new southern sky

Aeronautical Information Management System

Concept of Operations

2023

New Southern Sky

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Cover Image

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Aviation System Safety Criteria, Prepared for CAA by Navigatus Consulting, 21 November 2018
The National Airspace Policy of New Zealand (2012)

Issued by:

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List of Acronyms

Acronym	Term
ACE	Airport Capacity Enhancement
A-CDM	Airport Collaborative Decision Making
ADS-B	Automatic Dependent Surveillance - Broadcast
ADS-C	Automatic Dependent Surveillance - Contract
AFTN	Aeronautical Fixed Telecommunication Network
AIDC	ATS Interfacility Data Communications
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
AMAN	Arrivals Manager
AMHS	ATS Message Handling System
AM(R)S	Aeronautical Mobile (Route) Service
AMS(R)S	Aeronautical Mobile Satellite (Route) Service
ANP	Actual Navigation Performance
ANSP	Air Navigation Service Provider
APCH	Approach
API	Application Programming Interface
ATC	Air Traffic Control – a sub-function of Air Traffic Service
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Service – a sub-function of Air Traffic Management
Baro VNAV	Barometrical Vertical Navigation
BeiDou	China Global Navigation Satellite System, not yet fully operational
BLOS	Beyond Line of Sight *(refers to UAV operations)*
BVLOS	Beyond Visual Line of Sight *(refers to UAV operations) – may still be radio LOS*
CAA	NZ Civil Aviation Authority.
CA	Controlled Airspace
CCO	Continuous Climb Operations
CDM	Collaborative Decision Making

Acronym	Term
CDO	Continuous Descent Operations
CONOPS	Concept of Operations
CPDC	Controller Pilot Digital Communication
CPDLC	Controller Pilot Data Link Communications
CTA	Control Area
CTR	Control Zone
DME	Distance Measuring Equipment
FAA	Federal Aviation Administration
FIR	Flight Information Region
FL	Flight Level
FTO	Flight Training Organisation
GA	General Aviation
Galileo	European Global Navigation Satellite System, not yet operational
GBNA	Ground Based Navigation Aid
GLONASS	Globalnaya Navigazionnaya Sputnikovaya Sistema. *The Russian Government's Global Navigation Satellite System*
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GUI	Graphical user Interface
HALE UAV	High Altitude Long Endurance UAV
HEMS	Helicopter Emergency Medical Service
HF	High Frequency
HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IRU	Inertial Reference Unit
ITS	Intelligent Transport System
ITU	International Telecommunications Union
IWXXM	ICAO Weather Exchange Model
Large UA	Used in this document to broadly refer to traditional-aircraft sized UAV
LPV	Localizer Performance with Vertical Guidance
MALE UAV	Medium Altitude Long Endurance UAV

Acronym	Term
MET	Meteorological
MON	Minimum Operational Network
MoT	Ministry of Transport
MSAS	Multi-Functional Transport Satellite Augmentation System, *MSAS-MTSAT, Japan*
MoWP	Method of Works Plan *(as prepared by airport authorities for aerodrome works)*
NAANP	National Airspace and Air Navigation Plan
NAVAIDS	Navigation Aids
NM	Nautical Mile
NSS	New Southern Sky programme
PB	Performance Based
PBCS	Performance Based Communications and Surveillance
PBN	Performance Based Navigation
PBN Manual	Performance Based Navigation Manual, ICAO Doc 9613 4th Edition
PEDs	Personal Electronic Devices
PinS	Point in Space
RAIM	Receiver Autonomous Integrity Monitoring
RCP	Required Communication Performance
RLP	Required Link Performance
RPT	Regular Passenger Transport
RNAV	Area Navigation
RNP	Required Navigation Performance
RNP-AR	Required Navigation Performance – Authorisation Required
RPAS	Previously Remotely Piloted Aircraft System *(now superseded by the term UAV)*
RSP	Required Surveillance Performance
RWY	Runway
SATCOM	Satellite Communication
SATVOICE	Satellite Voice Communication
SARPs	ICAO Standards and Recommended Practices
SBAS	Satellite Based Augmentation System
SID	Standard Instrument Departure
Small UA	Used in this document to broadly refer to sub-traditional-sized aircraft UAV
SOA	Service Oriented Architecture

Acronym	Term
SSR	Secondary Surveillance Radar
STAR	Standard Terminal Arrival Route
SUA	Special Use Airspace
SWIM	System Wide Information Management
TBO	Trajectory Based Operations
TCAS	Traffic Collision Avoidance System (*Traffic Alert and Collision Avoidance System)*
UA	Unmanned aircraft
UAM	Urban Air/Aerial Mobility
UAS	Unmanned Aircraft System *(the whole system manging UAV and UAV operations)*
UAV	Unmanned Aerial Vehicle - *Previously termed: Remotely Piloted Aircraft System (RPAS)*
Unattended	An Unattended Aerodrome. *Refers to aerodromes where air traffic control or flight information service is not provided.*
UTM	Unmanned Traffic Management *(Unmanned Aircraft System Traffic Management)*
VFG	Visual Flight Guide.
VFR	Visual Flight Rules
VHF	Very High Frequency
VLOS	Visual Line of Sight *(refers to operations of UAV)*
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VoIP	Voice Over Internet Protocol
VOR	VHF Omnidirectional Range. *A ground based navigation aid*

Revision	Date	Authorised By	
		Name	Signature
Draft for stakeholder consultation V1	5 March 20	Geraint Bermingham Navigatus	
Draft for stakeholder consultation V2	18 May 20	Geraint Bermingham Navigatus	
Final draft for NSS WG review	15 June 20	Geraint Bermingham Navigatus	
Issue 1	30 June 2020	Steve Smyth Director NSS	
Issue 2			
Issue 3			
Issue 4			

CONOPS Review

The intention is for this Aeronautical Information Management System (AIMS) Concept of Operations (CONOPS) document to provide contemporary guidance to all stakeholders in the New Zealand aviation sector with respect to moving into a digital aeronautical information environment for New Zealand and also to specifically inform the next AIP contract, which is due to be let in 2023.

As the NSS Programme is due to complete at the time this CONOPS is effectively in use, this is the only version of the AIMS CONOPS that will be produced under the NSS Programme. It is the view of active stakeholders at the time of publication and reflects their input to what in a procurement sense could be considered a User Requirements Document, driven by perceived benefits.

New Southern Sky

Aeronautical Information Management System (AIMS) Concept of Operations

Executive Summary

1. This document, the Aeronautical Information Management System Concept of Operations (AIMS CONOPS) is a description of how a set of AIMS capabilities may evolve and be employed to operate in New Zealand's domestic airspace from 2023 onwards. This AIMS CONOPS is aligned with the NSS CONOPS 2023 document that is itself aligned with the National Airspace and Air Navigation Plan[1] (NAANP). This AIMS CONOPS is a collaborative document, produced with input from the end users to provide a reference framework for the New Southern Sky (NSS) programme end state. This AIMS CONOPS models today's view of how aeronautical information will be prepared and consumed by aviation users operating in the New Zealand Flight Information Region (FIR) aviation system post 2023. Aviation industry input enables a user view for each operations type, of the AIMS.

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[1] New Southern Sky, National Airspace and Air Navigation Plan, June 2014

