse the benefits that could be achieved through improved civil/military cooperation and sharing of the airspace serving international traffic flows and express the results of this analysis in terms of capacity increase, fuel savings and emissions reductions and other additional benefits. b): States to develop plans to implement improvements for the cooperative use of airspace on the basis of analysis made by States /PIRGs and ICAO. c): PIRGs and States to identify the top areas of opportunity that could benefit the most from improvements in civil/military cooperation and sharing of the airspace and develop concrete targets for improvement

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That ICAO: d) develop a set of criteria or metrics to enable objective measurement of progress in civil/military cooperation; and e) continue to develop guidance material for States on the flexible use of their airspace, airspace design, interoperability and integration of humanitarian assistance flights in crisis response scenarios in their airspaces to facilitate integrated use of the airspace.	d) and e): Noted.	d) and e): Approved and include in the Air Navigation work programme.	d) and e): Note.
Recommendation 4/6 – ICAO aviation system block upgrades relating to integration of remotely piloted aircraft into non-segregated airspace That the Conference: a) endorse the aviation system block upgrade module relating to remotely piloted aircraft included in Block 1 and recommend that ICAO use it as the basis of its work programme on the subject; b) agree in principle to the aviation system block upgrade modules relating to remotely piloted aircraft included in Blocks 2 and 3 as the strategic direction for this subject;.			

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That ICAO: c) as a matter of urgency, develop the necessary regulatory framework in its entirety to support the integration of remotely piloted aircraft into non-segregated airspace and at aerodromes including and clearly showing the scope of such regulation; d) investigate the need for and scope of oversight of data links related to command, control and air traffic control communications for remotely piloted aircraft systems; e) include, following further development and editorial review, the aviation system block upgrade modules relating to the integration of remotely piloted aircraft into non segregated airspace in the Appendices to the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); That States: f) be cognizant of the recent amendments to Annexes 2 — *Rules of the Air* and 7 — *Aircraft Nationality and Registration Marks* related to remotely piloted aircraft systems and to support the continuation of this work at ICAO; g) work closely with ICAO and each other to ensure harmonization of provisions if they have an urgent need to accommodate remotely piloted aircraft system operations	c) to e): Noted. f) and g): Noted.	c) to e): Approved and include in the Air Navigation work programme. f) and g): Noted and requested the Secretary General to bring to the attention of States.	c) to e): Note. f) Note g) States to work closely with ICAO and each other to ensure harmonization of provisions if they have an urgent need to accommodate RPAS operations.
Recommendation 4/7 – ICAO aviation system block upgrades relating to meteorological information That the Conference: a) endorse the aviation system block upgrade module relating to meteorological information included in Block 1, including the addition of the provision of information on space weather, and recommend that			

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ICAO uses it as the basis of its work programme on the subject; b) agree in principle the aviation system block upgrade module relating to meteorological information included in Block 3 as the strategic direction for this subject; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to meteorological information in the draft Fourth edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) undertake the development of the air traffic management meteorological information integration plan and an associated roadmap by a cross-disciplinary group of experts; e) work on defining the meteorological information exchange model as an enabler for system-wide information management; f) invite the next Meteorology Divisional Meeting, held in coordination with the World Meteorological Organization, to develop initial provisions in Annex 3 — *Meteorological Service for International Air Navigation* relating to the aviation system block upgrade modules concerning meteorological information and f) above, and to develop a long-term strategy to support their further development and full implementation;	c) to f): Noted.	c) to f): Approved and include in the Air Navigation work programme.	c) to f): Note.

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That States: g) according to their operational needs, to implement the aviation system block upgrade module relating to meteorological information included in Block 0, including the addition of the provision of OPMET information; h) work together in the implementation of the aviation system block upgrades relating to meteorological information and to increase investment in education and training.	g) and h): Noted.	g) and h): Noted and requested the Secretary General to bring to the attention of States.	g): States , according to their operational needs, to implement the ASBU module relating to meteorological information included in Block 0, including the addition of the provision of OPMET information; h) work together in the implementation of the ASBU relating to meteorological l information and to increase investment in education and training.
Recommendation 4/8 – Crisis coordination arrangements and contingency plans That ICAO: a) consider how crisis coordination arrangements for potentially disruptive events, similar to that used for volcanic eruptions, could be established on a regional basis; and b) and regional offices continue to support the development, promulgation, maintenance of contingency plans, including the holding of practical exercises, in preparedness for potentially disruptive events, including those events that may adversely impact aviation safety.	a) and b): Noted.	a) and b): Approved and include in the Air Navigation work programme.	a) and b): Note.

