Indian Ocean Strategic Partnership to Reduce Emissions (INSPIRE)

Strategic Plan

Version 3.7

December 2013

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1 Introduction

The air transportation industry is essential for future economic growth and development, trade and commerce, cultural exchange and understanding among peoples and nations. Today it provides approximately 32 million direct and indirect jobs worldwide. Aircraft carry approximately 40% of the value of all world trade. In 2007 more travellers than ever before flew on the world's scheduled air carriers, nearly 2.2 billion people, with predictions of 9 billion passengers by 2025. In the Arabian Sea and Indian Ocean region, the rapid movement of people and materials provided by aviation will be crucial to continued economic growth and development over the next few decades.

The aviation sector has a long and distinguished record of environmental achievement. Relative to other industries that emit global green house gases (GHG), aviation's contribution represents only 3% of global greenhouse gas emissions. Technological advancement has significantly reduced aircraft fuel consumption and emissions on a per passenger basis over the last 30 years, and the industry is committed to improving on this record. But we face a real challenge in the Arabian Sea and Indian Ocean region as air transport activity is expected to continue to grow steadily throughout the region.

In order to meet the growing regional demand for air transportation, while maintaining the industry's leadership position, it is essential for aviation partners to collaborate on environmental stewardship.

1.1 The INSPIRE Partnership

1.1.1 History

On February 18, 2008, a multi-lateral partnership known as the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE) was created in Singapore. The first air navigation service providers (ANSPs) to sign the ASPIRE joint statement were Airservices Australia, Airways New Zealand, and the Federal Aviation Administration. Since then ASPIRE has expanded to include the Japan Civil Aviation Authority (JCAB), the Civil Aviation Authority of Singapore (CAAS), and Aeronautical Radio of Thailand (AEROTHAI) as major partners.

To complement this work, the **In**dian Ocean **S**trategic **P**artnership to **R**educe **E**missions (INSPIRE) was formed. The INSPIRE partnership is intended to be collaborative network of partners and peer organisations across the Arabian Sea and Indian Ocean region dedicated to improving the efficiency and sustainability of aviation.

1.1.2 The INSPIRE Commitment

The INSPIRE partners are committed to work closely with airlines and other stakeholders in the region in order to:

- accelerate the development and implementation of operational procedures to reduce the environmental footprint for all phases of flight on an operation by operation basis, from gate to gate;
- facilitate world-wide interoperability of environmentally friendly procedures and standards;
- capitalise on existing technology and best practices;
- develop shared performance metrics to measure improvements in the environmental performance of the air transport system;
- provide a systematic approach to ensure appropriate mitigation actions with short, medium and long-term results; and
- communicate and publicise INSPIRE environmental initiatives, goals, progress and performance to the global aviation community, the press and the general public.

1.1.3 Area of Operations

INSPIRE is aimed at supporting all phases of flight from gate-to-gate for operations for four distinct traffic flows:

- Australia – Arabian Gulf – Australia
- Australia – Southern Africa – Australia
- Africa – South Asia / South East Asia – Africa
- Arabian Gulf – South-West Indian Ocean – Arabian Gulf

1.2 Purpose

In consultation with the airline partners and peer organisations, the INSPIRE partners have developed this strategic plan.

The strategic plan describes the organisation and governance of the partnership, outlines recommended best practices and describes the key initiatives which the INSPIRE members are focussing upon.

The best practices are procedures, applications and technologies that have been demonstrated or have shown the potential to provide efficiencies in fuel and emissions reduction management. The best practices encompass all phases of flight from gate-to-gate, and are designed to reflect the requirements, in particular but not limited to, long haul flights that typically exceed 8 hours in duration.

The key initiatives nominated by INSPIRE members are major activities that they will be pursued over the next 12 months. Each initiative is supported by a work program of activities that each INSPIRE member will progress in order to contribute to the delivery of the initiative.

The work program can be found at Section 9.

2 Document Management

2.1 Document Structure

The INSPIRE Strategic Plan consists of the following parts:

Section 1	Introduction
Section 2	Document Management
Section 3	Organisation
Section 4	Governance
Section 5	Support of ICAO objectives
Section 6	Recommended Best Practices for Air Navigation Service Providers (ANSPs)
Section 7	Performance Measurement
Section 8	Key Initiatives
Section 9	INSPIRE Work Program
Section 10	INSPIRE Daily
Appendix A	Coordinators & Points of Contact
Appendix B	Table of Acronyms
Appendix C	Appendix C INSPIRE Daily - Terms of Reference

2.2 Document Owners

This document is owned and maintained by the INSPIRE chair.

2.3 Change Management

This document will be updated regularly by the INSPIRE partners to reflect the most current considerations regarding regional emissions reductions and efficiencies.

Document change proposals shall be sent to the INSPIRE Strategic Plan editor for review and dissemination to the INSPIRE partners. Changes must be approved by all partners through the INSPIRE Coordinators.

Minor and routine changes to the INSPIRE Strategic Plan will be distributed as updates to the existing version (e.g. v1.1, v1.2, v1.3). Major updates and modifications to the INSPIRE Strategic Plan will result in a new version number (i.e. v2.0).

3 Organisation

3.1 Partners

INSPIRE is a partnership of like minded Air Navigation Service Providers (ANSPs). The partnership structure of INSPIRE is not reflective of a hierarchy of contributing organisations. Rather the partners are those ANSPs that have the capacity and capability to provide leadership to the work program and contribute resources to the administration of INSPIRE.

The INSPIRE partners are:

- Airports Authority India (AAI);
- Airservices Australia; and
- Air Traffic and Navigation Services of South Africa (ATNS)

3.2 Airline Partners

The INSPIRE partnership is supported by a number of Airline partners. The Airline partners provide input from an Airspace User point of view ensuring the INSPIRE work program is properly aligned with their operations. Furthermore the Airline partners provide direct support to the work program and the ongoing administration of the partnership.

The Airline partners are:

- Air India;
- Air Madagascar;
- Cathay Pacific Airline;
- Emirates Airline;
- Ethiopian Airlines;
- Etihad Airways;
- Kenya Airways;
- QANTAS Airways;
- Qatar Airways;
- Singapore Airlines;
- Singapore Cargo;
- South African Airways; and
- Virgin Australia

Other Airlines are encouraged to contribute to INSPIRE as Airline Partners.