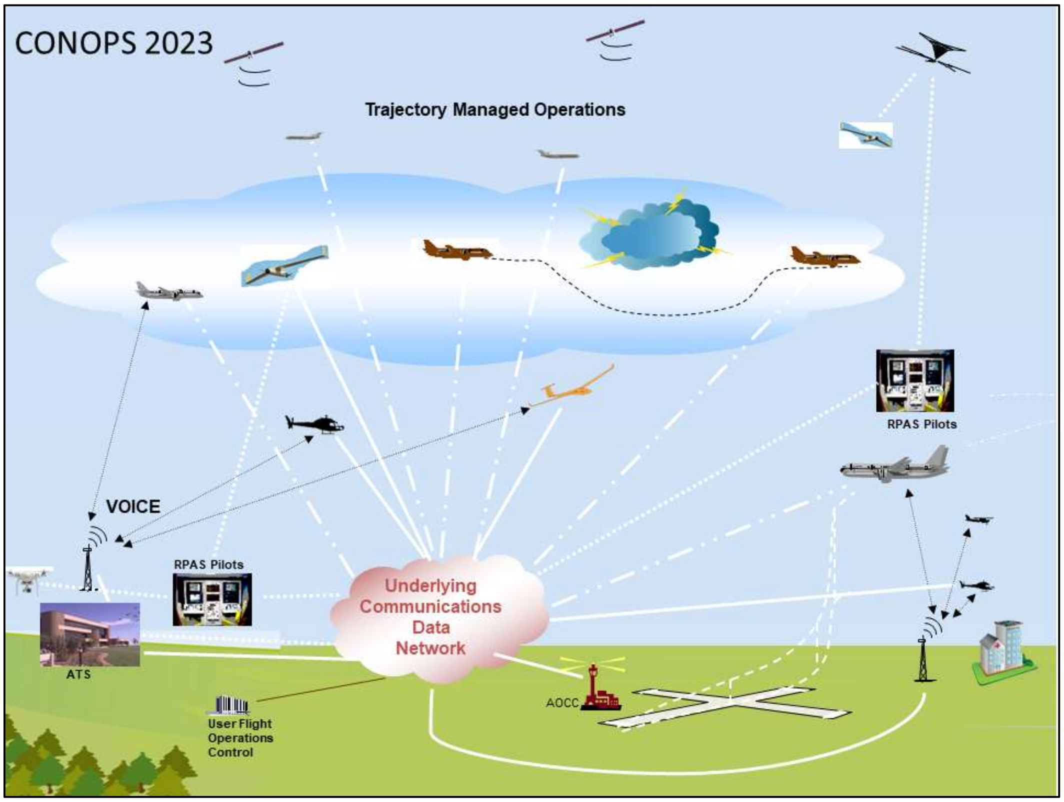


Figure 1: Overall CONOPS 2023

2. In 2023, at the end of NSS Stage 3 we will see greater use of digital data, providing a rich environment for information dissemination to aviation systems users. Optimal use of airspace will be achieved through suitably equipped aircraft operating in this airspace. This technology transition will be flexible, enabling growth in aircraft movements through the FIR and be able to accommodate aircraft with different layers of capability.

3. A wide spectrum of New Zealand's aviation industry operates throughout the FIR airspace. At one end of the spectrum are international flights entering or departing the FIR, there are domestic jet operations in airspace above FL245, medium level Regular Passenger Transport (RPT) operations between FL130 to FL245 and lower level operations through to FL130. Military and Corporate aircraft operate throughout this airspace range. General Aviation (GA) operate mainly in the airspace below FL130 with the majority below Fl100. Helicopters and agricultural operations may be at very low height above ground. In addition, there is increasing small unmanned aerial vehicles (UAV) visual line of sight (VLOS) operations and the expectation of the development of small and large UAV beyond visual line of sight

(BVLOS) and beyond line of sight (BLOS) operations including, in due course, for urban mobility.

4. By 2023, the New Zealand FIR is expected to see nearly all aeronautical information being supplied in digital form and possibly at first in traditional formats. The provision of digital data, disseminated efficiently in a timely and dynamic way to aviation systems will provide a rich picture to the various users. Optimal provision and use of digital data, in a range of conventional and contemporary formats via user-centric applications, if done well, will deliver industry efficiencies and contribute to reducing risk and enhancing safety.
5. This AIMS CONOPS envisages an Aeronautical Information Service (AIS) that enables the continuous, up-to-date and real-time information transfer and the real-time availability of aeronautical information data for flight planning and into aircraft.
6. While the overall design of the AIMS will be unique to New Zealand, providing operationally ready user-centric data, the system will remain ICAO compliant to facilitate international connections and synergies.
7. This AIMS CONOPS articulates the data to be required by aviation users within the New Zealand aviation system. Ultimately it will be fully enabled through users deploying the appropriate equipment. This AIMS CONOPS adds to the CONOPS 2023 and NSS strategy and objective outcomes work programme. Where a proposed change refers to policy or regulatory decisions that have yet to be made, the content herein should be taken as a vision of the future, rather than a statement of what will happen.
8. AIMS is a key enabler of a nation's aviation system that in turn, is integral to the transport system and economy. The transition to an entirely digital AIMS environment will be a key enabler to New Zealand's aviation becoming an integral part of the 'Intelligent Transport System' as set out in the Ministry of Transport strategy and further enhances the safer journeys concept.
9. A fully digital AIMS is far more than simply new software and equipage. It will represent a new environment and way of doing things and improved user access and experience. While involving new platforms and therefore a step change in core systems, the user formats, and ways of accessing information, system changes must be user led and must not impose undue change costs on the user community.
10. The AIMS CONOPS will inform DCE Security and Infrastructure at CAA during the next AIP contract iteration.

Introduction

11. This AIMS CONOPS document is a description of how a set of data and communications capabilities could be deployed and employed by the aviation systems and aviation users.
12. The AIMS CONOPS is a collaborative document, produced with input from the stakeholders and is used to provide a reference framework for the AIMS at the NSS programme end state.

A Concept of Operations is a document describing the characteristics of a proposed system from the viewpoint of an individual who will use that system. It is used to communicate the quantitative and qualitative system characteristics to all stakeholders.

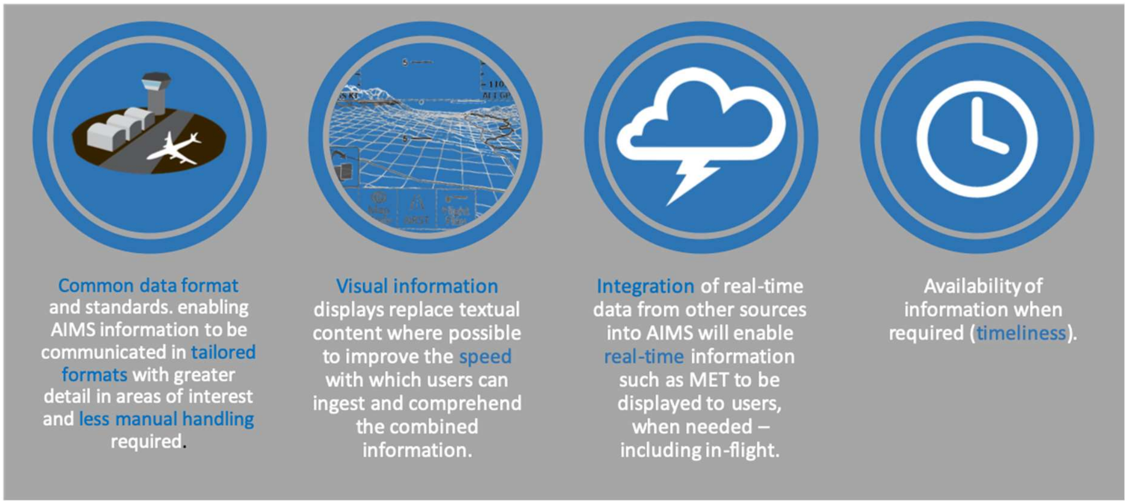
13. The significant technology shift in digital data capability and availability that AIMS will facilitate can be expected to enable new safety tools, that may include automatic detection of anomalous behaviour as well as improved operational efficiencies.

The global COVID-19 pandemic is ongoing at the time of drafting this CONOPS. The impact of this on aviation users has been significant and the full impact has yet to be seen. It is recognised that this presents both challenges and opportunities on the basis that while investment to change may be problematic, there are potential efficiencies and cost savings to be had from the introduction of this AIMS CONOPS.

The aim of the AIMS CONOPS is:

14. To provide an agreed stakeholder view of New Zealand AIMS and how it could operate post 2023, by defining the future AIMS state and identifying the benefits of future AIMS capabilities.

Benefits



The benefits realisable from AIMS CONOPS

15. Benefits that can be realised from introduction of this AIMS CONOPS are summarised in the following table:

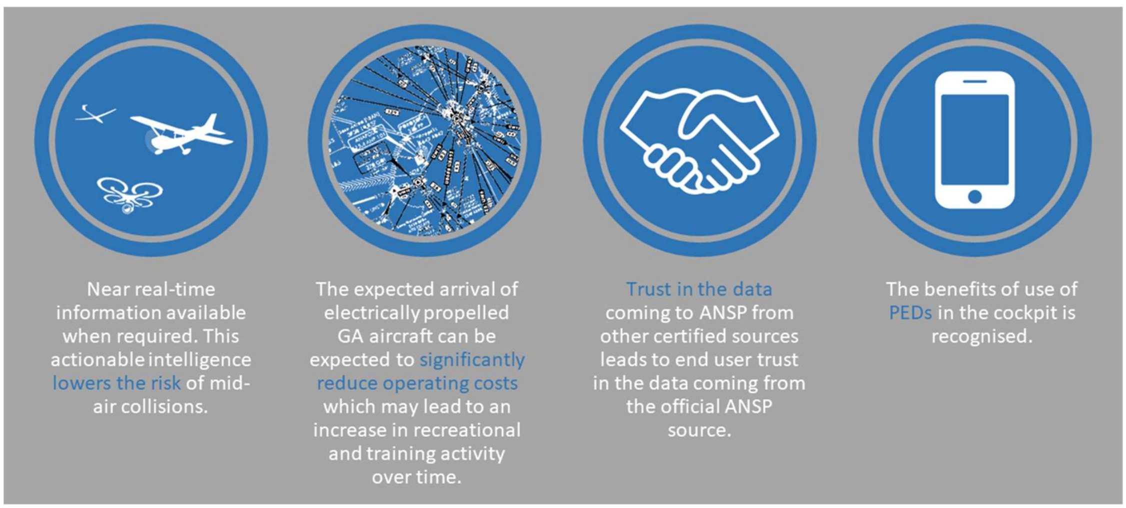
User Group	AIMS CONOPS benefit that can be realised
All users	Aeronautical information will be created, managed and distributed via modern data and communications systems, using common data format and protocol standards. This technology will enable statutory AIMS information to be communicated to users in more tailored and useful formats with greater detail in areas of interest and less manual handling required.
All users	Through the application of System Wide Information Management (SWIM) principles, AIMS will integrate with complementary sources of information such as weather, runway conditions, and air traffic reports using common formats. Combined together and with the ability to update in near real-time, this consolidated information presents a more complete view of the operational environment at any given time.
All users	Taken together, information visualised and fed from approved, qualified sources will provide validated information that will in turn deliver benefits to aviation users through enhanced

