



# ICAO AIR NAVIGATION COMMISSION

SPECIAL 200TH SESSION COMMEMORATIVE REVIEW

Fall 2015



# Celebrating the Invaluable Contributions of the **ICAO Air Navigation Commission** to Global Aviation Technical Achievement

The ICAO Air Navigation Commission (ANC) considers and recommends Standards and Recommended Practices (SARPs) and Procedures for Air Navigation Services (PANS) for the safety and efficiency of international civil aviation, which are adopted or approved by the ICAO Council.

The Commission is composed of nineteen members who must have “*suitable qualifications and experience in the science and practice of aeronautics*”, as outlined in the Convention on International Civil Aviation (the Chicago Convention).

Although Commission members are nominated by specific ICAO Member States and appointed by the Council, they do not represent the interest of any particular State or Region, but rather are expected to act in their expert capacity in the interest of the entire international civil aviation community.



**One of the first meetings of the ICAO Air Navigation Commission, held at ICAO's Montreal HQ on 21 September 1949. At centre is Mr. Walter J. Binaghi of Argentina, the ANC's first Chairman and later ICAO Council President from 1957–1976.**

Since its establishment, the Commission has considered and recommended the development of SARPs in 16 of the 19 Annexes to the Chicago Convention and five PANS. The Annexes and PANS relate to aspects of international civil aviation including but not limited to: Accident Investigation; Aerodromes; Air Routes and Ground Aids; Aeronautical Maps and Charts; Aeronautical Telecommunications and Radio Aids; Airworthiness and identification of Aircraft; Rules of the Air and Air Traffic Control; Aeronautical Meteorology; Search and Rescue; Safety Management; Systems of Dimensional Units; and Training Requirements. Such provisions promote safety, regularity and efficiency of international civil aviation.

Challenges currently faced by the Commission include maintaining and improving aviation safety and air navigation efficiency while integrating increased traffic into the current aviation infrastructure, introducing advanced systems, as well as proactively identifying risks and devising mitigation measures, in accordance with the Global Aviation Safety Plan (GASP) and the Global Air Navigation Plan (GANP).

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Message from the

## President of the Council

As the main technical body of the Provisional International Civil Aviation Organization (PICAO), the Committee on Air Navigation (or Air Navigation Committee) was established by the Interim Council on 28 August 1945. Under its early mandate it directed and coordinated a number of technical sub-committees, which just as today were composed of civil aviation specialists from Member States and observers from relevant international organizations.

PICAO was eventually formalized as ICAO on 4 April 1947, and two years later, at the 4th Meeting of its 6th Session held on 1 February 1949, the ICAO Council adopted several resolutions on the establishment of what would henceforth be recognized as the ICAO Air Navigation Commission. It held its first meeting one week later and has been serving as an invaluable technical advisory body to the ICAO Council ever since.

While originally composed of 12 members, the ANC was later expanded to 15 members during the 18th Assembly of ICAO (Vienna) in 1971 (entering into force in 1974), and later to the 19 members it stands at today subsequent to a further 27th Assembly Resolution in Montreal in 1989 (entering into force in 2005).

Throughout its long history of dedicated support to the ICAO Council, and indeed the entire global civil aviation sector, the ANC has continuously amended principles and procedures governing its activities, conduct and operations. This has allowed it to keep step with the rapid technological advancements inherent to air transport progress over the decades, not to mention refining the new or amended international Standards and Recommended Practices (SARPs) agreed through ICAO to ensure harmonized global civil aviation modernization.

All of these contributions of this dedicated and talented technical group ultimately serve to ensure the safety of passengers and goods and the overall efficiency of the global air transport system. And for that every man, woman and child who has ever flown owes some degree of gratitude to the men and women who have committed themselves to the ANC's important mission.

On the occasion of the 200th session pre-eminent technical body, I am honoured to acknowledge the history and contributions of the ICAO Air Navigation Commission on behalf of ICAO and all its Member States.

**Dr. Olumuyiwa Benard Aliu**  
President  
ICAO Council



Message from the

## President of the ANC

From a fundamental standpoint, the ICAO ANC serves as an independent advisory body of the ICAO Council on all air navigation technical matters. Sharing its responsibilities with ICAO's Air Navigation Bureau (ANB), it is served by the principles of separation and independence as well as a commitment to cooperation and collaboration in every responsibility it undertakes.

Since the ANC first began its work, over 12,000 Standards and Recommended Practices (SARPs) have been developed. These are contained in 16 Annexes to the Chicago Convention, 5 Procedures for Air Navigation Services (PANS) publications and numerous ICAO manuals. This significant accomplishment would not have been possible without the commitment of what I would refer to as the 'ANC Community'; namely the panels and experts, the Air Navigation Bureau and the Air Navigation Commission, Commissioners, Industry Observers and State Observers. This collective and constructive approach remains essential to realizing future improvements to the safety, efficiency and sustainability of civil aviation.

In recent years, this expert community and the ANC have improved their methodologies, resulting in more effective project management and more timely and effective support for the objectives and targets contained in ICAO's Global Plans for aviation safety and air navigation. Through a committed team effort, SARP development and implementation are now more effective than ever and the ANC will now be looking to design an Air Navigation Work Programme that even more efficiently assists ICAO and our Commission in managing resources and priorities as per Global Plan requirements.

I wish to thank everyone concerned for their important contributions, advice, opinions and energy, which have been dedicated to the global ideals of safety and efficiency for aviation. Considering the air transport sector's five per cent annual global growth rate and the constant evolution of related technologies, there will doubtless be many challenges ahead for the ANC. However I remain very confident in our historic ability to find common ground and pool resources to find solutions that deliver truly global benefits.

In the pages which follow you will find our new Panel structure and a description of each, which I trust will serve to illustrate the extent of our work while encouraging States to remain active and dedicate participants in the ANC's SARP-development process.

The ANC has the great honour to be at the conclusion of this very collaborative and constructive process before the final adoption in the Council. It should however be stressed that the results are delivered by the whole community working in a constructive, non-partisan way for a global benefit.