3.3 Peer Organisations

The following peer organisations are contributing to the INSPIRE partnership:

- Abu Dhabi Department of Transport;
- Abu Dhabi Airports Company (ADAC);

- Airport and Aviation Services Sri Lanka Limited (AASL);
- Public Authority for Civil Aviation, Sultanate of Oman;
- Dubai Air Navigation Services (DANS) ;
- ICAO Somalia;
- Kenya Civil Aviation Authority (KCAA);
- Maldives Airports Company Limited (MACL);
- Department of Civil Aviation of Mauritius;
- Seychelles Civil Aviation Authority;
- ASECNA[1]; and
- UAE General Civil Aviation Authority (UAE GCAA).

Other ANSP organisations are encouraged to contribute to INSPIRE as peer organisations. The only condition of membership to INSPIRE is active participation to the program to implement ATM environmental best practice within their area of responsibility.

3.4 Role of ASIOACG

INSPIRE promotes the implementation of Air Traffic Management environmental best practice in all stages of flight.

It is recognised that the Arabian Sea / Indian Ocean ATS Coordination Group (ASIOACG) plays a key role in supporting and expediting the goals and objectives of ICAO, especially in regard to CNS/ATM initiatives within the Oceanic airspace of the Arabian Sea and Indian Ocean.

The INSPIRE partnership recognises that ASIOACG is complementary to the objectives of INSPIRE and intends that activities in the INSPIRE work program related to the enroute phase of flight will be progressed through ASIOACG.

[1] Agence pour la Sécurité de la Navigation Aérienne en Afrique

4 Governance

This section details the principles applicable to the governance of the INSPIRE partnership.

4.1 Coordination

Periodically, the INSPIRE partners will issue, individually or collectively, media releases to coincide with significant events such as demonstrations or implementations of new services that contribute to the reduction of greenhouse gases.

Copies or links to all INSPIRE related media (e.g. news articles, magazine items) will be forwarded to the Chair for distribution to the Partners, Airline Partners, and Peer organisations.

Each Partner will nominate an INSPIRE coordinator who will represent the partner organisation and act as their point of contact. Also each peer organisation will nominate a point of contact for INSPIRE related communications and activities.

Details of the Coordinator and Points of Contact for each organisation can be found at Appendix A.

The Chair will act as the point of contact for all external groups wishing to contact INSPIRE.

Content for the INSPIRE-GREEN.com website will be coordinated by the Chair. The Chair will alert the Partners, Airline Partners, and Peer organisations, at the time of each update.

4.2 Annual Report

The INSPIRE partners will communicate progress and performance n Annual Report which will include a work program status report.

The Annual Report will be developed by the INSPIRE coordinators in the second quarter of each calendar year to provide status updates on work program initiatives and demonstrations, performance measurements and future plans for the INSPIRE partnership. The report will be distributed to appropriate members of the aviation community, including industry, media and global forums.

The partners will publish the report each calendar year which will summarise the progress of the partnership in the preceding 12 months.

4.3 Annual Meeting

The INSPIRE partners, Airlines, and peer organisations will meet annually to review progress in the preceding twelve months and plan for the next 12 months.

The following points apply to the Annual meeting:

- Hosting of the INSPIRE annual meeting will be rotated among the partners;
- To remain productive the number of participants to the annual INSPIRE meeting will be held to under 30 attendees;
- Each partner will identify 2-3 delegates to keep the meeting a manageable working size with the exception of the host, who may require administrative support;
- The meetings should include key airline and industry partners where appropriate; and
- The meetings should arrange for aviation environmental experts from bodies such as IATA, and ICAO to speak on relevant issues such as the state of aviation and the environment.

In order to achieve efficiencies with the cost of travel it is anticipated that the INSPIRE annual meetings will be hosted immediately before and at the same location as the annual ASIOACG meeting.

4.4 Chairmanship

Chairmanship of the Annual meeting, and the de-facto INSPIRE lead will be delegated to representative of the organisation which is hosting the next annual meeting. The handover of Chair between organisations will occur at the annual meeting.

The current chair for the INSPIRE partnership is:

Air Traffic and Navigation Services of South Africa (ATNS of SA)

INSPIRE Chair:	Mr Johnny Smitt
Address:	O.R. Tambo International Airport Private Bag X1, Boonaero Park 1622 South Africa
Phone:	+27 11 928 6441
E-mail:	johnnys@atns.co.za

The chair has a series of administrative responsibilities, including;

- Acting as the point of contact for all external groups wishing to contact INSPIRE (e.g. media, other ANSPs, Airlines, Educational Institutions, Environmental Groups);
- Publication of Annual updates to the Strategic Plan (December of each year);
- Hosting the Annual Meeting (November of each Year);
- Hosting the quarterly teleconference;
- Publication of the Annual Report (March of each year);
- Management of the INSPIRE email account (info@inspire-green.com).

4.5 Quarterly Teleconference

The Chair will host quarterly teleconferences where coordinators will discuss progress and update plans.

4.6 Website

The INSPIRE website (www.inspire-green.com) has been established to promote the activities of the INSPIRE group. The website will be maintained by a nominated INSPIRE partner as agreed at the annual conference.

5 Support of ICAO Objectives

The INSPIRE partners will ensure that INSPIRE is in support of the **ICAO environmental and Strategic Objectives**[2] and initiatives, including the Global Plan initiatives and initiatives found in the Global Air Navigation Capacity and Efficiency plan.

5.1 Strategic Objective

INSPIRE contributes toward the achievement of Strategic Objective C:

> *Environmental Protection and Sustainable Development of Air Transport – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment.*

5.2 Global Plan Initiatives

The ICAO Global Air Navigation Plan outlines a number of initiatives (GPIs) designed to support planning and implementation of performance objectives in the regions. The following Global Plan Initiatives relate directly to INSPIRE.

- **GPI-5 - RNAV and RNP (Performance-Based Navigation)**

  The implementation of Performance Based Navigation (PBN) will facilitate increased airspace capacity and efficiency through reductions in separation minima. RNAV and RNP navigation capabilities can be exploited to develop efficient routes and trajectories.

- **GPI-6 - Air Traffic Flow Management**

  The implementation of strategic, tactical and pre-tactical measures aimed at organizing and handling traffic flows in such a way that the totality of the traffic handled at any given time or in any given airspace or aerodrome is compatible with the capacity of the ATM system.

- **GPI-7 - Dynamic and Flexible ATS Route Management**

  The establishment of more flexible and dynamic route systems, on the basis of navigation performance capability, aimed at accommodating preferred flight trajectories.

- **GPI-11 - RNP and RNAV Standard Instrument Departures (SIDS) and Standard Terminal Arrivals (STARS)**

  The optimization of the terminal control area (TMA) through implementation of improved ATS route structures based on RNP and RNAV, connecting the en-route phase of flight with the final approach, based on improved coordination processes.

- **GPI-17 - Data Link Applications**

  Increase the use of data link applications.