	situational awareness before, during and after operations as well as saving considerable time locating and digesting information. It also ensures that all users, regardless of their method of receiving information (paper, data feed, electronic flight bag, etc), will be able to access verified up to date information at all times. It also sets the foundation for a future of manned and unmanned aircraft (UA) operations.
All users	Visual information displays replace textual content where possible to improve the speed with which users can ingest and comprehend the combined information.
All users	A new MET forecasting office in Auckland to complement the Wellington office means the provision of weather services is now more resilient to interruption.
All users	Better representation of MET information through the use of graphics has resulted in richer information being presented in consistent, more user-centric formats.
All users	Improved information on threats to aviation operations are being supported with new advanced algorithms given more in-depth user-centric information, LIDAR systems and enhanced radar and lightning data, each delivered in near real time.
All users	Full integration of meteorological information into aeronautical information applications will enable safer decision making pre-flight and in real time. This AIMS CONOPS envisages the real-time availability of MET data for flight planning and directly into users including to aircraft flight decks and to PEDs.
Small UA	Shared information exchange.
Small UA	Enables efficient service delivery.
Small UA; Large UA	Availability of real-time situation information when required (timeliness).
Small UA; Large UA	Enables innovation.
Large UA	Digital data exchange enables full integration with the existing aviation system, reducing the need for human intervention.

Large UA	Enables and supports urban aerial mobility.
All VFR Users	Near real-time information available when required. This actionable intelligence lowers the chance of mid-air collisions.
All VFR Users	Reduced costs.
All VFR Users	Simplified user experience more akin to the expectations of the new generation of pilots.
VFR Ag	Hazard information in an electronic form that can be used by common flight support equipment (tablets/EFIS/apps).
All IFR Users; Attended/unattended aerodromes	Timeliness and relevance of change or temporary state information (NOTAMs).
All IFR Users	Digital data will make the well-established information for IFR operations more readily available and in simpler more dynamic forms which can be expected to improve safety by reducing the opportunity for human error.
All IFR Users	Connected flight decks will be introduced to get the maximum benefit of the system.
Large airlines	Information required can be provided to standalone digital tablets at notably lower cost with the ability to centrally control version updates.
Small/medium airlines	Commercial reality precludes the availability of a full flight support department, technology can go some way to bridging this gap – integrated sources may alleviate this issue.
Small/medium airlines; Other Commercial IFR; EMS	The benefits of use of PEDs in the cockpit / on the flight deck is recognised and realised.
Small/medium airlines	The move from paper based information and towards device-based information access has the potential to deliver increased safety and efficiency.

Attended aerodromes	Digital data will make the well-established information for IFR operations more readily available and in simpler more dynamic forms. This reduces the opportunity for human error.
Attended aerodromes	Common runway condition report format.
Attended aerodromes	Improved data exchange leading to efficient operations.
Unattended aerodromes	Simpler information management and dissemination.
Unattended aerodromes	Effective runway condition report format.
ATC	A significant time saving, not having to search multiple websites and update paper based and non-digital text formatted AIP.
ATC	Improve situational awareness by having all relevant data integrated into one view (for ANSP use).
ATC	End user trust in the data coming from the official ANSP source and other certified providers.
ATC	Trust in the data coming to ANSP from other sources.
ATC	Value for money for end users of ANSP information.
ATC	Enhanced safety through better situational awareness by being able to see multiple complementary data sets integrated together. Combined these provide additional real-world context to supplement the core system, giving the controller better decision-making ability.
ATC	Ease of access to reference material.
ATC	Time efficient access to data and associated processes.
ATC	Backup flight data should the core system freeze or fail.
App Developers	Innovation can be expected to lead to improved API output / display design

App Developers	Innovation can be expected to result in low cost production of paper products (if requested by user) using lean arrangements.
App Developers	Innovation can be expected to enable non-standard and clumsy data formats to be converted automatically.
App Developers	Innovation can be expected to reduce the costs of ingesting aeronautical data in dynamic formats.
App Developers	Apps allow excellent flexibility to design effective graphical user interfaces.
App Developers	Working with standard digital data formats.



Assumptions

16. A number of assumptions have been applied to both the development of aviation safety criteria and the CONOPS 2023. These are set out in the 2023 CONOPS document (Para 3.1.1). The following AIMS key assumptions should be read in conjunction with those:

    a. Given the pace of change, the forward-look of this AIMS CONOPS is expected to be limited to approximately 10 years.
    b. There will be increased pressure on the aviation system from environmental factors.
    c. There will be increasing numbers of unmanned aircraft (UA) operating in the NZ FIR and in time there will be market pressure to enable this over dense urban areas.

17. Other interventions such as training, education, information, guidance, and sector-led initiatives, may also be needed to support realisation of this future vision. Any changes needed as part of enabling this AIMS CONOPS will require to be managed to avoid any potential for change-risks and ensure all safety criteria are met. Key among these will be to ensure that providers and integrators of aeronautical information are appropriately qualified to give assurance that the data validation requirements are in place.
18. While Airport Collaborative Decision Making (A-CDM) may be used by the majority of New Zealand International airports in the future, that is outside the scope of this AIMS CONOPS.

Constraints and Limitations

19. This CONOPs is subject to the followed constraints and limitations:

    a. The ICAO Standards and Recommended Practices (SARPs) are the basis for the aviation system.
    b. The CONOPs are designed to meet the aviation system safety criteria (ASSC); the ASSC was devised to provide criteria to guide system collaborators ahead of the development and delivery of the relevant rules.
    c. The Communications element of the AIMS CONOPs assumes that VHF will remain the primary means of voice communication within the New Zealand FIR.
    d. The CONOPs covers gate to gate and non-scheduled operations of all fixed wing (FW), rotary aircraft and lighter-than-air and UAV operating under VFR or IFR operating in any class of airspace.
    e. The scope includes all phases of flight including pre-flight.

The Changing Nature of the Industry

20. The changing nature of the industry is described in the CONOPS 2023 document. The key points are summarised below.
21. Dynamic user-centric information is a key to safety and efficiency within the aviation system.
22. There have been significant advances in technology that allow information derived from digital and satellite data to be integrated into aviation system wide activity to provide;
    - Enhanced Safety
    - Reduced environmental impact
    - Economic benefits
    - Societal benefits
23. UA is a disruptive technology where there may be exponential growth driven by the ongoing evolution of the UA at a pace set by the ability of the regulatory environment to evolve. UA developments can be expected to occur across all existing and other yet to be developed applications and be multi-facetted. Each application and their close integration into the existing airspace will present challenges that the AIMS must be able to respond to.
24. Other, potentially disruptive advances can be expected. Rocket Lab is an example where safety zones need to be frequently activated in the hours preceding a launch – that in turn may be at short notice. This is an example of where information must become more dynamic, flexible and more readily accessible than has traditionally been the case.
25. Due to the notably lower operating costs expected, electrically propelled aircraft can be expected to be introduced into the flight training sector, for short duration type operations and potentially into the regional transport sector. Notably lower operating costs can will be expected to change the dynamics of the aviation sector and lead to increased traffic density and movements in certain areas. Again, the AIMS must be able to support these changes.
26. Given the new air traffic management (ATM) system (Skyline X), associated changes in ATC delivery structure and procedures, there can be expected to be greater utilisation of airport infrastructure and aircraft.
27. Discreet operations by Defence or Police are likely to occur in both controlled and uncontrolled airspace. Defence and Police operations may need to carry out these operations covertly.

28. It is conceivable that New Zealand may wish to adopt a more adaptable airspace system whereby dynamic airspace designations are changed at various times of the day or to facilitate differing types of operations. Digital AIMS make such regimes more practical than is currently the case. Accurate and real time airspace and visualisations to users in the air and on the ground would be required to improve the safety margins in such dynamic operations. It is noted that flexible use of airspace is employed in countries such as the US and UK.