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Recommendation 5/1 – Improved operations through enhanced airspace organization and routing Considering that performance-based navigation (PBN) is one of ICAO's highest air navigation priorities and the potential benefits achievable through creation of additional capacity with PBN: That States: a) implement performance-based navigation in the en-route environment; b) fully assess the operational, safety, performance and cost implications of a harmonization of transition altitude and, if the benefits are proven to be appropriate, undertake further action on a national and (sub) regional basis a first step towards a globally harmonized transition altitude; c) take advantage of improved models for inter-regional coordination and collaboration to achieve seamless air traffic management and more optimum routes through the airspace; d) through the planning and implementation regional groups improve their methods of coordination to increase implementation of en-route performance-based navigation in order to achieve more optimum routes through the airspace;	a) to d): Noted.	a) to d): Approved and include in the Air Navigation work programme.	a): States implement PBN in the enroute environment b) : States fully assess the operational, safety, performance and cost implications of a harmonization of transition altitude and, if the benefits are proven to be appropriate, undertake further action on a national and (sub) regional basis a first step towards a globally harmonized transition altitude; c): States and PIRGs take advantage of improved models for inter-regional coordination and collaboration to achieve seamless air traffic management and more optimum routes through the airspace; d): States and PIRGs improve their methods of coordination to increase implementation of en-route performance-based navigation in order to achieve more optimum routes through the airspace;

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That ICAO: e) encourage the planning and implementation regional groups to support the early deployment of performance-based navigation in accordance with Assembly Resolution 37-11; f) support, through development of a framework that capitalizes, builds on, and promotes demonstration activities which confirm the benefits of performance-based navigation as an enabler of more efficient operations in the en-route phase of flight; and g) that avionics incorporate fixed radius transition functionality to support closer spacing of performance-based navigation routes and improve airspace capacity.	e) and f): Noted. g): Noted.	e) and f): Noted and request the Secretary General to bring to the attention of States. g): Noted and request the Secretary General to bring to the attention of relevant Industry Stakeholders.	e) and f): Note. g): Note
Recommendation 5/2 – ICAO aviation system block upgrades relating to trajectory based operations That the Conference: a) endorse the aviation system block upgrade module relating to trajectory-based operations included in Block 1 and ICAO use it as the basis of its work programme on the subject; b) agree in principle with the aviation system block upgrade module relating to 4D trajectory-based operations included in Block 3 as the strategic direction for this subject;			

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That ICAO: c) include, following further development and editorial review, the aviation system block upgrade module relating to 4D trajectory-based operations in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); That States: d) support development by ICAO of Standards and Recommended Practices and guidance material related to trajectory-based operations; and e) implement, according to their operational needs, the aviation system block upgrade module relating to trajectory-based operations included in Block 0.	c): Noted. d) and e): Note.	c): Approved and include in the Air Navigation work programme. d) and e): Note and request the Secretary General to bring to the attention of States.	c): Note. d): support development by ICAO of SARPs and guidance material related to TBO e): States implement, according to their operational needs, the ASBU module relating to TBO included in Block 0.

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Recommendation 5/3 – Increased flexibility and efficiency in descent and departure profiles That the Conference: a) endorse the aviation system block upgrade module relating to continuous descent operations included in Block 1; b) agree in principle to the aviation system block upgrade module relating to continuous descent operations included in Block 2; That ICAO: c) include, following further development and editorial review, the aviation system block upgrade modules relating to continuous climb operations and continuous descent operations in the draft Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP); d) incorporate the point merge technique as an interim continuous descent operations measure in Block B0-05; That States: e) as supported by their operational requirements and a positive business case, implement according to their operational needs as a matter of urgency, the aviation system block upgrade modules relating to continuous climb operations and continuous descent operations included in Blocks 0 and 1; and f) as supported by their operational requirements and a positive business case, use point merge technique as an application towards achieving full continuous descent operations, when developing performance-based navigation standard instrument arrivals (STARs).	c) and d): Noted. e) and f): Noted.	c) and d): Approved and include in the Air Navigation work programme. e) and f): Noted and requested the Secretary General to bring to the attention of States	c) and d): Note e):States, as supported by their operational requirements and a positive business case, implement according to their operational needs as a matter of urgency, the ASBU modules relating to CCO and CDO included in Blocks 0 and 1. f) States, as supported by their operational requirements and a positive business case, use point merge technique as an application towards achieving full continuous descent operations, when developing PBN STARs,