Farid Zizi  
President  
ICAO Air Navigation Commission

# The ANC Today



Top row – Left to Right: Einar HEDINSSON, Jameel METWALLI, Jeffrey BOLLARD, Declan FITZPATRICK, Rolf MONNING, Kyung-soo YU  
Middle row – Left to Right: Antonio CRESPO, Ismael PACHECO, Alexander KORSAKOV, Moussa HALIDOU, Simon ALLOTEY, Hajime YOSHIMURA  
Bottom row – Left to Right: Mervyn FERNANDO, William VOSS, Claude HURLEY, Kirsten RIENSEMA, Farid ZIZI (President ANC),  
Steve CREAMER (Director ANB), TAI Feng, Raul CARBONI



# The ANC Panels

In the following pages readers will find a list and description of current ANC Panels



## History

ICAO Convention Article 57: *The Air Navigation Commission shall establish technical subcommissions on which any contracting State may be represented, if it so desires.*

As early as 1959 the first edition of the “Directives for Panels of the Air Navigation Commission” was published, providing guidelines necessary for the formation of Panels, as mandated by the Convention.

This can be considered the very beginning of a great ICAO success story: the establishment of Air Navigation Commission (ANC) Panels.

## Responsibilities

The ICAO Council delegates the authority with respect to Panels to the ANC. Panels are technical groups of qualified experts, formed by the ANC. The primary purpose of these Panels is to advance, within specified time frames, solutions for specialized problems, and to develop ICAO Standards for the evolution of air navigation which cannot be done within the ANC or the ICAO Secretariat.

The ANC establishes the Panel’s Terms of Reference and its Work Programme, and determines Panel membership by putting emphasis on expertise and well-balanced geographical representation, taking care to include International Organizations as well as States. ICAO relies on States and industry to provide highly qualified experts to develop the required provisions using the most current knowledge of the field. The Secretariat designates a Panel Secretary, who is the interface between the ANC, the Panel and the Secretariat. Panels meet typically once or more per

year, at the ICAO Headquarters in Montreal or outside in the ICAO Regions as full Panels or Working Groups. They report back to the ANC with their results and proposals; consequent to deliberation between the ANC, Secretariat and Panel, these may be included in new ICAO Standards.

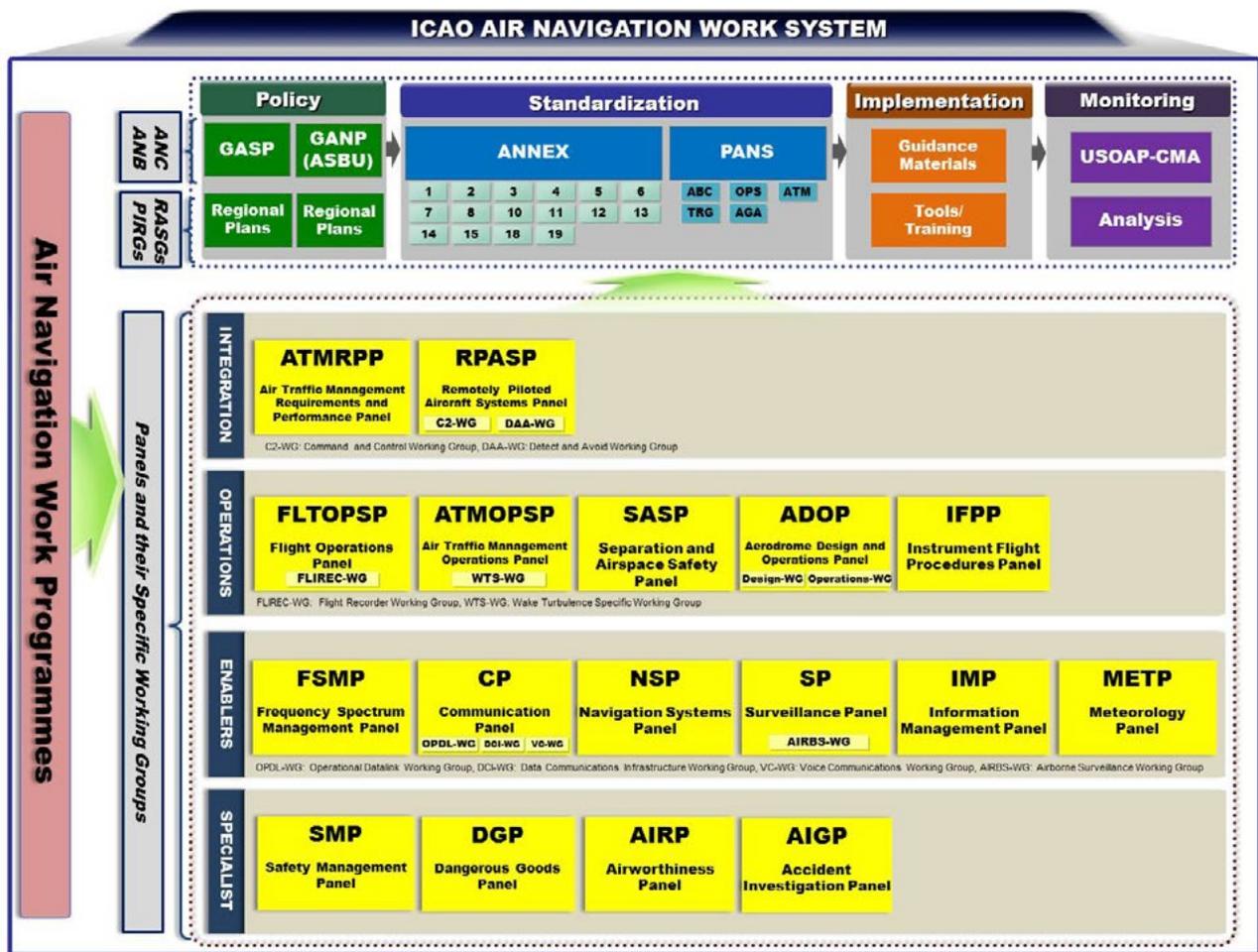
## Structure

Appreciating decades of successful work, in 2012 the 12<sup>th</sup> Air Navigation Conference concluded that aviation had changed to a sufficient extent that an integrated systems-approach was the best way forward, rather than the independent systems-approach of years past. With this in mind, a restructuring of all existing expert groups was tasked to ICAO, creating a new or adapted structure, where the available expertise from States and industry could be used most suitably and effectively. Furthermore, existing procedures for Panels would be optimized to reflect this changed situation, emphasizing the need for improved methods of interaction between Panels, frequent exchange of results, appropriate delegation of tasks, and optimal use of the reduced available resources from States, industry and other stakeholders. The planning for future handling and operation of the ICAO expert groups would therefore have to be integrated and transparent, in order to achieve the highest possible acceptance and support.