Scope and Context

29. A wide spectrum of New Zealand's aviation industry operates throughout controlled airspace (CA). At one end of the spectrum are international flights entering or departing the FIR, there are domestic jet operations in airspace above FL245, medium level RPT operations operating in the FL130 to FL245 range and lower level operations through to FL130. Corporate aircraft operate throughout this airspace range, as do some high-performance gliders. General aviation, helicopters and, increasingly, UA are safely integrated into the airspace below FL130 with some craft needing to operate at very low heights and over dense urban environments – an environment not normally accessed by traditional craft. This will present new challenges for AIMS and call for innovation and non-traditional solutions.

30. The AIMS CONOPS takes a systems approach to each user group. While users can be considered under many differing classifications and types, for the purposes of the CONOPS, the users are grouped as follows:

- VFR (including lighter than air and sail planes):
- IFR (including small, medium and large airlines)
- ATC and Air Navigation Service Provider (ANSP)
- Application providers
- Military
- Lighter than air / non-rigid / semi-rigid gliders

The NSS Context

31. The NSS programme delivers system outcomes through three stages to achieve the end state in 2023. This NSS CONOPS end state sets the context for the AIMS CONOPS. This is described as follows:

A mature PBN environment with a comprehensive fleet and infrastructure capability. Air traffic management tools complement airborne systems and enable the management of those aircraft that may experience temporary loss of PBN capability. Contingency ground infrastructure that enables all aircraft to safely return to the ground.

Communications Context

32. The CONOPS 2023 states that VHF will remain the prime means of communication in the NZFIR.

33. Voice over Internet Protocol (VoIP) can be expected to link remote sites for ground communication and aircraft applications once suitable methods have been established and validated. Exchange of messages and digital data between parts of the system will use the Air Traffic Service Message Handling System (AMHS) and ultimately the Aeronautical Telecommunication Network (ATN).

34. Communications for UA operations will remain work in progress as the technology and solutions develop over the coming years. Associated interim standards can be expected to be developed and to evolve.

    While non-safety critical data and communications may be over normal public systems, there is likely to be a requirement for safety of flight communication links to operate over protected aviation spectra, under ITU designations AM(R)S and AMS(R)S.

AIMS – Digital integration

35. Aeronautical information will be created, managed and distributed via modern data and communications systems, using common data format and protocol standards. This technology will enable statutory AIMS information to be communicated to users in more tailored and useful formats with greater detail in areas of interest and less manual handling required.

36. In addition, through the application of System Wide Information Management (SWIM) principles, AIMS will integrate with complementary sources of information such as weather, runway conditions, and air traffic reports. Combined together and with the ability to update in near real-time, this consolidated information presents a more complete view of the operational environment at any given time.

37. Taken together, information visualised and fed from certified and other appropriate sources, will provide validated information that will in turn deliver benefits to aviation users through enhanced situational awareness before, during and after operations as well as saving considerable time locating and digesting information. It also ensures that all users, regardless of their method of receiving information (paper, data feed, electronic flight bag, etc.), will be able to access verified up to date information at all times. It also sets the foundation for a future of manned and UA operations where new sources of information and the probable need for enhance accuracy and detail, can be expected.

38. Developments will see visual information displays replace textual content where possible to improve the speed with which users can ingest and comprehend the combined information. It is anticipated that third party providers will develop applications and systems to present the information in a number of ways as dictated by the user market. Given the user and the information being supplied, some of these providers will required to hold appropriate certifications.

Meteorological Information – Integrating Part 174 certified MET information

39. There has been notable progress in the delivery of Part 174 certified MET to the aviation sector in the time since the inception of the NSS programme, driven by four major themes:

    a. **Resilience**: The national MetService has developed enhanced redundancy that means the provision of the core weather monitoring and forecasting service is now more resilient to interruption than it was.

    b. **Enhanced data delivery and display systems:** Modern digital platforms now deliver richer information in a user-friendly format. Examples include; a MET CDM tool, and multi-station networks providing greater insight into weather affecting airports, their immediate surrounds and on approach paths, APIs delivering data directly to partner applications, minimising communications overhead, and enabling user-centric presentation.

    c. **Graphical Products:** Better representation of MET information through the use of graphics has resulted in information being presented in a consistent, easier to read and interpret formats and designed with user-input.

    d. **New Observation technologies:** Improved information on threats to aviation operations are being supported with;, new advance algorithms given more in-depth user-centric information, LIDAR systems and enhanced radar and lightning data, each delivered in near real time.

    a. **Additional providers:** The certification of a new Part 174 provider has illustrated that innovation can be introduced by new non-government owned providers.

40. Fuller integration of MET information into aeronautical information applications will enable safer decision making pre-flight and in real time. While not directly part of AIMS, because of the fundamental operational importance of MET to all aviation activities, this AIMS CONOPS envisages the real-time availability of MET data for flight planning and directly into aircraft flight decks, ground control stations and to PEDs.
41. ICAO MET Information Exchange Model (IWXXM) will continue to be used to provide a common format for MET ground-to-ground data exchange across the region, enabling improved integration with modern aeronautical information systems. Integration of MET data into the AIMS may use IWXXM or other suitable data formats and protocols to enable real-time MET information to be provided directly to users, including into the cockpit / flight deck / control station.

Information Management

Many of the benefits promised by NSS will be derived from effective information management

42. SWIM is an advanced technology concept designed to facilitate greater sharing of aviation system information, such as airport operational status, weather information, flight data and status of special use airspace. SWIM implementation is the optimal outcome for the aviation system in the conversion of digital data to information for systems users. The AIMS therefore becomes a key component of SWIM.

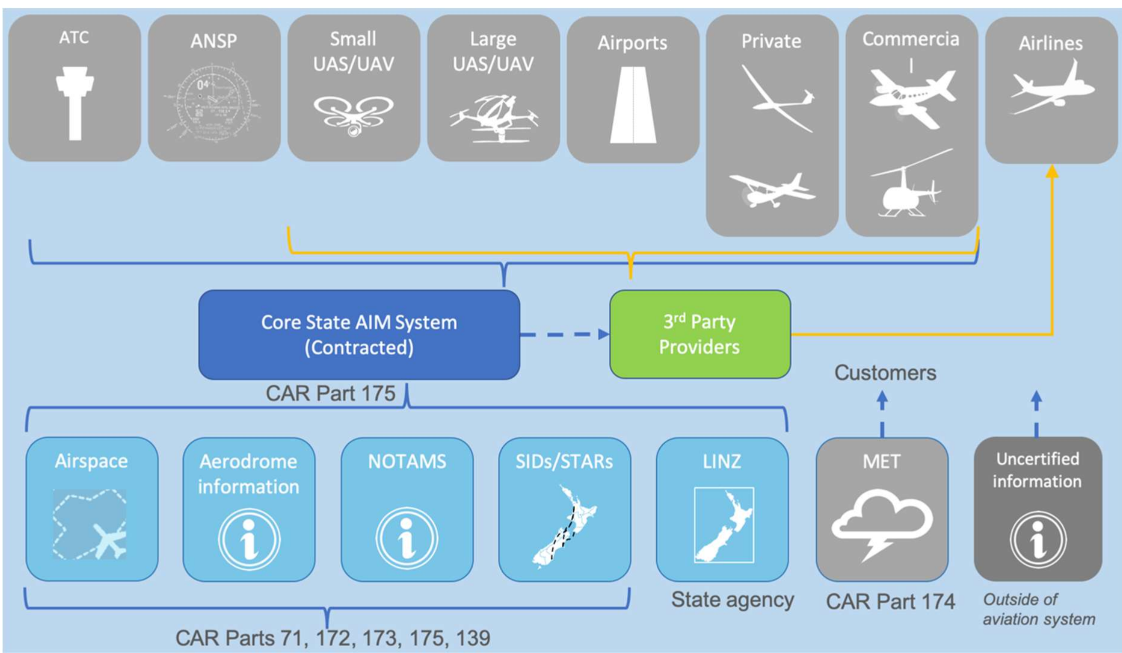


Figure 2: Common digital AIMS Concept

43. The following information will need to be handled and integrated by the AIMS to support user operations:

a. **Aeronautical** – Static- subject to update

b. **Aeronautical** – Dynamic – reflected changed conditions and circumstance

c. **Aeronautical** – Procedural - subject to update

d. **Aerodrome infrastructure** – Static – subject to update

e. **Aerodrome infrastructure** - Dynamic

f. **Geospatial – Terrain and landform –** Static (typically supplied by non-aviation sources)

g. **Geospatial – Obstacles** – Static - subject to update

h. **MET** – dynamic information on the past, current and future state of earth's atmosphere relevant for air operations

i. **MET** – dynamic information on the current atmospheric and ground conditions relevant to aerodrome operations.

Airspace Use Cases

44. The Airspace Use Cases were developed through a series of workshops and subsequent dialogue with stakeholders and how they perceived the future digitally based system would best meet their needs. The following paragraphs reflect that dialogue.