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Recommendation 6/1 – Regional performance framework – planning methodologies and tools That States and PIRGs: a) finalize the alignment of regional air navigation plans with the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) by May 2014; b) focus on implementing aviation system block upgrade Block 0 Modules according to their operational needs, recognizing that these modules are ready for deployment; c) use the electronic regional air navigation plans as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities; d) involve regulatory and industry personnel during all stages of planning and implementation of aviation system block upgrade modules; e) develop action plans to address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities;	a) to e): Approved.	a) to e): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	a): States and PIRGs finalize the alignment of regional air navigation plans with the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) by May 2014; b):States and PIRGs focus on implementing ASBU Block 0 Modules according to their operational needs. c): States, PIRGs, IOs, use the electronic regional air navigation plans as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities; d) States and PIRGs involve regulatory and industry personnel during all stages of planning and implementation of ASBU modules; e) States and PIRGs develop action plans to address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities;

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That ICAO: f) considers how the continuous monitoring approach to safety oversight maps to the evaluation of Member States' safety oversight capabilities concerning aviation system block upgrades g) review the current amendment process to the Regional Air Navigation Plans (ANPs) and recommend improvements to increase efficiencies related to the approval and maintenance of the data in the regional ANPs; h) develop guidance material, on the basis of best practices employed worldwide, for the regional/local deployment of new ATM technologies, required procedures, operational approvals and continue to support States in the implementation of the aviation system block upgrades; i) identify the issues, funding, training and resource requirements necessary to support a safety framework that would lay the foundation for successful implementation the aviation system block upgrades; j) develop, together with industry and stakeholders, an engagement strategy to address the economic and institutional impediments to implementation of the aviation system block upgrades; k) develop a mechanism for sharing of best practices for the aviation system block upgrade implementation; and l) define a methodology to ensure interregional and global harmonization of air navigation services through ANRF reporting in an effective and timely manner, and consider the employment of interregional and multi-regional fora.	f) to l): Noted. j): Approved and requested the Secretary General to address the economic and institutional impediments to GANP implementation.	f) to l): Approved with the exception of j), include in the Air Navigation work programme and request the Secretary General take appropriate action. j): Noted and consider contribution to be included in the Air Navigation work programme.	f) to l): Note j): Note

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Recommendation 6/2 – Guidelines on service priority That: a) ICAO develop an appropriate set of operational and economic incentive principles to allow early benefits of new technologies and procedures, as described in the aviation system block upgrade modules, to support operational improvements, while maximizing safety, capacity and overall system efficiency; and b) States and international organizations contribute to this work.	a) and b): Noted.	a) and b): Approved, consider contribution to be included in the Air Navigation work programme and request the Secretary General to take appropriate action.	a) and b): Note
Recommendation 6/3 – Assessment of economic, financial and social implications of air traffic management modernization and aviation system block upgrades deployment That ICAO: a) undertake work toward developing a network-wide operational improvement level assessment for global use, which should include the development of standard values and processes for economic evaluations; b) take the relevant conclusions from the AN-Conf/12, regarding economic, financial and social aspects of the aviation system block upgrades, to the Sixth Air Transport Conference with the aim of developing solutions which would support a safe and sustainable air navigation system; That States: c) conduct their economic, financial and social analyses in a closely coordinated manner with relevant ATM stakeholders in view of their diverse position of involvement in the implementation of aeronautical systems.	a) and b): Noted. c): Note and request the Secretary General to bring to the attention of States.	a) and b): Approved, consider contribution to be included in the Air Navigation work programme and request the Secretary General to take appropriate action. c): Noted and the Secretary General to bring to the attention of States.	a) and b): Note c): States conduct their economic, financial and social analyses in a closely coordinated manner with relevant ATM stakeholders in view of their diverse position of involvement in the implementation of aeronautical systems