A result of this modernization process is now visible in a recently revised ANC Panel structure, as illustrated. The Panel structure today reflects the changed world of aviation, including new methods of possible future transportation, communication, navigation and surveillance for safe and sustainable aviation.



Figure - Panel Structure



## Aerodrome Design & Operations Panel (ADOP)

The Aerodrome Panel (AP) was the successor of a Visual Aids Panel established in 1958, of the former Aerodrome Reference Code and RFF Panels, and of a number of existing study groups on aerodrome facilities

and services. The AP was renamed to the ADOP in 2014 with greater emphasis on efficiency and capacity issues through enhanced aerodrome operations.



### Challenges & Opportunities

Annex 14 - Aerodromes was created in 1947 as a design document to guide States in the development of their aerodrome infrastructure. The ADOP has started a holistic review of Annex 14, and its related documents, to facilitate their use with modern aerodrome operations.

The ADOP's main challenges are to review: Aerodrome design characteristics to take advantage of modern aircraft's better performance; Aerodrome Reference Code design methods and governing parameters; Obstacle Limitation Surfaces concept to make it an effective regulation; pertinence and adequacy of many visual aids which were developed in the 1950s or 60s – all the while keeping in mind modern technologies on-board aircraft and on the ground which could improve safety, efficiency and capacity, with the aim to maintain safety of operations in a changing environment.

These challenges have required the ADOP to adapt, so as to effectively address:

- provisions for Ground Handling Services
- Airport Collaborative Decision Making (A-CDM)
- Advanced Surface Movement Guidance & Control Systems (ASMGCS).

Current ADOP challenges require tight collaboration with the ATMOPSP, FLTOPSP and other Panels, with an aggressive timescale to ensure success.



## Accident Investigation Panel (AIGP)

The Accident Investigation Panel (AIGP) was established in 2014 to research and develop provisions for accident and incident investigations to allow for timely and effective investigations as set forth in Annex 13 - Aircraft Accident and Incident Investigation, and in support of the Global Aviation Safety Plan (GASP).

### Challenges & Opportunities

The AIGP held its first meeting in April 2015. During this meeting, expert investigators from sixteen Member States and five international organizations, familiar with the provisions of Annex 13, progressed the work programme of the panel. Eleven working groups were created to study the different items on the AIGP work programme as set forth in the AIGP job-cards.

Accident and incident investigation related amendments to Annex 13 and Annex 6 - Operation of Aircraft are underway regarding the protection of accident and incident investigation records. Guidance material is currently being developed for the implementation of these provisions.

The work of the AIGP involves coordination with other panels and working groups within and outside ICAO. Main challenges in the near future is to keep accident and incident investigation provisions up-to-date on evolving technology enhancements, mutual assistance during investigations, delegation of investigations, investigation of serious incidents and evolving operational challenges during investigations, such as remotely piloted aircraft systems (RPAS).

## Airworthiness Panel (AIRP)

The Airworthiness Panel (AIRP) undertakes specific studies of the technical and operational ICAO provisions for Airworthiness. The general objective of the Panel is to develop and maintain SARPS and guidance material

for Continuing airworthiness and aircraft certification provisions of Annex 8 — Airworthiness, maintenance related provisions of Annex 6 — Operation of Aircraft and Annex 7 — Aircraft nationality and registration marks.



### Challenges & Opportunities

The AIRP members are very enthusiastic about the future work. The particular areas of focus will be on:

- Adapting existing standards to technological developments, and innovative aircraft design, production and maintenance concepts, while ensuring an adequate level of safety.
- Supporting the implementation of effective risk management to the aircraft design, production, and maintenance process.
- Developing standards and recommended practices which promote the efficient use of industry standards, the cooperation between States, and which reduce duplication of the oversight of organizations.