[2] Strategic Objectives of ICAO: Consolidated Mission and Vision Statement, 10 December, 2010

5.3 Aviation System Block Upgrades

The ICAO draft Global Air Navigation Capacity and Efficiency plan 2013-2028 provides a roadmap for the harmonised implementation of ATM technology. The Block 0 Aviation System Block Upgrades relating to INSPIRE are listed and briefly described below. Each of these points is expanded upon in Section 6.

Performance Improvement Area 1: Airport Operations:

- **B0-65** Optimization of Approach Procedures including Vertical Guidance
- **B0-75** Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)
- **B0-80** Improved Airport Operations through Airport-CDM

Performance Improvement Area 2: Globally Interoperable Systems and Data:

- **B0-25** Increased Interoperability, Efficiency and Capacity though Ground-Ground Integration

Performance Improvement Area 4: Efficient Flight Paths:

- **B0-05** Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDOs)
- **B0-40** Improved Safety and Efficiency through the Initial Application of Data Link En-route
- **B0-20** Improved Flexibility and Efficiency Departure Profiles – Continuous Climb Operations (CCO)

6 Recommended ANSP Best Practices in the Arabian Sea and Indian Ocean Region

6.1 Overview

In consultation with stakeholders, the INSPIRE partners have compiled a series of recommended procedures, practices and services that have been demonstrated or have shown the potential to provide efficiencies in fuel and emissions reduction management. They encompass all phases of flight from *gate-to-gate,* and are designed to reflect the requirements, in particular but not limited to, long haul flights that typically exceed 8 hours in duration.

Many of the best practices described below are for procedures, practices, and services that are fully developed or that have reached a state of demonstrable maturity. Some of the best practices are new and conceptual applications that the INSPIRE members are assessing.

The best practices will be reviewed annually with key stakeholders to ensure they continue to represent ATM environmental best practice.

Initiatives from the ICAO Global Air Navigation Capacity and Efficiency plan 2013-2028 are highlighted where they relate to the best practices identified by INSPIRE.

6.2 Network Optimisation - Collaborative Decision Making

Collaborative Decision Making (CDM) is an initiative aimed at improving Air Traffic Flow Management (ATFM) through increased information exchange among aviation community stakeholders. CDM comprises of representatives from air navigation service providers, airport operations (e.g. stand and gate management), ground handling services, aircraft operators and other stakeholders who work together to create technological and procedural solutions to the ATFM challenges faced by the network stakeholders.

The goal of CDM is a safe, efficient, secure and sustainable air navigation system that provides flight operators the flexibility to operate within their own capabilities and economic objectives. While supported by a variety of tools and technologies, collaboration transcends specific programs and fosters a more efficient and reliable way to achieve system goals by including ATFM stakeholders in the decision-making process. By sharing information, values and preferences, stakeholders learn from each other and build a common pool of knowledge, resulting in Air Traffic Management decisions and actions that are most valuable to the system.

Under the CDM principle, aviation stakeholders could view each other as “partners” collaborating with the common goal of delivering high-quality air transport products or services that are attuned to the needs and values of their customers; i.e., the flying public or other economic sectors relying on air transport. Adoption of the CDM principle could contribute to enhancements in predictability, flexibility, cost-effectiveness, participation of aviation community and environment. Significant environmental benefits are also delivered by lowering CO2 emissions and fuel burn by reducing the time aircraft spend in the runway queue.

B0-80 Improved Airport Operations through Airport-CDM
Implements collaborative applications that will allow the sharing of surface operations data among the different stakeholders on the airport. This will improve surface traffic management reducing delays on movement and manoeuvring areas and enhance safety, efficiency and situational awareness. **Environment:** Reduced taxi time; reduced fuel and carbon emission; and lower aircraft engine run time.

6.3 Surface Movement Optimisation

Surface Movement Optimisation procedures and surface and runway movement monitoring technologies have the potential to substantially improve the fuel and emissions efficiency of aircraft by reducing taxi times through improved planning of surface movements.

Surface movement optimisation procedures will be aimed at minimising the delay from start request to approval, and the time/fuel burn from start approval to take off,

The INSPIRE partners recognise the potential benefit of surface and runway movement monitoring capabilities at congested airports using surveillance via radar and/or automatic dependent surveillance – broadcast (ADS-B), often enhanced by multilateration. While these surface movement systems are principally designed to enhance safety and reduce the potential for runway incursion, they also serve as the foundation for future systems that will optimise surface and runway movement.

B0-75 Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

Basic advanced-surface movement guidance and control systems (A-SMGCS) provides surveillance and alerting of movements of both aircraft and vehicles at the aerodrome, thus improving runway/aerodrome safety.

Automatic dependent surveillance-broadcast (ADS-B) information is used when available (ADS-B APT).

Environment: Reduced aircraft emissions stemming from improved efficiencies

6.4 Departure Optimisation

Optimisation for departure profiles is a developing ANS enhancement. Procedures for the fuel and emissions optimisation of departures have yet to be defined within INSPIRE. Procedures are expected to include optimise departure to facilitate unconstrained climb to cruise level and track to route start point, and manipulate taxi and departure time to optimise oceanic entry altitude and position in the enroute sequence.

Departure optimisation procedures are expected to substantially improve the fuel and emissions efficiency of aircraft during the climb-to-cruise portion of flight by minimising low altitude vectoring and the need to level-off at interim altitudes. These optimised departure procedures are generally referred to by ICAO as Continuous Climb Departures (CCD).

B0-20 Improved Flexibility and Efficiency Departure Profiles – Continuous Climb Operations (CCO)

Implements continuous climb operations (CCO) in conjunction with performance-based navigation (PBN) to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles, and increase capacity at congested terminal areas.

Environment: Authorisation of operations where noise limitations would otherwise result in operations being curtailed or restricted. Environmental benefits through reduced emissions.

6.5 Enroute Flight

6.5.1 User Preferred Routes

A User Preferred Route (UPR) during the oceanic phase of flight is defined as a lateral profile developed for each individual flight by the flight operator. These lateral profiles are customised in order to meet the specific needs of the aircraft operator for that flight, such as fuel optimisation, cost-index performance, or specific mission requirements.

Figure 1 - User Preferred Route Example

Typically a UPR will be calculated by an aircraft operator's flight dispatch based on factors such as forecasted winds, aircraft type and performance, convective weather and scheduling requirements.

UPRs are a favoured enhancement to oceanic operations where air traffic control (ATC) limitations previously required that aircraft fly on fixed air traffic services (ATS) routes, or published flexible track systems. This enhancement is directly attributable to the implementation of ground and airborne improvements such as automated conflict prediction, conformance monitoring and automatic dependent surveillance (ADS).