45. The following use cases form the core driver for the design of this AIMS CONOPS. The format is as follows:

    - Overall context and background for each user group including assumptions of the future
    - For each user group:
        - Typical user's profile
        - What is important for a typical or representative user within the group
        - What aeronautical information the typical user requires
        - Anticipated benefits realisable and challenges of introducing a system meeting the AIMS CONOPS

46. For the purposes of the CONOPS the users are grouped as follows:

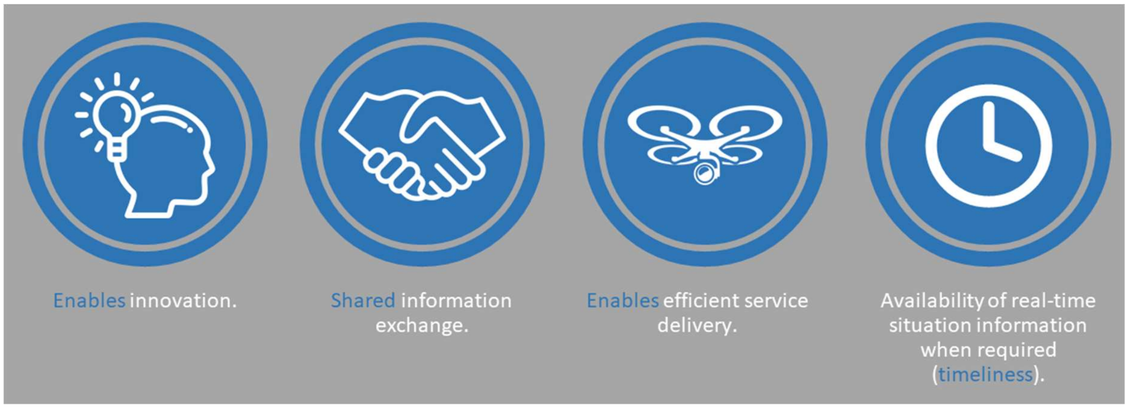
- UA users
    - Small UA users
    - Large UA Users
- VFR Users
    - GA
    - Agricultural operators
    - Rotary/EMS
    - Gliders
    - Lighter than air / non-rigid / semi-rigid gliders
- IFR Users
    - Large RPT airlines
    - Small / medium airlines
    - Other commercial users
    - Itinerant IFR users
    - Rotary/EMS
- ATC and ANSP
    - ATC
    - ANSP
- Application providers
    - Third party aeronautical information creators
    - Third party aeronautical information deliverers
- Military

Unmanned Aircraft Users

Context

47. UA operations are carried out under Part 102 or Part 101 requirements. These rules can be expected to evolve as the technology and solutions mature over time.
48. Future policy and regulatory requirements will reflect decisions as to whether UA should operate and meet the same or different performance requirements as per manned aircraft operating within the New Zealand aviation system, with regard to navigation, surveillance, communications/data links, and other relevant matters.
49. Small UA can be expected to typically operate at low level and in a wide range of environments including urban areas. This may demand use of data that is not derived or delivered in the current aviation system.
50. Development of large UA (GA scale) for urban mobility is being progressed. Their use must be enabled to gain the associated societal benefits. UA urban mobility is expected to require access for these craft to controlled airspace and to heli-pad type operating surfaces in a similar way to current helicopter transport.
51. Development of UA for utilisations similar to traditional aircraft is also being progressed. Their development and use must be allowed for to gain the associated economic benefits. Such use is expected to require operation of these craft in a range of environments and airspace and to all types of operating surfaces in a similar way to existing aircraft.
52. UA urban mobility can be expected to require large UA to use operating surfaces positioned within densely built up areas. This will require access to and use of data that is currently not derived or accessed from the current aviation system. Some of this data (e.g. MET, hazard location, ANP etc) may be required at a granularity not needed for current aviation use.

Small UA User Case



Representative small-UA user operations and context

53. The following describes the expected typical small UA operation and context:

- Flights occur mainly from the surface to 1,000 feet AGL, covering both controlled and uncontrolled airspace.
- VLOS and BVLOS operations in uncontrolled and controlled airspace.
- Use aeronautical and non-aeronautical information to undertake pre-flight planning of visual flights around New Zealand.

Aspects typically of importance for small-UA users

54. The following describes the information typically important for small UA users:

- ATC approval (for controlled airspace)
- VFR charts (for area of operation)
- NOTAM information and SUPPS
- MET info, both forecast and actual (also at a fine local level)
- Communication with or notification of other manned aircraft operators in the vicinity.

Information required by typical small-UA user

55. The following describes the expected typical use of aeronautical data by small UA and users:

- Near real-time information operationally
- Changes to airspace to be flown within and adjacent to (e.g. restrictions or other operations)

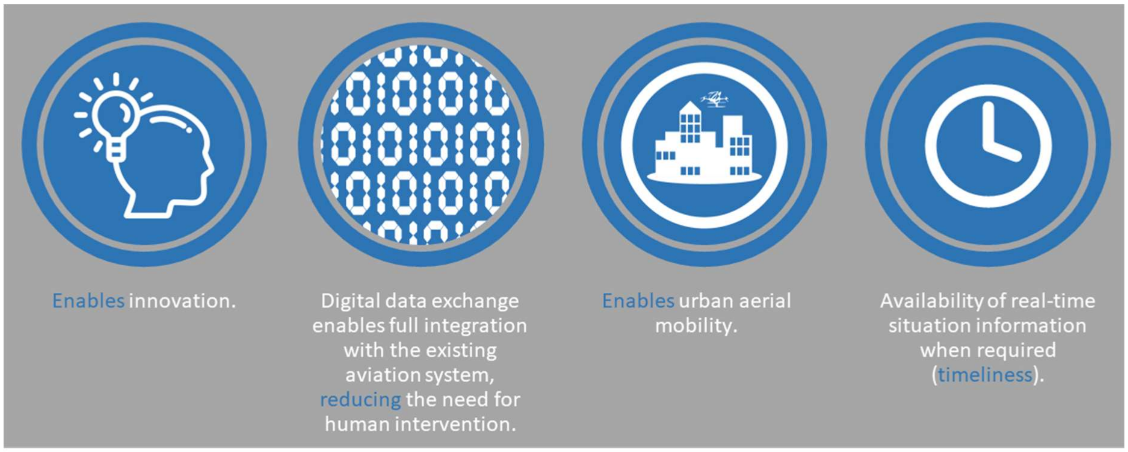
- Ability to forward plan, seeing temporary restricted areas and other operator planned info – e.g. giving visual access to NOTAM information
- Having a good understanding of the environment, both on the ground (obstructions) and above – such as local constraints and restrictions e.g. landowner, council.
- In the future, a central formal source of core aeronautical information, including real time positioning of, with the exception of some government needs, other airborne craft will be essential in at least some areas.

Information benefits and challenges for typical small-UA user

56. The following describes the expected benefits and challenges for this user group:

- Benefits:
    - Enables innovation;
    - Shared information exchange;
    - Enables efficient service delivery; and
    - Availability of real-time situational information when required (timely).
- Challenges:
    - Uncertainty of other users in airspace (e.g. Agriculture spraying or other low- level operations);
    - Steep learning curve for new recreational entrants – need for simplicity of information and access to that required to support safe use of the sky for non-professional users;
    - Professional operators (Part 102) – need to be able to issue flight information regarding intended area of operations at short notice while enabling required oversight and control of restrictions by controlling authorities; and
    - Non-UA specialist controlling authorities may not always understand the rules around UA (e.g. councils, or ATC). Standardisation of process and information communication would enable all participants to have a common awareness picture.

Large UA User Case



Representative large UA user operations and context

57. The following describes the expected typical large UA operation and context:

- Flights cover BVLOS in controlled and uncontrolled airspace, from the surface to 3,000 feet AGL, and to FL150 for Medium Altitude Long Endurance (MALE) and High Altitude Long Endurance (HALE) UA. Vertical take-off and landing, use of conventional operating surfaces and generally quiet propulsion and lift systems.
- May operate remotely from start to finish with alternate courses of action available.
- Mostly pre-programmed, automated flight plan. Can select alternate flight plans, but they are pre-programmed. Due to the non-scheduled short notice of flight, there is limited time for pre-flight planning. Flights are demand driven.
- If regulation allows, systems may fulfil all the duties of a pilot in command within defined areas.
- Use both certified aviation and non-aviation (maybe from unofficial or uncertified sources) information to undertake pre-flight planning of remote operated flights in pre-defined locations.

Aspects typically of importance for large UA users

58. The following describes the information typically important for large UA:

- Having an accurate, up-to-date and clear information source to support providing good situational awareness of the environment – including live weather. Information is likely to be required at a more granular level than has traditionally been the case and for areas and environments that have not been routinely used for aviation.
- Considerations, decision points and alternate course of action relating to programmed flights. Highly dynamic environment.
- Data integrity and interoperability, supplied possibly by multiple suppliers, need understanding of robustness of data.
- New industry – which is neither VFR nor IFR – clarity of requirements on how to manage integration of new technology at industry level across the sector.
- Interface to data streams (Application Programming Interface (API) etc.) including connection/data rates and security.
- Requires all information to be broken into structured data streams which can be digested by a machine. Digital information, quick, easy, understandable, verified – able to be processed by systems.
- Ability to integrate with all other aviation users (other UAV and manned aircraft).