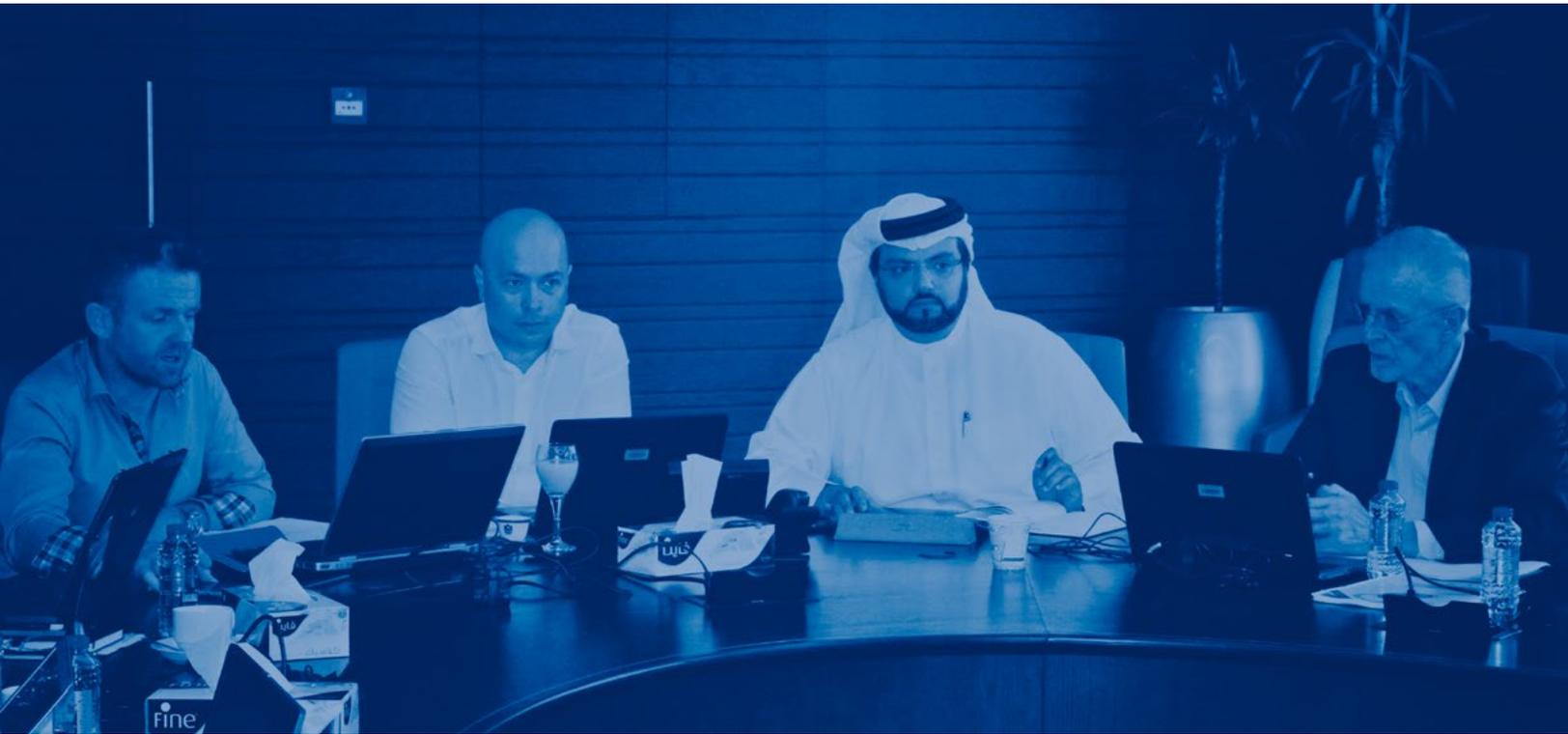
The AIRP is currently developing provisions including guidance material for the harmonisation of maintenance organization approvals. This will help in the mutual recognition of maintenance approvals which is the goal to be reached in the longer term.

Opportunities also exist to facilitate the harmonisation and recognition of other airworthiness related approvals, to enhance the cooperation with industry and to make more use of industry standards in ICAO guidance material. All these initiatives will facilitate the improved efficiency of operations and make the regulatory environment more flexible for industry while reducing safety risks.

# Air Traffic Management Operations (ATMOPSP)

The Air Traffic Management Operations Panel (ATMOPSP) focuses on developing new ATM procedures in support of the Global Air Navigation Plan (GANP) and addressing operational issues brought to the fore by the application

of current Procedures for Air Navigation Services - Air Traffic Management (PANS-ATM) provisions.



## Challenges & Opportunities

The ATMOPSP analyses existing provisions falling under its purview to ensure that they are sufficiently robust to support the increased global use of new communication, navigation and surveillance (CNS) technologies in every day operations, whilst maintaining the consistency of procedures to be applied by air traffic controllers and pilots. As such, the panel must ensure that various requests for change stemming from the work of other technical panels are consistent with the operational meaning attached to PANS-ATM and Annex 11 - Air Traffic Services provisions (e.g. phraseology in support of ATC procedures).

One of the main challenges that this panel faces is linked to the fact that the provisions that fall under its purview are procedures that are widely used, and already implemented. As such, this panel must constantly balance the need to improve provisions and procedures against the necessary

stability that the aviation community expects from document such as Annex 11 or PANS-ATM. For example, the panel recently reviewed and proposed an amendment related to SID and STAR, clarifying the procedures and the associated phraseology to indicate to flight crews whether or not they should abide by all the restrictions of a given SID or STAR.

The expansion of the panel's responsibilities into areas such as air traffic flow management, civil-military cooperation or wake turbulence requirements presents the opportunity to adopt a holistic perspective on ATM procedures with the inherent interdependencies between the various ATM domains.

# Air Traffic Management Requirements and Performance Panel (ATMRPP)

The Air Traffic Management Operational Concept Panel (ATMCP) was established in 1998 and renamed to Air Traffic Management Requirements and Performance Panel (ATMRPP) in 2004 to reflect the fact that the previous

panel had completed the development of the ATM operational concept and it was needed to establish the performance requirements to serve as the basis for SARPs and PANS development.



## Challenges & Opportunities

The ATMRPP develops concepts and guidance on key strategic ATM areas in which developments are needed to ensure a harmonized transition to the Global ATM Concept. In doing so, the ATMRPP develops target concepts but also addresses transition by developing material for the first transition steps. A main foundation of a globally harmonized ATM system is relevant, timely and consistent information. To this end, ATMRPP has delivered the concept for System Wide Information Management (SWIM) which will be further enhanced by the Panel with a concept covering the integration of the aircraft into SWIM.

The main performance benefits can be achieved through consistently maintaining and sharing aircraft trajectory information; the objective of Trajectory Based Operation (TBO). ATMRPP has developed a concept for the sharing of trajectory information i.e. FF-ICE (Flight and Flow Information for a Collaborative Environment); the replacement of the traditional flight plan by a more dynamic and interactive exchange of trajectory and flight information during the pre-departure phase. In addition ATMRPP is developing an overall concept for TBO which should be used as a common reference for more detailed developments in that area. Finally, the ATMRPP supports the ANC in the maintenance and update of the Global Air Navigation Plan (GANP) and will address the overall ATM architecture, all to facilitate an efficient, harmonized and consistent transition to the Global ATM Concept.