When UPRs are created based on fuel optimisation considerations, the corresponding savings in greenhouse gas emissions can be substantial.

UPRs are often constrained by requirements for flights to cross boundaries between Flight Information Regions at predetermined points. This can be alleviated through improved ground-ground integration. For example through the implementation of ATS interfacility data communication (AIDC).

B0-25 Increased Interoperability, Efficiency and Capacity though Ground-Ground Integration

Improves coordination between air traffic service units (ATSUs) by using ATS interfacility data communication (AIDC) defined by ICAO's Manual of Air Traffic Services Data Link Applications (Doc 9694). The transfer of communication in a data link environment improves the efficiency of this process, particularly for oceanic ATSUs.

A key enabler for the implementation of UPRs is the implementation of Air-Ground Datalink Communications.

B0-40 Improved Safety and Efficiency through the Initial Application of Data Link En-route

Implements an initial set of data link applications for surveillance and communications in air traffic control (ATC), supporting flexible routing, reduced separation and improved safety.

6.5.2 Dynamic Airborne Reroute Procedures

Dynamic Airborne Reroute Procedures (DARP) refers to an oceanic in-flight procedure whereby the lateral profile of a flight can be modified periodically in order to take advantage of atmospheric conditions and updated forecasts. Typically, flight operators file flight plans some hours prior to a flight estimate time of departure. Often, revised upper wind forecasts are available after the flight plan is filed or the aircraft departs.

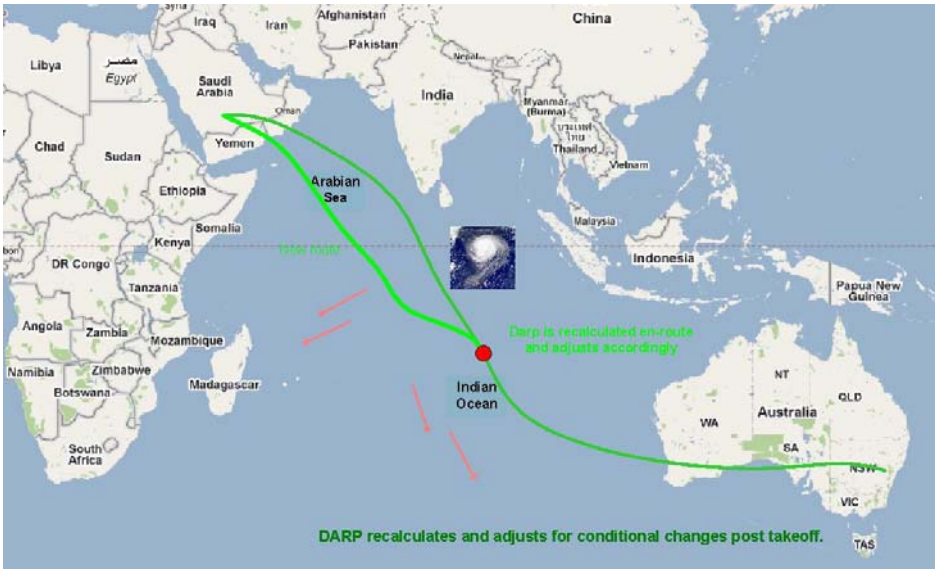

Figure 2 - Dynamic Airborne Reroute Procedure Example

DARP allows aircraft operators to calculate revised profiles from the aircraft's present position to any subsequent point in the cleared route of flight in order to realise savings in fuel or time. This update profile is coordinated by the Airline Operations Centre (AOC) with the flight crew, and sent to ATC as a reroute request from the aircraft.

Initially demonstrated in the South Pacific in 1999, recent enhancements to conflict prediction, conformance monitoring and inter-facility coordination in Air Traffic Management automation systems have enabled the wider implementation of the DARP. Participating ANSPs can accommodate multiple in-flight reroute requests across airspace boundaries.

The DARP can provide significant savings in fuel and emissions. A recent Air New Zealand analysis concluded that 58% of all flights from Auckland to North America assessed during the analysis sample would achieve fuel savings from the DARP procedure, resulting in an average fuel burn reduction of 453kg per flight, or roughly 1431kg of CO_2 emissions.[3]

[3] ISPACG/22 IP-16

6.5.3 Flexible Track Systems

In an oceanic environment where the use of UPRs is not feasible, flexible track systems can provide an alternative vastly more efficient than fixed ATS routes. A flexible track is typically calculated so that all flights flying a specific city-pair route will utilise a single lateral profile or track. This track is calculated based on forecasted meteorological data and a representative aircraft performance model and published via NOTAM. A flexible track system is a series of flexible tracks designed to provide a generic optimised route between nominated city pairs.

Flexible tracks provide greater efficiencies than fixed ATS routes, because they are optimised to take advantage of favourable winds. Flexible tracks do not provide the same level of efficiencies to individual aircraft that can be achieved in a UPR system. However in circumstances where implementation of UPRs is not yet feasible a flexible track system provides a notable improvement in efficiency and reduction in emissions.

In a recent trial, 592 Emirates Airlines flights from Dubai to Melbourne and Sydney were selected to examine the benefits of the flexible track system.

For eastbound flights alone Emirates Airlines saved 628 tonnes of fuel and 57 hours in trip time[4]. Analysing a trajectory between Dubai and Sydney, using this optimal air traffic management, Emirates Airlines saved 8408kg of fuel and 43 minutes of flight time. This equates to more than 26,900 kgs of C02 saved. The average saving per flight was six minutes of flight time and one tonne of fuel.

6.5.4 Reduced Horizontal Separation Minima (50/50 & 30/30)

The capacity of oceanic airspace is severely constrained when legacy oceanic separation standards are in use.

Improvements in navigation capabilities have enabled reduction in the Oceanic separation minima to 50NM longitudinally and 50NM laterally. When coupled with direct controller pilot communications via data-link and automatic dependent surveillance, aircraft meeting certain navigation performance requirements can be safely separated at as little as 30NM longitudinally and 30NM laterally.

The reduced separation minima for use in the oceanic environment are published in the ICAO Procedures for Air Navigation Services – Air Traffic Management (Doc 4444) and the ICAO Annex 11 - Air Traffic Services.

RNP10 Aircraft	50nm longitudinal, 50nm lateral
RNP4 Aircraft	30nm longitudinal, 30nm lateral

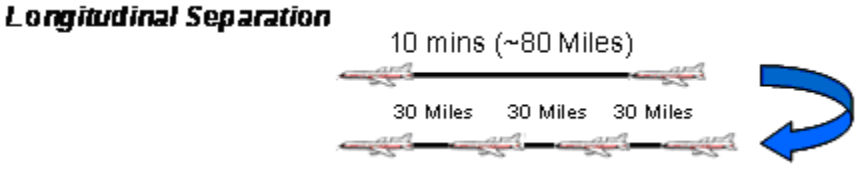

Figure 3 - Reduced Oceanic Separation Minima

[4] Each minute of flying-time saved reduces fuel consumption by an average of 62 litres and reduces C02 emissions by 160 kilograms.