Information required by typical large UA user

59. The following describes the expected typical use of aeronautical data by large UA:

- IFR/VFR CHARTS (including airspace, obstacles, frequencies, airports) – digital, additional information from that currently available
- NOTAM type information – digital, able to be processed by on board/off board systems
- MET forecasts/actuals – at a more granular level than current and for bespoke areas
- Temporary flight restrictions (TFR) – sent digitally
- UAV integration into a Unmanned Traffic Management (UTM) system in at least local or urban environments.
- Obstruction data – includes buildings and topographic

Information benefits and challenges for typical large UA user

60. The following describes the expected benefits and challenges of AIMS CONOPS for this user group:

- Benefits:
  - Enables optimum utilisation of UA within the aviation system;
  - Digital data exchange enables full integration with the existing aviation system, reducing the need for human intervention;
  - Enables urban aerial mobility; and
  - Availability of real-time situational information as and when required (timeliness).
- Challenges:
  - Lack of clarity of requirements for new industry sector – possible need for new aviation rules and local planning rules to provide clarity for all users;
  - Information on non-cooperative aviation (small UA and GA) and non-aviation actors (e.g. cranes outside of aerodrome areas); and
  - Interface with non-aviation information (not from certified sources). Need for closer integration with other agencies, e.g. Local Councils and other territorial authorities including during planning processes.

VFR Users

Context

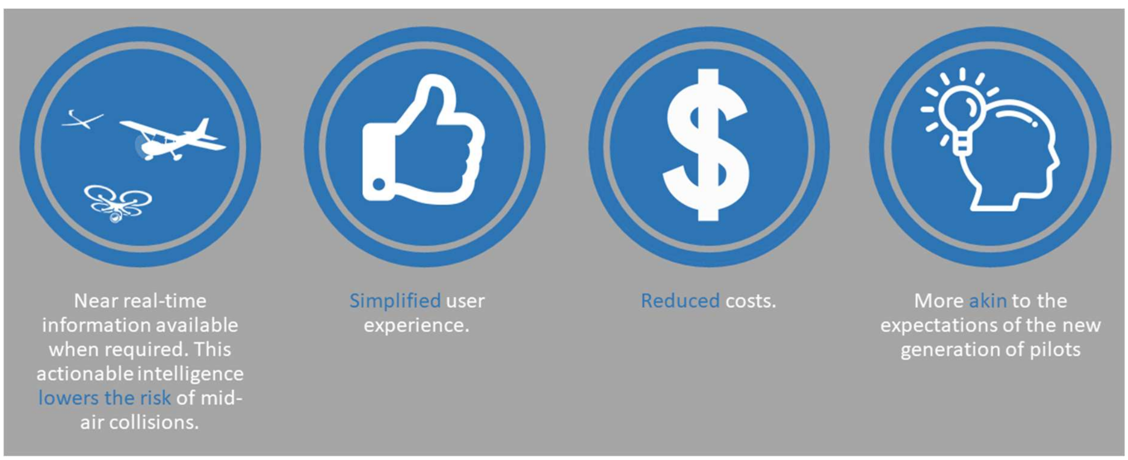
61. VFR operations are carried out in uncontrolled airspace. Collison avoidance is principally by means of ‘see and avoid’.

62. VFR operations are well established and so also the information needs. Digital data will make this same information more readily available and in simpler more digestible forms that which can be expected to improve safety – particularly for pilots with low hours or who fly less frequently.

63. Regulatory requirements on VFR users is mature and only limited change can be expected in the short to medium term. This reflects the maturity of the sector. However, technology continues to advance and some change within the regulatory content may occur as a result.

64. The expected arrival of electrically propelled GA aircraft can be expected to significantly reduce operating costs which may lead to an increase in recreational and training activity over time. The AIMS must be able to handle this.

VFR GA User Case



Representative user operations and context

65. The following describes the expected typical VFR GA operation and context:

- Flights occur mainly in uncontrolled airspace from the surface to 13,000 feet, but at times in controlled airspace, particularly to leave from or arrive at airfields.
- Use information to plan and execute visual flights around New Zealand.

Aspects typically of importance for VFR users

66. The following describes the information typically important for VFR GA users:

- Topography and airspace

- Considerations, decision points and alternate course of action relating to the planned flight
- Actionable near real time intelligence to avoid dynamic threats.

Information required by typical VFR user

67. The following describes the expected typical use of aeronautical data by VFR GA users:

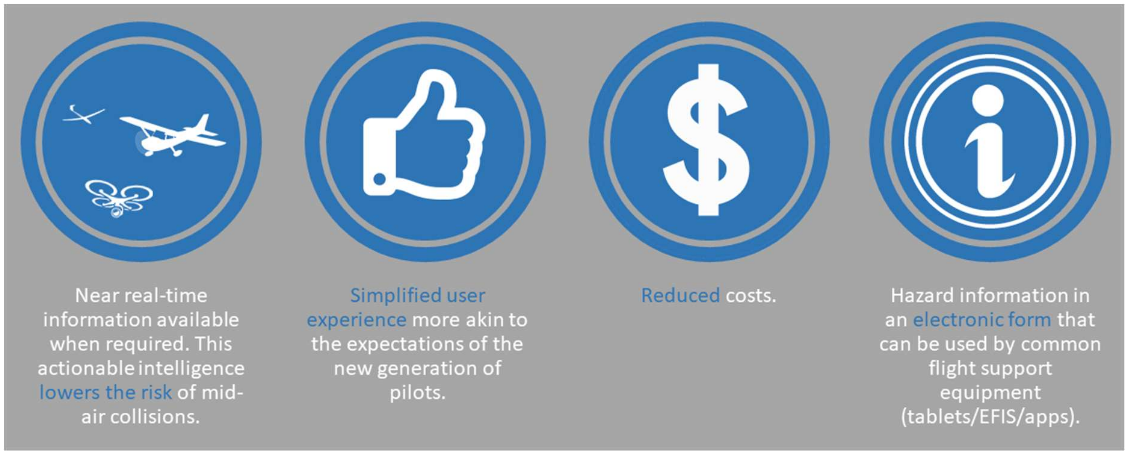
- VFR Charts (info on airspace, frequencies, airports) – updated in real time, linked to NOTAM information.
- AIP data for aerodromes of interest
- NOTAM information – route specific, relevant, accessible, easy to read, third party overlay, centralised with other information, API access.
- MET Forecast – using personal professional judgement, reviewing multiple sources and using local knowledge to assess, recency of forecast. Timely and accurate to make decisions, up to system to decide where from, could be a range of sources.
- MET Actuals – Use of other sources to provide real time information e.g. weather cameras, observation stations
- Twilight times for operating locations – systems capable of taking into account local conditions, need more granularity (additional aerodromes).

Information benefits and challenges for typical VFR user

68. The following describes the expected benefits and challenges of AIMS CONOPS for this user group:

- Benefits:
  - Reduced costs;
  - Simplified user experience;
  - More akin to expectations of the new generation of pilots;
  - Near real-time information available when required. This actionable intelligence lowers the risk of mid-air collisions.
- Challenges:
  - Risk that information is not available in an electronic form that can be used by common flight support equipment (tablets/EFIS/apps). This will increase cost or complexity.
  - Current Visual Flight Guide (VFG) format is not suitable for small light aircraft (prefer spiral bound).

VFR Agriculture User Case



Representative user operations and context

69. The following describes the expected typical VFR Ag operation and context:

- Flights occur in a localised area, typically in uncontrolled airspace.
- Locations are researched ahead of time; landowner is contacted and pilot is aware of hazards. Pilot has access to weather sites.

Aspects typically of importance for VFR Ag users

70. The following describes the information typically important for VFR Ag users:

- Airspace for visual navigation.
- Considerations, decision points and alternate course of action relating to the planned flight.
- Environmental situation awareness.
- Strip condition – usually from discussion with landowner.
- Actionable near real time intelligence of dynamic threats.
- Integrating official core information with a range of supplementary information from other providers (e.g. powerlines) and present it in a usable integrated way. Allow overlay of third-party information.