## Communication Panel (CP)

The Communication Panel (CP) was established in 2013 as a result of a merger between the Aeronautical Communications Panel and the Operational Datalink Panel. The CP undertake specific studies and develops technical and operational ICAO provisions for ATM voice and data communications systems, supporting procedures and their applications as outlined in the Global Air Navigation Plan (GANP).

### Challenges & Opportunities

CP is tasked to maintain the current ICAO communication provisions, and also very importantly to advise the ANC and provide the recommendations for future aeronautical communications. This is a critical task for CP, as communication is a critical enabler for future concepts and with direct links to activities of other Panels including NSP, SASP, ATMOPSP, IMP, RPASP, FLTOPSP and FSMP.

The need to distribute ever greater amounts of data will continue to put pressure on the already limited spectrum resources available, thus requiring the aviation community to develop and adopt more spectrum efficient concepts and technologies.

This is being accomplished by the CP under a Future Communications Infrastructure initiative. In addition to the introduction of data communications over the Very High Frequency (VDL-2) system in various regions throughout the world, the CP has identified new technologies to support increased demands in the airport surface, enroute



and oceanic environments. New Internet Protocols are being standardized to take advantage of the performance improvements and lower cost associated with their use. In addition, the CP is standardizing new cyber-security solutions to help thwart future threats. Finally, the CP is continuing to work closely with other international standardization bodies to help reduce the time and cost for their development.

## Operational Data Link Specific Working Group

The Operational Data Link Specific Working Group of the Communications Panel (formerly known as OPLINKP) aims to advance the use and performance of datalink and satellite voice technologies, addressing all operational aspects of ATS that use these technologies for communications, whether between aircraft and the ground or multiple ground facilities. The work and effort involved in advancing many of these technologies, while ensuring consistency with ICAO's global objectives, are interdependent on the various industry bodies including the avionics and aircraft manufacturers, the air navigation service providers (ANSPs) and communications service providers (CSP).





## Dangerous Goods Panel (DGP)

The Dangerous Goods Panel (DGP), established in 1976, undertakes specific studies and develops dangerous goods ICAO provisions as set forth in Annexes in response to evolving technologies and the introduction of new dangerous articles and substances. The DGP works to harmonize the provisions with those for all modes of transport while considering additional and often more stringent requirements necessary for transport by air.

### Challenges & Opportunities

The DGP has traditionally dealt with chemicals in gaseous, liquid or solid form. These dangerous goods are classified according to set standards/criteria and represent a known risk which is easily mitigated. For the last 10 years or so, the DGP has faced the additional challenge of articles containing dangerous goods [which may or may not represent the same risk as goods contained]. Industry “just-in-time” culture has resulted in large quantities of these commodities on board aircraft.

Energy storage devices, including lithium batteries are such articles. Lithium batteries continue to demand much attention from the DGP as they may represent additional

risks on board an aircraft. In order to mitigate these risks, the DGP has involved experts from relevant fields to thoroughly assess the various aspects of flight, including operations and aircraft design and fire suppression systems capabilities. Also, the Panel is in the process of developing a performance packaging standard for lithium batteries. The Airworthiness Panel (AIRP), Flight Operations Panel (FLTOSP) and Safety Management Panels (SMP) together with airframe manufacturers have collaborated extensively on lithium battery issues, including participation in three ICAO multidisciplinary lithium battery meetings which were held in 2014/2015. As a result, all have a better understanding of the role dangerous goods play in cargo safety.

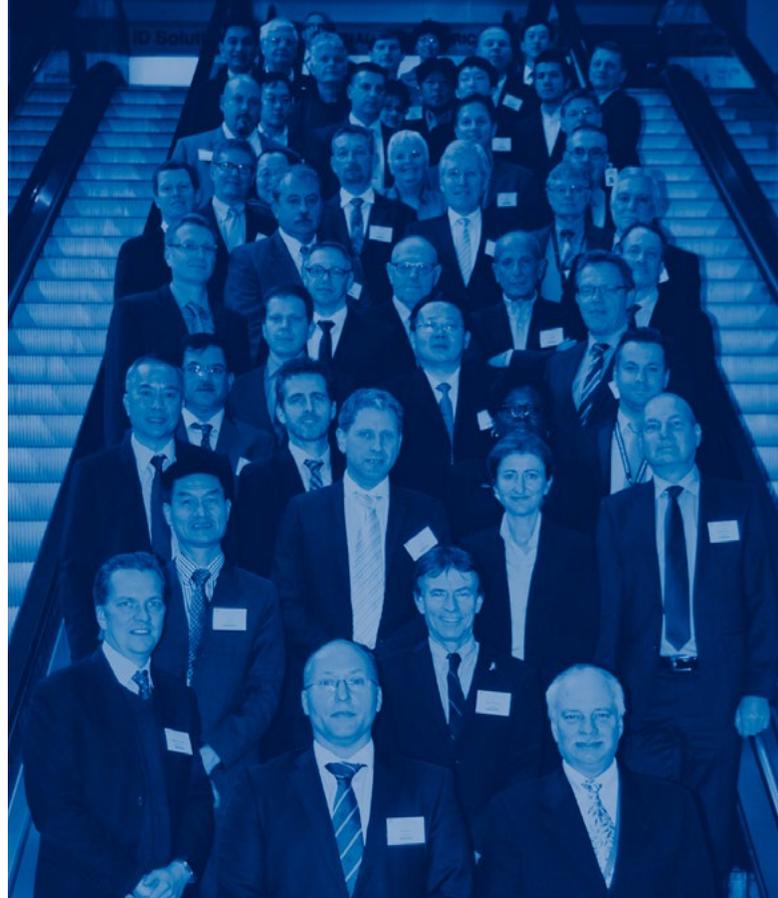
## Flight Operations Panel (FLTOSP)

The Flight Operations Panel (FLTOSP), originally established in 1976 as the OPSP, continues to undertake specific studies and develop technical and operational ICAO provisions related to flight operations – for commercial air transport, general aviation, and helicopter operations – to ensure that proposed SARP amendments reflect current and emerging requirements, opportunities and developments in modern technologies.