Qualified aircraft navigating in airspace where these reduced separation minima have been implemented achieve significantly greater efficiencies than aircraft that cannot meet these standards. This is due to the vastly increased access to optimum flight profiles associated with the tighter spacing of the aircraft. This enhanced efficiency is reflected in lower fuel burn and reduced emissions as more aircraft can fly closer to optimal tracks and altitudes.

6.5.5 Cruise Climb (Block levels)

A cruise climb allows pilots to execute a gradual climb from one cruise altitude to another, which when properly configured enables the optimum altitude to be sustained for reduce fuel burn and emissions.

In circumstances where cruise climb is not permitted, block levels provide an efficient alternative. In a block level clearance a pilot is cleared to operate between two altitudes. As with the cruise climb the pilot is able to configure the aircraft for the optimum altitude to reduce fuel burn and emissions.

6.5.6 Time Based Metering

To reduce the environmental impact of delays caused by congestion at airports ANSP's have introduced traffic flow management procedures and automated decision support automation to reduce the need for fuel techniques such as low altitude vectoring and aircraft holding, and improve fuel and emissions efficiency by shifting delays to the enroute phase of flight.

6.6 Arrivals Optimisation

6.6.1 Overview

Arrivals Optimisation includes any one of several procedures available to aircraft operators and air navigation service providers to improve the fuel efficiency for aircraft during final descent phase of a flight. Qualifying arrivals optimisation procedures include, continuous descent arrivals, continuous descent approaches, optimised profile descents, tailored arrivals, and are generally referred to by ICAO as Continuous Descent Operations. ICAO has recently published Manuals on CDO and CCO. Both documents provide guidance in the design, implementation and operation of environmentally friendly arrivals and departures.

6.6.2 Optimum Profile Descents

An Optimum Profile Descent (OPD) is a cockpit-based flight technique where the vertical profile of an arrival is optimised to minimise undesired level flight segments so that the aircraft can be flown with engines at idle thrust from a high altitude, potentially from cruise, until touch down on the runway. Aircraft executing an OPD realise a far more efficient fuel burn profile and reduced emissions during the descent and arrival phases of flight, as compared to a traditional arrival path. A variety of OPD applications have been analysed and developed for fuel and emission efficiency improvements.

6.6.1 Optimum Profile Descents via RNAV and RNP-AR Approaches

Where conditions will allow, arrival, departure and en route traffic flows will allow, descent profiles and airspace restrictions on published Area Navigation (RNAV) and Required Navigation Performance – Authorisation Required (RNP-AR) approaches are modified to provide more optimum arrival profiles. This optimisation reduces fuel burn and carbon emissions by taking advantage of the sophisticated navigational capability of modern aircraft that can fly closer to optimal tracks and altitudes.

For example, RNP-AR approaches are conducted using idle power, continuous descent from an optimally chosen top of descent point. In Australian RNP-AR implementations, this has typically saved around 200Kg of fuel per approach. This results in a reduction of 620Kg of CO2 emission per approach. During the first 18 months of implementing RNP-AR OPD, Airservices Australia estimates that 33 B737-800 aircraft have conducted more than 10,000 RNP-AR approaches. The estimated cumulative savings in jet fuel is 345,240 kg with estimated carbon dioxide emissions reductions of 1,151,280 kg.

6.6.1.1 OPD via Tailored Arrivals

Another application of OPD procedures, known as a Tailored Arrival (TA), is a procedure where trajectories are dynamically optimised for each aircraft to permit a fuel-efficient, low-noise descent profile that has imbedded compliance with arrival sequencing requirements and other airspace constraints.

Operational trials in Australia, New Zealand, and the United States have demonstrated that both types of OPD described above provide significant fuel and emissions savings. Although the successful execution of an uninterrupted OPD is greater during periods of light traffic.

B0-65 Optimization of Approach Procedures including Vertical Guidance

The use of performance-based navigation (PBN) and ground-based augmentation system (GBAS) landing system (GLS) procedures to enhance the reliability and predictability of approaches to runways, thus increasing safety, accessibility and efficiency. This is possible through the application of basic global navigation satellite system (GNSS), Baro-vertical navigation (VNAV), satellite-based augmentation system (SBAS) and GLS. The flexibility inherent in PBN approach design can be exploited.

Environment: Environmental benefits through reduced fuel burn.

B0-05 Improved Flexibility and Efficiency in Descent Profiles using Continuous Descent Operations (CDOs)

Performance-based airspace and arrival procedures allowing aircraft to fly their optimum profile using continuous descent operations (CDOs). This will optimize throughput, allow fuel efficient descent profiles, and increase capacity in terminal areas.

6.7 Performance Based Navigation (PBN) Implementation

PBN is a framework for defining navigation performance requirements that can be applied to an air traffic route, instrument procedure, or defined airspace. PBN includes both Area Navigation (RNAV) and Required Navigation Performance (RNP) specifications. PBN provides a basis for the numerous Air Traffic Services enhancements such as oceanic RNP separation reductions, Optimum Profile Descents, the development of aircraft, and the development of future concepts for trajectory based operations. These PBN enabled enhancements are a cornerstone of ANSP efforts to improve fuel and emission efficiencies

ANSP guidance for the implementation of PBN and associated ATS applications are contained in the ICAO Performance Based Navigation Manual, Doc 9613.

7 Performance Measurement

The INSPIRE partnership recognises that the measurement of success through the credible tracking of the reduction of emissions as a result of initiatives in the INSPIRE program is essential to establish and maintain the credibility of the partnership.

There is a significant amount of work being undertaken by other groups and organisations to develop metrics and methodologies for the measurement of emissions attributable to aviation.

The INSPIRE partners have agreed to take a pragmatic approach to measuring success.

For each initiative in the work program the partners, with the direct support of the Airline partners, will establish the current fuel burn/emissions for the part of trajectory that will be affected by the initiative. At the completion of the initiative or at the end of specific stages of the related works the airline partner will report the new fuel burn/emissions.

The savings associated with the success of each initiative will be reported in weight of fuel (kg) and CO2 (kg) to IATA (New Delhi).

The partners have engaged IATA for the assessment and validation of the fuel and emissions savings. Results will be submitted to IATA for review and independent validation.