Information required by typical VFR Ag users

71. The following describes the expected typical use of aeronautical data by VFR Ag users:

- VFR Charts (info on airspace, frequencies, airports) – updated in real time, linked to NOTAM information.
- AIP data for aerodromes of interest
- NOTAM information – route specific, relevant, accessible, easy to read, third party overlay, centralised with other information, API access
- MET Forecast – using personal professional judgement, reviewing multiple sources and using local knowledge to assess, recency of forecast. Timely and accurate to make decisions, up to system to decide where from, could be a range of sources. More site specific than MetService will provide, real time weather and customer will advise.
- MET Actuals

Information benefits and challenges for typical VFR Ag users

72. The following describes the expected benefits and challenges of AIMS CONOPS for this user group:

- Benefits:
  - Hazard information in an electronic form that can be used by common flight support equipment (tablets/EFIS/apps);
  - Simplified user experience more akin to the expectations of the new generation of pilots;
  - Reduced costs; and
  - Near real-time information (including of UA operations) available when required. Actionable intelligence lowers the chance of mid-air collisions.
  - Note: Current VFG format not suitable for small light aircraft (prefer spiral bound)
- Challenge:
  - Expense and Security of systems with greater capability than needed.

Glider User Case

Representative glider user operations and context

73. The following describes the expected typical glider operation and context:

- Flights occur mainly in uncontrolled airspace but enter controlled airspace for long distance flights at altitude, or to access aerodromes.
- Flights may be very close to terrain and also up to FL180, and occasionally FL280 or more (for sporting award or national/international record attempts).
- Use aeronautical information to plan and execute local and long-distance sporting flights.
- Daytime operations
- VHF equipped and used
- Operations frequently close to terrain and to other gliders
- More long-distance flying is envisaged in the future.

Aspects typically of importance for glider use

74. The following describes the information typically important for glider users:

- Collision avoidance of other aircraft, especially gliders and UA
- Glide performance to viable landing locations
- Airspace boundaries
- Weather information along the route of flight
- Status of GAA activation – more important, making more GAAs
- Ability to incorporate official data into planning/navigation tools and charts (Event Organisers: getting data ready for contests/events)
- Electronic data – to allow customised maps of area of interest to be developed.

Information required by typical glider use

75. The following describes the expected typical use of aeronautical data by glider users:

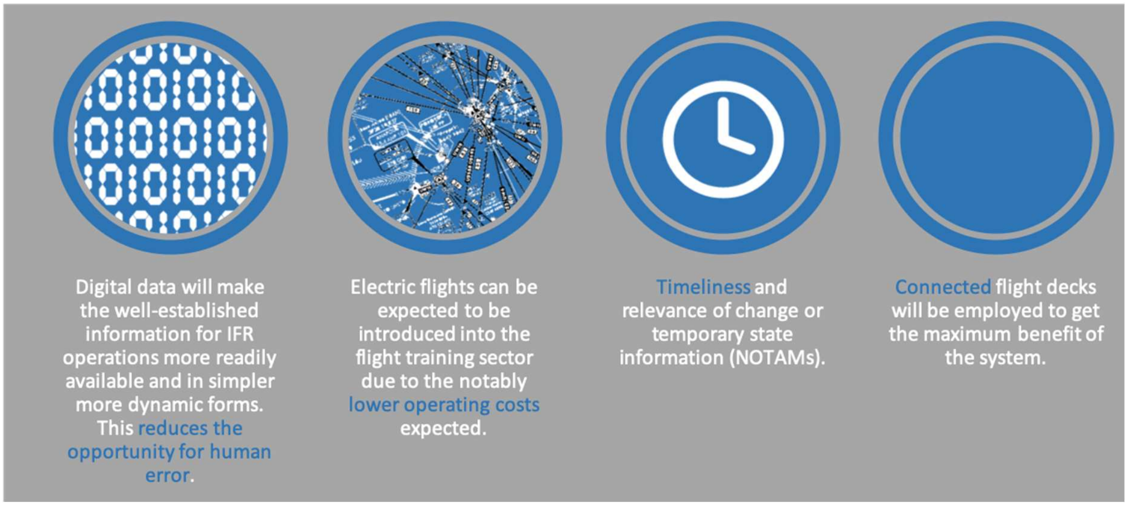
- VFR Charts - info on airspace, frequencies, airports
- AIP data
- MET forecasts
- NOTAM type information
- Twilight times
- Visual Reporting Points

Information benefits and challenges for typical glider use

76. The following describes the expected benefits and challenges of AIMS CONOPS for this user group:

- Benefits:
  - Simplified user experience;
  - More akin to the expectations of the new generation of pilots;
  - Reduced costs;
  - Near real-time information available when required. This actionable intelligence lowers the risk of mid-air collisions; and
  - Real-time information: awareness of live issues, e.g. fires, events.
- Challenges:
  - Amount of data coming into cockpit is a potential issue, this needs to be managed to ensure pilots are not overloaded.

IFR Users



Context

77. IFR operations encompass a wide range of user types operating under various CAR Parts.

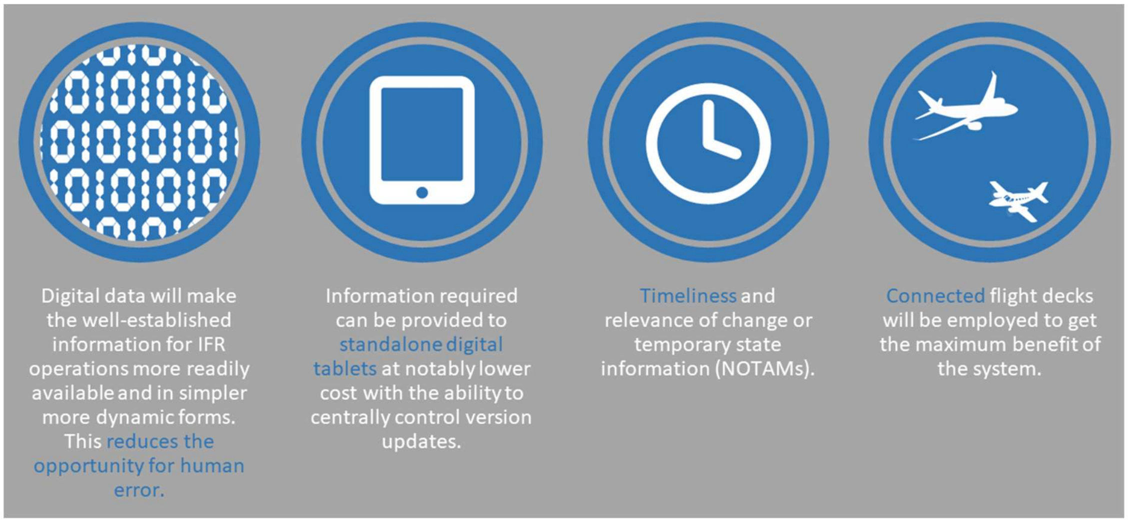
78. While the regulatory requirements on IFR users is mature given the rapid pace of PBN developments and aircraft navigation and control technologies, some change may occur in the medium term. This reflects the maturity of the sector. However, technology continues to advance and some change within the regulatory content may occur.

79. For the purposes of this AIMS CONOPS, IFR users are separated into the following groupings:

    - Large RPT airlines
    - Small medium RPT airlines
    - Other commercial operators
    - Itinerant type IFR operations (e.g. EMS)

80. IFR operations are well established, as are the information needs. Digital data will make this same information more readily available and in simpler more dynamic forms that which can be expected to improve safety by reducing the opportunity for human error.

Large Airline Users



Large Airline Context

81. Large airlines carry out both domestic and international operations and so must operate across the FIR boundary.
82. Large airlines are relatively well resourced and have a level of internal expertise not available to other user groups.
83. Relatively large fleets with generally common equipage enables common streamlines and efficient requirements but also demands a common AIMS requirement across fleets.
84. Given international operations, ICAO compliance and accepted international practices are required.
85. Large airlines source most aeronautical information from international third-party providers.

Large Airline User Case

Representative large airline user operations and context

86. The following describes the large airline context:

- Large passenger aircraft operating within NZ and on intercontinental routes.
- Exclusive IFR operations are planned within controlled airspace, either on structured high-level IFR routes or, where airspace allows, on user preferred routes (multiple sectors).
- NZ operations are from/to Primary or Secondary airports. High repetition of domestic routes generally result in highly proficient pilots although complacency

and fatigue/burn-out are significant issues. Fatigue is also a significant factor for ultra-long-range operations.

- Do not consume state source data directly as operations also occur outside NZ so need systems that present global data.
- The pilots do not carry out own flight planning as have flight despatch departments within airlines to produce plans. There is an automated flight planning function.
- Operate a mobile device based briefing solution, using mobile devices (class 2).
- Connected flight deck, obtaining dynamic data.

Aspects typically of importance for large airline users

87. The following describes the information typically important for large airline users:

- Being able to participate in full Trajectory Based Operations (TBO) from planning to arrival at the gate.
- Data presented graphically on one device.
- Air Traffic Flow Management (ATFM) designed to keep flight deck workload at manageable levels.
- Ability to access data that is changing rapidly or not available/stale at point of departure e.g. Met data. Need to access this information during the flight.
- Having the tools to be able to manage the departure – co-ordination across FIR boundary.
- State source data needs to be compatible for use by other third-party systems.
- NZ supplier of state data sources will be compliant with ICAO standards.
- Open architecture setup.