### Challenges & Opportunities

The work of the FLTOSP involves extensive coordination with other panels and working groups within and outside ICAO, with the main challenges in the near future being to keep flight operation provisions up-to-date with evolving risk management concepts, technology enhancements and evolving operational procedures. The FLTOSP work-programme includes the following areas:

- Adaption of Commercial Air Transport provisions for General Aviation applications, notably Fatigue management, Rescue Fire Fighting Services, and Extended Diversion Time Operations (EDTO);
- Approval, acceptance, authorization – need for consistent terms;
- Cargo compartment fire suppression issues, e.g. EDTO and DG;
- Complex Performance Based Navigation (PBN) operations;
- Electronic Flight Bag Manual update;



- Enhanced aerodrome accessibility using PBN and flexible ops minima;
- Flight Data Analysis to provide best practices to States;
- Pilot Monitoring Skills ref. the Human in the System;
- Runway safety improvements;
- Airborne Collision Avoidance System during emergency descent; and
- Helicopter and Tilt rotor operations

## Flight Recorder Specific Working Group of the FLTOSP Panel

### Challenges & Opportunities

The FLIRECSWG undertakes studies and develops provisions taking into account emerging requirements for on-board flight recordings and recent developments in flight recorder technology.

In the light of recent accidents the FLIREC-SWG is continuing the development of amendments regarding the:

- location of aircraft in distress,
- underwater location of wreckage and recorders,
- extended duration of CVR, and the
- means to recover flight data without recovering flight recorders.



Further work for flight recorders related amendments to Annex 6 are currently underway regarding:

- image recorders,
- recording of flight data for RPAS.

## Frequency Spectrum Management Panel (FSMP)

The former Aeronautical Communications Panel Working Group F was transformed into Frequency Spectrum Management Panel (FSMP) in 2014 to manage aeronautical frequency spectrum in order to ensure sufficient

access to the resource for the provision of aeronautical communication, navigation and surveillance services (CNS) in an efficient and safe manner.



### Challenges & Opportunities

The growing use of wireless applications across different industries is increasing the competition for radio frequency spectrum. At the same time, aviation systems are requiring better performance and more wireless data capacity to support new applications and industry growth. Therefore the challenge is to balance managing the finite spectrum resource to support existing and evolving aviation technologies, protecting it from interference, resisting loss to competing industries, and facilitating more efficient usage to meet the growth of existing, and introduction of new, aviation systems. Not meeting these challenges can severely limit aviation operations, ranging from a direct impact to flight safety, to insufficient capacity to meet growing air traffic requirements.

New technologies to support aeronautical communication, navigation and surveillance (CNS) services provide innovative ways to use existing aviation spectrum, or additional frequency ranges not already used by aviation. The FSMP supports the development and management of the frequencies used by these systems, and coordinates the aviation positions that will go to the ITU-R World Radio Communication Conferences. By developing the spectrum requirements for these new technologies, the FSMP can support the full potential of new aeronautical CNS services, while limiting the spectrum constraints that may be placed upon these systems.

# Instrument Flight Procedures Panel (IFPP)

The Obstacle Clearance Panel (OCP) was established in 1966, and renamed to the Instrument Flight Procedures Panel (IFPP) in 2007 to address new capability such as performance-based navigation (PBN) as well as the emerging requirements for increased accuracy, the use

of automation, the need for quality assurance and the consideration of environmental issues in instrument flight procedure designs. The IFPP undertakes specific studies and develop technical and operational ICAO provisions for instrument flight procedure design and associated domains.



## Challenges & Opportunities

The IFPP area of work concentrates on the development and maintenance of safe and efficient Flight procedures and mainly focuses on procedure criteria for new navigation methods, such as PBN and GBAS Category II/III as well as the promulgation requirements to charts and navigation databases. The panel is also paying attention to the integration of PBN into conventional airspace through new types of operations that seek to improve cost effectiveness and environmental impact and improve airport access (e.g. PBN to xLS procedures)

Flight procedures are increasingly depending on the input of information in databases and the reliance on FMS. In this respect, a growing concern are the challenges in the quality assurance process, including adequate regulatory oversight processes and integration challenges with the avionics industry. The non-standardization of FMS and accompanying differences in control laws depending on the combination of FMS and airframe cause major challenges.

In order to obtain procedures that can be implemented both from a strategic airspace design as well an avionics perspective, there is a growing need for multidisciplinary work methods. It is therefore required that the Panel works closely together with other ICAO expert groups and external industry organizations.



## Information Management Panel (IMP)

The Information Management Panel (IMP) investigates and develops a global interoperability information sharing framework for international air navigation, as well as investigating solutions to support the planning framework on information management contained in the Global Air Navigation Plan (GANP). The Panel's initial work includes the further development of the system-wide information management (SWIM) concept in collaboration with the ATM RPP.

### Challenges & Opportunities

Air Traffic Information Management and by definition, system wide information management (SWIM) will complement human-to-human communication with machine-to-machine communication, and improve data distribution and accessibility in terms of quality of the data exchanged. The implementation of SWIM will also be the basis as the ATM community move from a product-centric to an information-centric environment in the future.

Therefore, implementation of the SWIM Concept must address the challenge of creating an "interoperability environment" which allows SWIM information technology (IT) systems to cope with the full complexity of operational information exchanges. SWIM will introduce a significant change in the business practices regarding how

information is managed during the entire life cycle of ATM processes. The implementation of SWIM seeks to provide quality information to the right people and the right systems at the right time. The SWIM environment will shift the ATM information architecture paradigm from point-to-point data exchanges to system-wide interoperability.

Importantly there are a number of newer issues that require significant global development and co-ordination, these include, but are not limited to, the modernization of the NOTAM system, definition of a global interoperability framework for system architecture and identifying service requirements to maintain ATM information security, integrity, confidentiality availability, and economy.