8 Key Initiatives

The INSPIRE members recognise that each participant has a finite amount of resources to contribute. To facilitate regular and timely success in the delivery of environmental benefit the INSPIRE members nominate a limited number of key initiatives that they commit to pursuing over the next 12 months.

Each initiative is supported by a work program of activities that each INSPIRE member will progress in order to contribute to the delivery of the initiative.

The key achievement for the INSPIRE group has been in the Arabian Sea/Indian Ocean User Preferred Route Geographic Zone (ASIO-Z), which is also referred to as the "UPR Geographic Zone".[5] This was completed in October 2013.

The Key initiatives for 2014 relate to the ongoing refinement of the UPR geographic zone. The key initiatives are:

- The implementation of RNP10 across all airspace in the UPR geographic zone and the development of the plan for RNP4 implementation, and
- The implementation of AIDC[6].

8.1 Arabian Sea Indian Ocean UPR Geographic Zone (ASIO-Z)

In 2011 the INSPIRE members agreed to pursue implementation of a UPR Geographic Zone in Indian Ocean airspace.

The purpose of the zone is to provide widespread access to User Preferred Routing in the Enroute stage of flight for aircraft transiting the zone.

In October 2013 the UPR zone was formally promulgated via AIP SUP by the contributing ANSPs. The establishment of the zone included a wide range of changes to reduce constraints within the zone and improve routing options into and out of the zone.

The zone provides operators with widespread availability of User Preferred Routes. User Preferred Routes allow airline operators to reduce fuel burn and therefore emissions, by taking advantage of optimum routing and conditions for a particular flight.

The INSPIRE members have a continuous focus on the reduction of constraints in the UPR zone and are working toward expanding the zone wherever practicable.

[5] The concept for the ASIO-Z was initially presented by IATA at ASIOACG/6 in Working Paper WP/11 - Southern Arabian Sea & Indian Ocean "UPR Zone"

[6] ATS Interfacility Data Communications. AIDC messaging provides an automated means for the electronic exchange of flight information between adjoining ATS units.

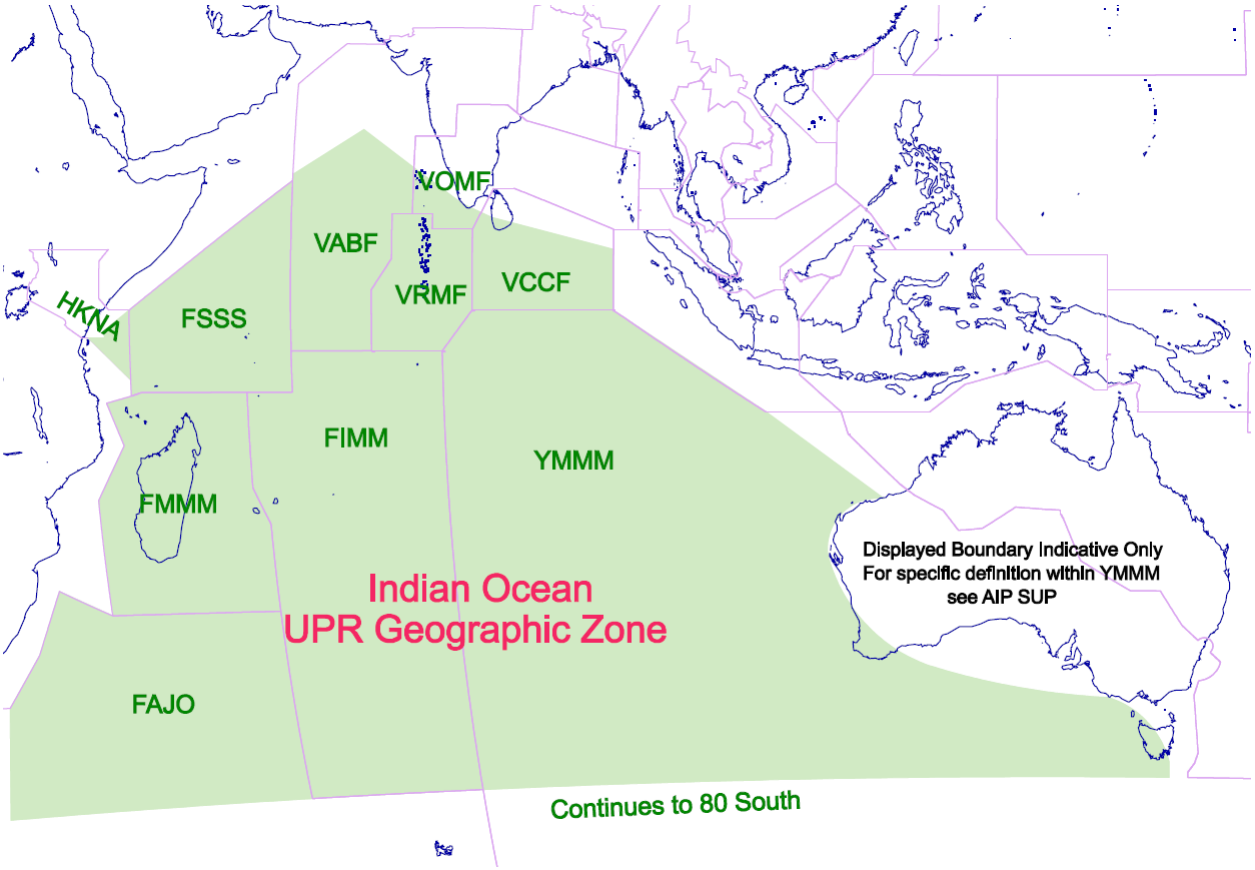

Figure 4 - Arabian Sea and Indian Ocean User Preferred Route geographic zone (ASIO-Z)

9 INSPIRE Work Program

The work program consists of a series of activities which, as they're completed, will directly contribute to the delivery of the key initiatives or support the implementation of best practice and progress towards the general goal of improving the efficiency and sustainability of aviation in the Arabian Sea and Indian Ocean.

The INSPIRE work program is captured in a table of activity maintained by the ASIOACG. The table is available on the INSPIRE website.

10 INSPIRE Daily

10.1 Background

Since the formation of INSPIRE publication the INSPIRE members have conducted a series of demonstration flights successfully demonstrating the potential for fuel and emissions savings. Although the demonstrations flights represent the best-case or ideal scenario due to the removal of controllable constraints, a practice not feasible in daily operations, the majority of the procedures used are available on a daily operational basis for a variety of city-pair routes throughout the Arabian Sea and Indian Ocean region.

In the INSPIRE Daily program, city-pair routes are identified where key elements of the INSPIRE Best Practices are utilised. Then each day participating airline partners report the availability of the ATM environmental best practice.