RECOMMENDATIONS ADOPTED BY AN-CONF/12	FOLLOW-UP ACTION TAKEN		FOLLOW-UP ACTION TO BE INITIATED
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Recommendation 6/4 – Human performance That ICAO: a) integrate human performance as an essential element for the implementation of ASBU modules for considerations in the planning and design phase of new systems and technologies, as well as at the implementation phase, as part of a safety management approach. This includes a strategy for change management and the clarification of the roles, responsibilities and accountabilities of the aviation professionals involved; b) develop guidance principles, guidance material and provisions, including SARPs as necessary, on ATM personnel training and licensing including instructors and assessors, and on the use of synthetic training devices, with a view to promoting harmonization, and consider leading this effort with the support of States and industry; c) develop guidance material on using field experience and scientific knowledge in human performance approaches through the identification of human-centred operational and regulatory processes to address both current safety priorities and the challenges of future systems and technologies; d) assess the impact of new technologies on competencies of existing aviation personnel, and prioritize and develop competency-based provisions for training and licensing to attain global harmonization; e) establish provisions for fatigue risk management for safety within air traffic services operations; f) develop guidance material on different categories of synthetic training devices and their respective usage;	a) to f): Noted.	a) to f): Approved and include in the Air Navigation work programme.	a) to f): Note.

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That States: g) provide human performance data, information and examples of operational and regulatory developments to ICAO for the benefit of the global aviation community; h) support all ICAO activities in the human performance field through the contribution of human performance expertise and resources; i) adopt airspace procedures, aircraft systems, and space-based/ground-based systems that take into account human capabilities and limitations and that identify when human intervention is required to maintain optimum safety and efficiency; and j) investigate methods to encourage adequate numbers of high quality aviation professionals of the future and ensure training programmes are in line with the skills and knowledge necessary to undertake their roles within a changing industry.	g) to j): Note.	g) to j): Note and request the Secretary General to bring to the attention of States.	g): States provide human performance data, information and examples of operational and regulatory developments to ICAO. h) States support all ICAO activities in the human performance field through the contribution of human performance expertise and resources. i) States adopt airspace procedures, aircraft systems, and space-based/ground-based systems that take into account human capabilities and limitations and that identify when human intervention is required j) States investigate methods to encourage adequate numbers of high quality aviation professionals of the future and ensure training programmes are in line with the skills and knowledge necessary.

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Recommendation 6/5 – ICAO work programme to support global navigation satellite system evolution That ICAO undertake a work programme to address: a) interoperability of existing and future global navigation satellite system constellations and augmentation systems, with particular regard to the technical and operational issues associated with the use of multiple constellations; b) identification of operational benefits to enable air navigation service providers and aircraft operators to quantify these benefits for their specific operational environment; and c) continued development of Standards and Recommended Practices and guidance material for existing and future global navigation satellite system elements and encouraging the development of industry standards for avionics.	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note
Recommendation 6/6 – Use of multiple constellations That States, when defining their air navigation strategic plans and introducing new operations: a) take advantage of the improved robustness and availability made possible by the existence of multiple global navigation satellite system constellations and associated augmentation systems; b) publish information specifying the global navigation satellite system elements that are approved for use in their airspace; c) adopt a performance-based approach with regard to the use of global navigation satellite system (GNSS), and avoid prohibiting the use of GNSS elements that are compliant with applicable ICAO Standards and Recommended Practices;	a) to e): Noted.	a) to e): Noted and requested the Secretary General to bring to the attention of States and Stakeholders.	a): States take advantage of the improved robustness and availability made possible by the existence of multiple GNSS constellations and associated augmentation systems; b) States publish information specifying the GNSS elements that are approved for use in their airspace; c) States adopt a performance-based approach with regard to the use of GNSS, and avoid prohibiting the use of GNSS elements that are compliant with applicable ICAO SARPs