## Meteorology Panel (METP)

The Meteorology Panel (METP) was established in 2014 to define and develop concepts and ICAO provisions for aeronautical meteorological (MET) services consistent with operational improvements envisioned by the *Global Air Navigation Plan (GANP)* and in keeping with the working arrangements between ICAO and the World Meteorological Organization.

### Challenges & Opportunities

Accurate and timely meteorological information is essential to aviation safety and air navigation efficiency. Concurrently, meteorological hazards and phenomena know no political or State boundaries. The underlying challenge then for the METP is to ensure the ongoing observation, modeling and prediction of the state of any multi-dimensional point in the atmosphere in a successful and shared global manner. The work of the METP must continue to be closely aligned and engaged with the GANP and ASBU developments, as well as the advancing requirements of aeronautical technology and aviation commerce.

In parallel to these core challenges the METP must develop new methods of providing real-time and forecast meteorological information to aviation in a data-centric form through more dynamic database and communications systems. This approach will have significant demands in transition from the traditional product-centric provision of meteorological information.

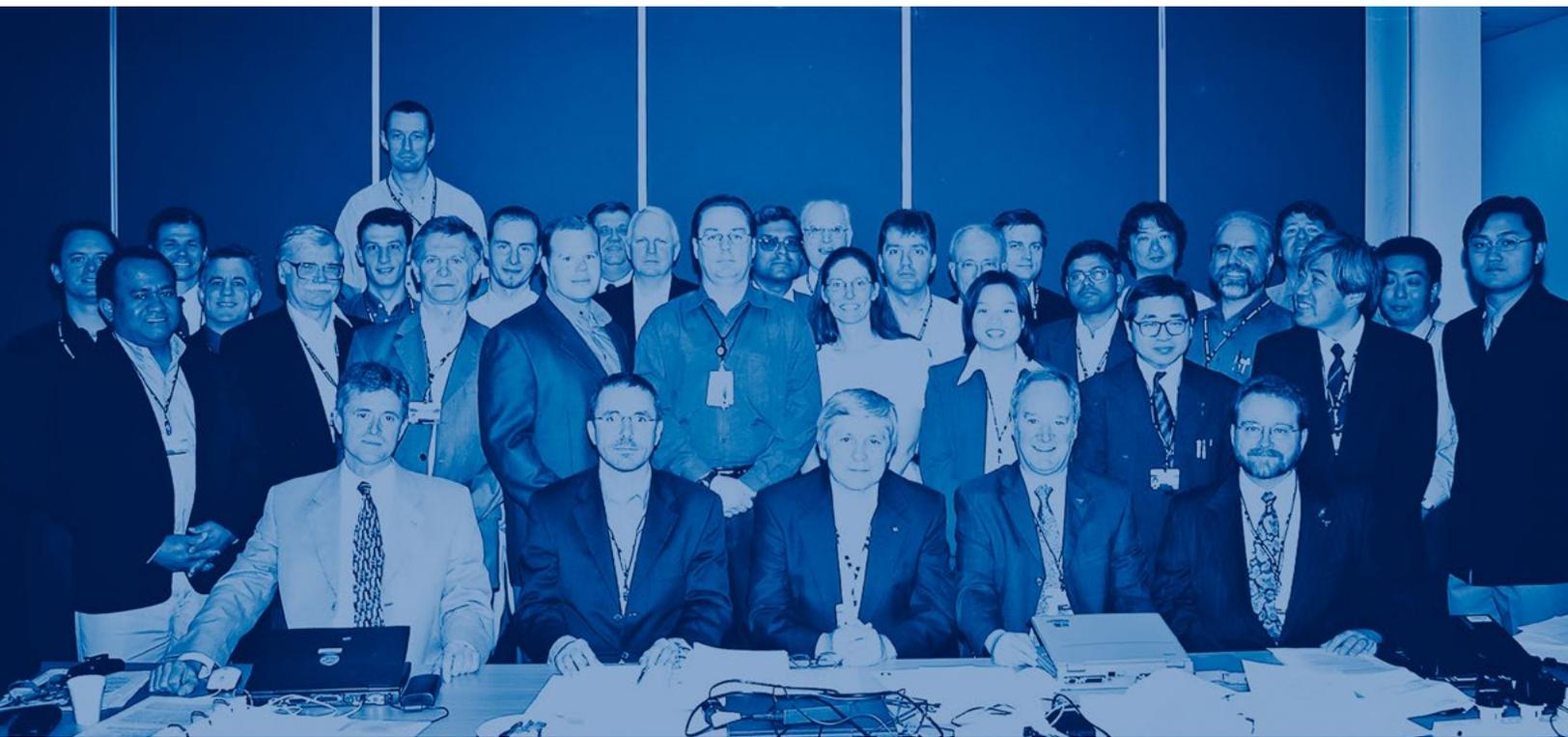


Importantly, there are a number of newer issues that require significant global system development and co-ordination. These include, for example, the provision of dynamic warnings information on space weather events, and the release of radioactive material into the atmosphere. The successful development of the international airways volcano watch system shows that such multi-disciplinary systems are possible and will contribute significantly to international aviation safety and economy.

## Navigation Systems Panel (NSP)

The Navigation Systems Panel (NSP) was established in 2003 to define and elaborate on concepts of use, operational requirements and where appropriate technical solutions for aeronautical navigation applications and

the infrastructure to support them. The NSP is tasked with developing strategies and plans for global navigation harmonization as per the Global Air Navigation Plan (GANP).



### Challenges & Opportunities

The NSP addresses challenges and opportunities of both ground based and satellite based (GNSS) systems. While the global positioning system (GPS) is now a well-established system, new satellite constellations are in operation or under design (GLONASS, GALILEO, BEIDOU), and the NSP not only has the task to standardize the new signals, but also to provide a concept of use of these other constellations within aircraft systems to increase the performance and robustness of satellite positioning, navigation and timing. GNSS Augmentations increase the reliability and performance of core constellations, supporting all kind of operations (from Oceanic navigation to Precision approaches), and will also need to be adapted to the new constellations.