10.2 Objective

The objective of INSPIRE Daily is to increase awareness and utilisation of Best Practices on a daily basis in the Arabian Sea and Indian Ocean region.

10.3 Goals

The goals of the INSPIRE Daily program include:

- Identify and publish INSPIRE-Daily City Pairs where 3 or more fuel-saving Best Practices are available
- Certify INSPIRE-Daily City Pairs with a star rating system in consultation with the International Air Transportation Association (IATA) Asia Pacific Office
- Enable and encourage reporting by airlines of their successful utilisation of INSPIRE-Daily City Pair routes and index this information
- Actively promote and advertise the availability and usage statistics of new and existing INSPIRE-Daily City Pairs though industry forums, web distribution and the INSPIRE Annual Report

10.4 Best Practices

INSPIRE Daily Best Practices are procedures and services that:

- have proven fuel & emissions savings; and
- are available on a daily basis to participating equipped flights either by pilot request (e.g. DARP), or with no action required by the flight crew (e.g. Reduced Oceanic Separation).

The process for the nomination and management of the INSPIRE Daily is detailed in the INSPIRE Daily terms of reference at Appendix C, and more detail on INSPIRE daily can be found on the www.inspire-green.com website.

Appendix A INSPIRE Coordinators

Partner	Coordinator	Address	Phone	Email
Airports Authority India	A.B. Joshi	ATS Complex, CSI Airport, Mumbai 400099, India	+91 98 3392 6869 +91 22 2682 8010	abjoshi@aai.aero
Airservices Australia	David Webb	P.O. Box 1093, Tullamarine, VIC 3043 Australia	+61 408 004 213	david.webb@airservicesaustralia.com
Air Traffic and Navigation Services South Africa	Leon Altree	O.R. Tambo International Airport, Private Bag X1, Boonaero Park 1622, South Africa	+27 11 928 6441	leona@atns.co.za

Airline Partner	Point of Contact	Address	Phone	Email
Etihad Airways	Peter Raw	P.O. Box 35566 Head Office Khalifa City A, Abu Dhabi	+971 508118348	praw@etihad.ae
Emirates Airlines	Bob Everest	P.O. Box 686 Flight Operations Support, 3rd Floor EGHQ Dubai, UAE	+971 4 708 4300	bob.everest@emirates.com
Qantas Airways	Graham Rennie	Qantas Centre Building C/5, 203 Coward St, Mascot NSW, 2020, Australia	+61 418 602 638	grennie@qantas.com.au
Virgin Australia	John Crane	P.O. Box 1034 Spring Hill Queensland Australia 4006	+61 401 695 969	john.crane@virginaustralia.com

Peer Organisation	Point of Contact	Address	Phone	Email
Abu Dhabi Department of Transport	Ron Rigney	P.O. Box 20 Abu Dhabi UAE	+971 2659 4164	ronald.rigney@dot.abudhabi.ae
Abu Dhabi Airports Corporation (ADAC)	Asim Rizwan	PO Box 94449, Abu Dhabi, UAE	+971 508 189 073	arizwan@adac.ae
Airport and Aviation Services (Sri Lanka) Ltd.	W. Chrisanthi Tissera	SATC Office, Colombo Airport, Ratmalana, Sri Lanka	+947 1 273 0661	r head.ans@airport.lk
Public Authority for Civil Aviation – Sultanate of Oman	Moosa Abdulaziz Moos AL Bulushi	P.O. Box 1 – Code 111 Seeb International Airport Muscat, SULTANATE OF OMAN	+968 24 519 201	menon@caa.gov.om
Dubai Air Navigation Services (DANS)	Marc Erskine	PO Box 1897 Dubai UAE	+971 501 441 735	marc.erskine@dubaiairnav.gov.ae
Maldives Airports Company Limited (MACL)	Abdulla Zakariyya	Male International Airport, Hulhule, Republic of Maldives	+960 301 3388	a.zakariyya@macl.aero
United Arab Emirates General Civil Aviation Authority (ATS)	Juma Abdulla H. Al Falahi	Juma Abdulla H. Al Falahi P.O. Box 30500 Dubai, UAE	+971 (4) 2828270	jharib@szc.gcaa.ae
Seychelles Civil Aviation Authority (SCAA)	Lineda Samson	PO Box 181, Seychelles International Airport, Mahe, Republic of Seyechelles	+248 438 41 82	lsamson@scaa.sc

Peer Organisation	Point of Contact	Address	Phone	Email
Agence pour la Securite de la Navigation Aerienne en Afrique (ASECNA) Madagascar	Attoubounou Abdourahmane	46 Ivato Aeroport, Antananrivo 105, Madagascar	+261 33 23 391 68	abdouatb@yahoo.fr
Kenya Civil Aviation Authority (KCAA)	Keziah Ogutu	P.O.BOX 19031-00501, Nairobi, Kenya	+ 254 20 827100	kogutu@kcaa.or.ke

Appendix B Table of Acronyms

AAI	Airports Authority India
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ANSP	Air Navigation Service Provider
AIDC	ATS Interfacility Data Communications
ASIOACG	Arabian Sea Indian Ocean ATS Coordinating Group
ASIO-Z	Arabian Sea And Indian Ocean User Preferred Route Geographic Zone
ASPIRE	The Asia And South Pacific Initiative To Reduce Emissions
ATC	Air Traffic Control
ATM	Air Traffic Management
ATNS	Air Traffic And Navigation Services South Africa
ATS	Air Traffic Services
CANSO	The Civil Air Navigation Services Organisation
CDA	Continuous Descent Approach/Arrival
CNS/ATM	Communications, Navigation, Surveillance / Air Traffic Management
CTMS	Central Traffic Management System
DANS	Dubai Air Navigation Services
DARP	Dynamic Airborne Reroute Procedures
GCAA	United Arab Emirates General Civil Aviation Authority
GHG	Global Greenhouse Gas
IATA	The International Air Transport Association
ICAO	The International Civil Aviation Organisation
INSPIRE	Indian Ocean Strategic Partnership To Reduce Emissions
ISPACG	Informal South Pacific ATS Coordinating Group
MAESTRO	Means To Aid Expedition And Sequencing Of Traffic With Research Of Optimisation

NOTAM	Notice To Airmen
OPD	Optimum Profile Descent
PBN	Performance Based Navigation
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance – Authorisation Required
RVSM	Reduced Vertical Separation Minima
STAR	Standard Terminal Arrival
TA	Tailored Arrival
TOD	Top Of Descent
UPR	User Preferred Routes

Appendix C INSPIRE Daily - Terms of Reference

Rules of Order

INSPIRE-Daily will be managed as a sub-team of the INSPIRE partnership, reporting to the partners at the quarterly and annual meetings. The INSPIRE-Daily team was selected from volunteers by the INSPIRE Chair.