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d) carefully consider and assess if mandates for equipage or use of any particular global navigation satellite system core constellation or augmentation system are necessary or appropriate; That aircraft operators: e) consider equipage with GNSS receivers able to process more than one constellation in order to gain the benefits associated with the support of more demanding operations.			d) States carefully consider and assess if mandates for equipage or use of any particular global navigation satellite system core constellation or augmentation system are necessary or appropriate; e) IOs consider equipage with GNSS receivers able to process more than one constellation in order to gain the benefits associated with the support of more demanding operations
Recommendation 6/7 – Assistance to States in mitigating global navigation satellite system vulnerabilities That ICAO: a) continue technical evaluation of known threats to the global navigation satellite system, including space weather issues, and make the information available to States; b) compile and publish more detailed guidance for States to use in the assessment of global navigation satellite system vulnerabilities; c) develop a formal mechanism with the International Telecommunication Union and other appropriate UN bodies to address specific cases of harmful interference to the global navigation satellite system reported by States to ICAO; and d) assess the need for, and feasibility of, an alternative position, navigation and timing system.	a) to d): Noted.	a) to d): Approved and include in the Air Navigation work programme.	a) to d): Note.

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Recommendation 6/8 – Planning for mitigation of global navigation satellite system vulnerabilities That States: a) assess the likelihood and effects of global navigation satellite system vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods; b) provide effective spectrum management and protection of global navigation satellite system (GNSS) frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance; c) report to ICAO cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations; d) develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers; e) allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems; and f) where it is determined that terrestrial aids are needed as part of a mitigation strategy, give priority to retention of distance measuring equipment (DME) in support of inertial navigation system (INS)/DME or DME/DME area navigation, and of instrument landing system at selected runways.	a) to f): Noted.	a) to f): Approved and requested the Secretary General to bring to the attention of States and Stakeholders.	a) States assess the likelihood and effects of GNSS vulnerabilities in their airspace and apply, as necessary, recognized and available mitigation methods. b) States provide effective spectrum management and protection of GNSS frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance. c) States report to ICAO cases of harmful interference to global navigation satellite system that may have an impact on international civil aviation operations. d) States develop and enforce a strong regulatory framework governing the use of global navigation satellite system repeaters, pseudolites, spoofers and jammers. e) States allow for realization of the full advantages of on-board mitigation techniques, particularly inertial navigation systems. f) States where it is determined that terrestrial aids are needed as part of a mitigation strategy, give priority to retention of DME in support of inertial navigation system (INS)/DME or DME/DME area navigation, and of instrument landing system at selected runways

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Recommendation 6/9 – Ionosphere and space weather information for future global navigation satellite system implementation That ICAO: a) coordinate regional and global activities on ionosphere characterization for global navigation satellite system implementation; b) continue its effort to address the global navigation satellite system (GNSS) vulnerability to space weather to assist States in GNSS implementation taking into account of long-term GNSS evolution as well as projected space weather phenomena; c) study the optimum use of space weather information that is globally applicable from low to high magnetic latitude regions for enhanced global navigation satellite system performance at a global context; That States:	a) to c): Noted.	a) to c): Approved and include in the Air Navigation work programme.	a) to c): Note.
d) consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation.	d): Noted.	d): Noted and requested the Secretary General to bring to the attention of States.	d): States consider a collaborative approach to resolve ionospheric issues including ionospheric characterization for cost-effective, harmonized and regionally suitable global navigation satellite system implementation

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Recommendation 6/10 – Rationalization of terrestrial navigation aids That, in planning for the implementation of performance-based navigation, States should: a) assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of performance-based navigation; b) ensure that an adequate terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of global navigation satellite system service in their airspace; and c) align performance-based navigation implementation plans with navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.	a) to c): Noted.	a) to c): Approved and requesedt the Secretary General to bring to the attention of States and Stakeholders.	a): States assess the opportunity for realizing economic benefits by reducing the number of navigation aids through the implementation of PBN; b) States ensure that an adequate terrestrial navigation and air traffic management infrastructure remains available to mitigate the potential loss of global navigation satellite system service in their airspace; and c) States align performance-based navigation implementation plans with navigation aid replacement cycles, where feasible, to maximize cost savings by avoiding unnecessary infrastructure investment.
Recommendation 6/11 – Regional performance framework – alignment of air navigation plans and regional supplementary procedures That ICAO initiate a formal amendment process in accordance with normal procedures to align the areas of applicability of the air navigation plans and the regional supplementary procedures, observing the following principles: 1) there will be no change to the current accreditation of the ICAO regional offices to Contracting States; 2) there will be no change to the obligation of individual States to provide services in accordance with ICAO Annex 11 — *Air Traffic Services*, 2.1; 3) there will be no change to the governance responsibilities of the ICAO Council, including approval of amendments to air	Approved and requested the Secretary General to bring to the attention of States and Stakeholders.	Noted.	Note