Interference to navigation systems, intentional or not intentional, is perceived as one of the significant threats, and NSP addresses spectrum management as one mean to control this issue. GNSS is potentially quite vulnerable to interference, as well as to space weather, thus in addition to maintaining the standards for ground based navigation systems, NSP also addresses strategies for global infrastructure planning for the future, using combinations of satellite systems, reduced networks of ground systems, aircraft autonomous systems, and ATM procedures.

# Remotely Piloted Aircraft Systems Panel (RPASP)

The Unmanned Aircraft Systems Study Group (UASSG) was established in 2007 to develop a regulatory framework for the safe integration of UAS in non-segregated airspace. Analysis resulted in the UASSG recommending a narrowing

the focus from all unmanned aircraft to only those that are remotely piloted, resulting in the transition to the Remotely Piloted Aircraft Systems Panel (RPASP) in 2014.



## Challenges & Opportunities

The RPASP works collaboratively to proposing Standards and Recommended Practices (SARPs) that will guide States in setting their own national regulations regarding RPAS. The current focus of RPASP's work is on standards related to airworthiness, operations, operator certification, licensing of pilots, air traffic management, detect and avoid, security, and environment. Licensing provisions are expected in 2018, with the additional SARPs in 2020 and beyond.

The RPASP key challenges are:

- Chicago Convention compliance
  - › Documents on board aircraft
  - › Pilots of pilotless aircraft
  - › Certificates of airworthiness
- Lack of real world data to support decision making for standards
- Most experience is with small national aircraft and military aircraft
- Interaction of non-aviation and aviation cultures
- Manned aviation requirements may not apply to RPAS—new solutions needed
- High variability of systems and rapid evolution of technologies and concepts

## Separation & Airspace Safety Panel (SASP)

The Separation and Airspace Safety Panel (SASP) was established in 2000, and undertakes specific studies and develops and/or reviews technical and operational ICAO provisions for improving safety at the same time it improves

efficiency of the ATM system, mainly through developments that will result in increased airspace and airport capacity, while maintaining or improving safety using reduced separation minima.



### Challenges & Opportunities

Opportunities are often presented to the aviation community in the form of technological advancements that allow for improved communication, navigation and surveillance capabilities. For the SASP, these same opportunities provide challenges to transform technological improvements into safety and operational service improvement benefits for all stakeholders in the aviation system. The goal is always to deliver procedures that are environmentally responsible, cost effective and applicable across the global spectrum.

Operating within the performance based framework of RCP/RNP/RSP in support of the Global Air Navigation Plan (GANP), the SASP continues work to attain significant parallel runway operations efficiencies to address future demands on airspace and airport capacity, the establishment of procedures to effectively manage rocket launch/re-entry and heavy balloon activities and the incorporation of Space-based ADS-B technology to provide ATS Surveillance Services over oceanic and remote areas.



## Safety Management Panel (SMP)

The Safety Management Panel (SMP) was established in 2011 to provide recommendations for a new Annex to the Chicago Convention, by consolidating pre-existing safety management provisions in multiple Annexes, with recommendations for further amendments to be provided subsequent to adoption of Annex 19. The SMP undertakes specific studies and develops ICAO provisions for safety management and as outlined in the Global Aviation Safety Plan (GASP).

### Challenges & Opportunities

The SMP's current task is to develop guidance material to support safety management implementation. Challenges include:

- addressing the needs of all States, regardless of the level of maturity of their safety oversight systems;
- addressing the diversity of service providers and international general aviation operators required to implement SMS by Annex 19;
- supporting the creation of frameworks for the collection, sharing and exchange of information;
- the identification and effective use of safety performance indicators; and
- supporting the reliable assessment of SMS or SSP, appropriate to the size and complexity of the organization's products or services.

With aviation traffic forecast to double over the next 15 years many changes are expected to be introduced into the global aviation system to support the demand for increased capacity and efficiency. The availability of comprehensive guidance material for the implementation of State Safety Programmes (SSP) and Safety Management Systems (SMS) will support States and service providers in ensuring that these changes are not at the sacrifice of safety performance. In addition, the effective implementation of SSP and SMS will provide aviation decision makers with up-to-date and accurate information and allow them to proactively manage safety.

## Surveillance Panel (SP)

The SP was established in 2015 as a result of a merger between the Aeronautical Surveillance Panel and the Airborne Surveillance Task Force. The SP undertakes specific studies and develops technical and operational ICAO provisions for aeronautical surveillance systems, collision avoidance systems and their applications as outlined in the Global Air Navigation Plan (GANP).

### Challenges & Opportunities

Rapid technological advances and different rates of adoption have resulted in diverse surveillance capabilities across the globe. The SP continuously works to attract diverse State participation to ensure that ICAO provisions address the wide range of surveillance capabilities.

Many new and emerging applications of surveillance technologies are not limited in scope to the surveillance technical domain and require integration with other expert groups, so the SP strives to strengthen relationships with



many other Panels. Additionally, the SP looks forward to the task of implementing a new airborne collision avoidance system (ACAS-X), adapted to future operations with improved surveillance functions and aimed at reducing nuisance alerts while supporting safe operations.

The growing global adoption of ADS-B, multi-lateration and other new surveillance technologies provides a foundation for the definition of new applications that can improve safety and enable new operational efficiencies.

## Airborne Surveillance Working Group of the Surveillance Panel

The Airborne Surveillance Task Force (ASTAF), established in 2010, focused the work on developing a manual on airborne surveillance applications (Doc 9994, 2014). Being renamed Airborne Surveillance Working Group, it is characterized mainly by the collaboration of operational and technical experts, in particular international organizations such as EUROCONTROL, IFALPA, IFATCA, IATA and ICCAIA as well as States.

The group is now focused on advanced applications such as Interval Management and SURF-IA. The group has recently been tasked to deal with ground-based safety nets and to develop corresponding ICAO provisions in order to assist States for their implementation.







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