INSPIRE-Daily preparation and responsibilities will be shared among the INSPIRE-Daily team members. The responsibilities are detailed in Table 1.

Table 1 - INSPIRE Daily responsibilities

Title	Lead Organisation	Responsibilities
INSPIRE-Daily Project Coordinator	ATNS SA	Ensure programme adheres to timeline, report back to group, serve as POC for INSPIRE-Daily
Media Liaison	AAI	Prepare press releases and reports, create & update webpage content, design logo.
Industry Representative	Prashant Sanglikar, IATA New Delhi	Develop the process for IATA review of city-pair nominations and for airline reporting. Serve as POC for IATA nomination review and feedback. Provide airline utilization reports to the Database Coordinator.
IATA Liaison	AAI	Work with Industry Representative to establish and maintain contact with airlines. Coordinate with IATA to ensure that reporting is provided to the Database Coordinator. Ensure information is shared in a timely manner between airlines, INSPIRE partners and IATA.

IATA will assist in identifying the various points of contact for each of the individual airlines as well as develop the process for review of city-pair nominations and provide nomination review and feedback. IATA will advise if there is more than one airline participating in a particular city-pair.

Participating Equipped Flight

Participating Equipped Flight refers to any flight where the aircraft meets the minimum criteria for participation in all published procedures available on the INSPIRE Daily City Pair route. These criteria will be documented in each city pair nomination.

INSPIRE Daily Best Practices

The current INSPIRE Daily Best Practices are:

- Network Optimisation
- Surface Movement Optimisation
- User-Preferred Routes (UPRs)
- Departure Optimisation
- Dynamic Airborne Reroute Procedure (DARP)
- 30/30 Reduced Oceanic Separation
- Time-Based Arrivals Management
- Arrivals Optimisation

Best Practices Review

INSPIRE Daily Best Practices will be reviewed annually and partners will be encouraged to submit new candidates for consideration. Nominations should be sent to the INSPIRE Daily Coordinator one month prior to the annual Coordinators' Conference. At a minimum, the nominations should include:

- name and description of the Best Practice,
- studies/documentation showing fuel savings,
- an explanation of restrictions/limitations on the availability of the Best Practice, and
- a point of contact.

The INSPIRE Daily team will review the nominations and present recommendations for inclusion/exclusion of the nominated Best Practices at the Annual Conference.

City Pairs nomination

The process for review of the INSPIRE Daily nominations is documented below.

An INSPIRE Daily City Pair is identified by origin and destination cities (e.g. San Francisco to Sydney). The reciprocal destination and origin city pair (e.g. Sydney to San Francisco), would be considered a separate and distinct route because of the potential differences in Best Practice availability for departure and arrival. Initially, INSPIRE Daily will only include international city pairs in the Asia-Pacific region with origin and destination under the jurisdiction of an INSPIRE partner.

As the INSPIRE Daily program matures, the INSPIRE partners will consider wider collaboration for the inclusion of City Pairs with origin and destination in other locations. Only City Pairs with three or more INSPIRE-Daily Best Practices will qualify for the designation of INSPIRE Daily city pairs.

The inaugural city pair was Auckland to San Francisco, with new nominations expected on a regular basis. INSPIRE partners are encouraged to nominate additional City Pairs for inclusion in INSPIRE Daily. Nominations should be sent to the INSPIRE-Daily Team Coordinator.

Star Ratings

Each nominated INSPIRE-Daily City Pair shall be assigned a designation as an INSPIRE 3-Star, 4-Star, or 5-Star City Pair. The nominating ANSPs will propose the star rating for each city pair. To achieve a 5-Star rating, a City Pair must utilize all 7 INSPIRE-Daily Best Practices. A 4-Star City Pair will be any route with four to six Best Practices, while a 3-Star City Pair will utilise three Best Practices. City Pairs that do not have at least three available Best Practices will not be published.

City Pair Validation

The partners have engaged IATA Asia Pacific for assessment and validation of the INSPIRE-Daily Best Practices, city pair nominations and star ratings. The IATA assessment and validation is for consultation and advisory purposes.

Issues/Risks:

Funding and Staffing. The INSPIRE-Daily programme is an offshoot of the INSPIRE partnership, which in and of itself is dependent on in-kind donation of personnel and services from partner ANSPs and, as such, does not have dedicated funding. Changes in personnel or organisational direction of partners may adversely affect the INSPIRE-Daily programme.

Airline participation. Accurate reporting of INSPIRE-Daily City Pair utilisation will depend largely upon the accurate and timely reporting of successful utilisation rates by the airlines to the INSPIRE partners. This will require a commitment by the airlines to follow reporting methodology provided by the INSPIRE-Daily team. The INSPIRE Partners can request information, but ultimately the consistency and accuracy of reporting will depend upon individual airlines. Utilisation rates will be included in the INSPIRE Annual Report as a measure of success of the programme.

Stakeholders

Stakeholders include INSPIRE member ANSPs, IATA, and airlines.

Stakeholder	Responsibility
INSPIRE members	Nominate City Pairs as INSPIRE Daily Routes Establish & maintain contact with IATA Forward nominations to IATA Publicise INSPIRE-Daily City Pairs Coordinate with airlines to achieve buy-in Create & maintain reporting guidance for airlines about route utilization Request & record successful/not successful route utilization from airlines Summarise & publish route utilisation and flight counts Report availability of Best Practices that the airlines are unable to report
IATA	Validate availability of Best Practices on nominated City Pairs and associated INSPIRE-Daily star ratings Provide airline-industry feedback to the INSPIRE partners on INSPIRE-Daily and potential INSPIRE-Daily City Pairs Provide airline Best Practice utilization rates Encourage participation and provide feedback on new Best Practices
Airlines	For flights between INSPIRE-Daily City Pairs, record instances when one or more of the Best Practice procedures is unavailable or denied.

Outputs/Deliverables:

The start-up deliverables of the INSPIRE Daily Program will include:

- INSPIRE-Daily Terms of Reference (approved by full team);
- List of INSPIRE-Daily Best Practices (approved by full team);
- Candidate INSPIRE-Daily City Pairs (agreed to by nomination of the partners, validated by IATA);
- INSPIRE-Daily website & marketing materials (e.g. logo, press release, brochure); and
- Reporting materials and guidance materials for airlines and IATA.

On-going deliverables of the INSPIRE-Daily Programme will include:

- A list of IATA-validated INSPIRE-Daily City Pairs, published annually; and
- A published summary of performance of INSPIRE-Daily City Pairs.

All deliverables will be published to the INSPIRE website.