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navigation plans and regional supplementary procedures; 4) there will be no change to the current requirements for services and facilities and or to the current supplementary procedures for a given airspace as listed in current air navigation plans and regional supplementary procedures; 5) there will be no change to the principle that a planning and implementation regional group is composed of the Contracting States providing air navigation service in the air navigation region and that other Contracting States can participate in the activities with observer status; 6) there will be no change to ICAO's assistance to planning and implementation regional groups from the regional offices; 7) the responsibilities of the performance framework management for an air navigation region will now be integrated and will rest with the planning and implementation regional group established for the region; and 8) to the extent possible, the main traffic flows will be accommodated within homogeneous airspaces in order to minimize changes between different air navigation systems and different operational procedures during flight.			

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Recommendation 6/12 – Prioritization and categorization of block upgrade modules That States and PIRGs: a) continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities; b) take a considerate approach when mandating avionics equipage in its own jurisdiction of air navigation service provision, taking into account of burdens on operators including foreign registry and the need for consequential regional/global harmonization; That ICAO: c) continue to work on guidance material for the categorization of block upgrade modules for implementation priority and provide guidance as necessary to planning and implementation regional groups and States; d) modify the block upgrade module naming and numbering system using, as a basis, the intuitive samples agreed by the Conference; and e) identify modules in Block 1 considered to be essential for implementation at a global level in terms of the minimum path to global interoperability and safety with due regard to regional diversity for further consideration by States.	a) and b): Noted. c): Noted. d):Noted. e):Noted.	a) and b): Noted. c): Approved and include in the Air Navigation work programme. d): Approved and requested the Secretary General to take appropriate action. e): Approved and include in the Air Navigation work programme.	a): States, PIRGS and IOs continue to take a coordinated approach among air traffic management stakeholders to encourage effective investment into airborne equipment and ground facilities b) States , PIRGs and IOs, take a considerate approach when mandating avionics equipage in its own jurisdiction of air navigation service provision, taking into account of burdens on operators including foreign registry and the need for consequential regional/global harmonization c): Note d): Note e): Note

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Recommendation 6/13 – Development of Standards and Recommended Practices, procedures and guidance material That ICAO: a) improve its project management and coordination of contributing ICAO panels, study groups and other expert groups, including task forces and other specialized teams tasked with the development of ICAO provisions and related work, through: 　1) consistent application of the *Directives for Panels of the Air Navigation Commission* (Doc 7984); 　2) receiving regular reports from the expert groups against agreed terms of reference and work programmes; 　3) mandating strong coordination between all expert groups developing ICAO provisions to ensure efficient management of issues and avoidance of duplication; 　4) application of the principles of accountability, geographical representation, focus, efficiency, consistency, transparency and integrated planning to the operation of all the expert groups; 　5) developing documented procedures for other expert groups, including task forces and other specialized teams as well; and 　6) better use of today's communication media and internet to facilitate virtual meetings, thereby increasing participation and reducing costs to States and ICAO;	a) to d): Noted.	a) to d): Approved and include in the Air Navigation work programme. d), 1): review and update the *Directives for Panels of the Air Navigation Commission* (Doc 7984) along principles stated by the Conference.	a) to d): Note

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b) continue to coordinate with the other recognized standards-making organizations (Assembly Resolution A37-15 refers) in order to make the best use of the capabilities of these other recognized standards-making organizations and to make reference to their material, where appropriate; c) initiate studies to improve the verification and validation process required within ICAO before material developed by recognized standards-making organizations can be referenced in ICAO documentation; and d) consider a methodology by which ICAO can capture the regional implementation and challenges, and to reflect them in a standardized process to effectively support the aviation system block upgrade deployment.			
Recommendation 6/14 – Guidelines for conducting aeronautical studies to assess permissible penetration of obstacle limitation surfaces That ICAO develop comprehensive guidelines for States in the uniform application in conducting aeronautical studies to assess the permissible penetration of obstacle limitation surfaces (OLS).	Noted.	Approved and include in the Air Navigation work programme.	Note

— END —