Information required by typical large airline user

88. The following describes the expected typical use of aeronautical data by large airline users:

- Digital Charting – on mobile device or paper
- Computer flight plan - presented on a mobile device and formatted interactively.
- NOTAM information package - route specific information formatted digitally, interactive object on display, full information available as required.
- Weather package including OPMET/ FICON/ SNOWTAMS/ Volcanic Ash Advisories - similar to NOTAM information system, referenced to flight plan and presented only if relevant.
- Receiver Autonomous Integrity Monitoring (RAIM) and GPS operational information – as above
- Space weather
- Take-off and landing performance tools e.g. using runway parameters - not automated

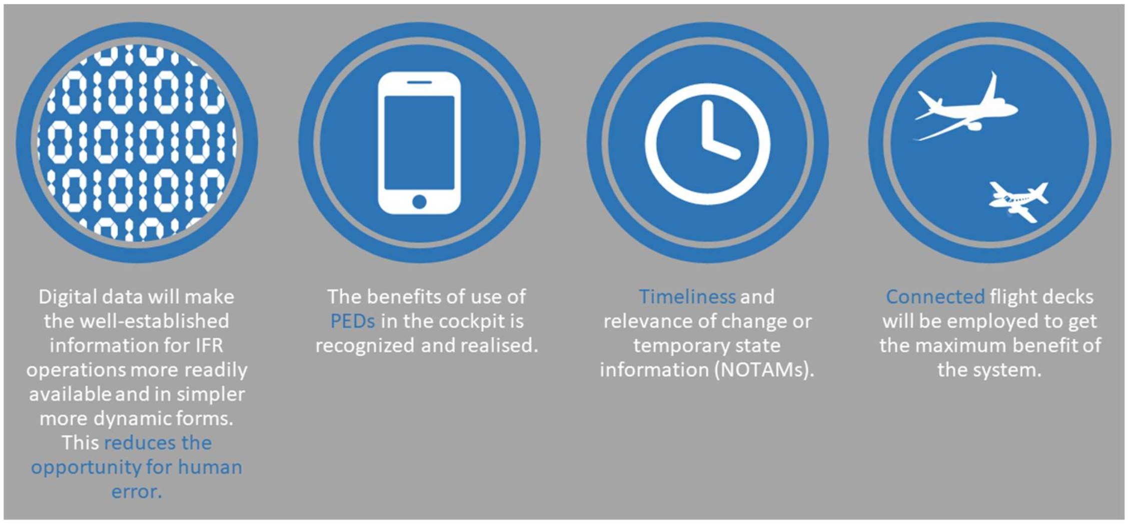
Information benefits and challenges for typical large airline user

89. The following describes the expected benefits and challenges of AIMS CONOPS for large airlines:

- Benefits:
  - A benefit of moving to digital AIMS is that much of the required information can be provided to standalone digital tablets at a much lower cost;
  - Digital data will make the well-established information for IFR operations more readily available and in simpler more dynamic forms. This reduces the opportunity for human error;
  - Timeliness and relevance of change or temporary state information (NOTAMs); and
  - Connected flight decks will be employed to get the maximum benefit of the system.
- Challenges:
  - The rate of change of tech outstrips airline's ability to keep up with aircraft modifications;

- Information overload - masses of data / hard to process into information on the flight deck;
- Connected flight decks will be employed to get the maximum benefit of the system;
- Security - Integrity and security of system is key;
- Risk to getting the right behavioural/cultural changes; and
- The cost of providing digital solutions to aircrew in large airlines is very high. Due to market forces, information is proprietary and designed to work with specific systems installed on the flight deck of each aircraft type.

Small / Medium Airline Users



Context

90. Small and medium airlines carry out domestic operations only.

91. While similar to large airlines in their needs for information in the domestic sector, they are less well-resourced in terms of support to pilots for flight planning and other back room support.

Small / Medium Airline User Case

Representative small/medium user operations and context

92. The following describes the small/medium airline context:

- Typically operate small pressurised and non-pressurised aircraft, primarily carrying passengers, in a single pilot configuration across multiple sectors.
- Operate from a number of aerodromes, both uncontrolled and controlled (which may be busy). The majority of flights are conducted below 10,000ft and some flown up to 30,000 feet.
- Mostly flying on structured routes, IFR outside controlled airspace but may fly VFR at times within the New Zealand domestic FIR.
- Don’t have a dedicated flight operations department, pilots can call on some support, however, they are the information gatherer, assessor, flight planner, and decision maker. Margins are tight, time is precious, and the pre-flight planning process tends to be very human centric.

Aspects typically of importance for small/medium users

93. The following describes the information typically important for small/medium airline users:

- Human factors is a key consideration.
- Information is available ideally from a common source (as much as possible).
- Information being available to pilot's that is up to date so they can make informed decisions about the conduct of the proposed flight.
- The ability for such information to be easily shared amongst company personnel for collective analysis and discussion as required.
- A minimum required operational information set[2] is available from certified sources.
- Other information received, is from a known source and isup to date or at a minimum to be date/time stamped to enable pilot assessment of its integrity, accuracy and usability.
- Providing updated information in a timely manner without generating information or work overload.

Information required by typical small/medium user

94. The following describes the expected typical use of aeronautical data by small/medium airline users:

- AIP including IFR charts, these may be provided via third party and hard copy – digitally available and instant
- NOTAM information, Supplements, AICs
- Certified Met information (atmospheric and aerodrome) current and forecast
- VFR Charts and IFR charts
- RAIM

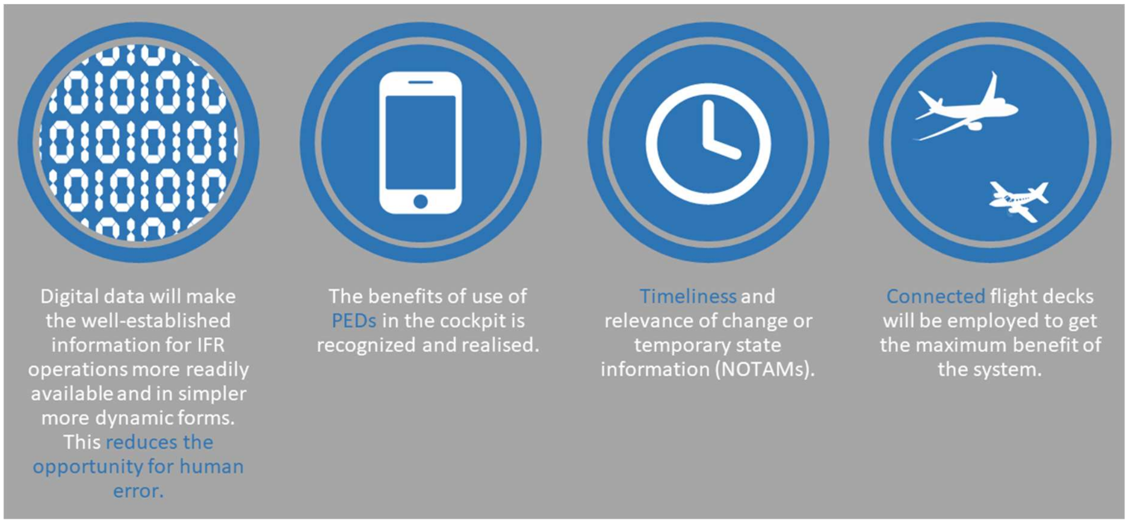
[2] Taken to mean the minimum information and data required to enable routine operational activity to be undertaken safely.

Information benefits and challenges for typical small/medium user

95. The following describes the expected benefits and challenges of AIMS CONOPS small/medium airline

- Benefits:
  - Reduced opportunity for human error;
  - Commercial reality precludes the availability of a full flight support department, technology can go some way to bridging this gap – integrated sources may alleviate this issue;
  - Connected flight decks will be employed to get the maximum benefit of the system.
  - Accessibility, efficiency and portability of the use of PEDs on the flight deck. and
  - The move from paper based and towards device-based information access has the potential to deliver increased safety and efficiency.
- Challenges:
  - Reliance on a single third-party provider may present a risk due to sudden non availability of access.
  - Deluge of data potential to cause issues including validity and security.
  - While the benefits of use of PEDs on the flight deck is recognised and more research in this area is needed to understand the risks. E.g. human factors such as tendency to 'head down' and users relying on cellular data to obtain critical information on PEDs. This may cause issues if cellular data drops out and is not equipped to readily source the minimum required information via other sources;

Other Commercial IFR Users



Context

96. Commercial IFR users carry out a wide range of types of operation in a range of environments. Their needs are therefore varied and may not be routine.

97. As with small airlines, pilots need to undertake a wide range of flight planning functions themselves.

Other Commercial IFR User Case

Representative commercial IFR user operational and context

98. The following describes the other commercial IFR context:

- Medium MEIFR CTO/ATO helicopters within NZ and in other AOC.
- Fly VFR and IFR in controlled and uncontrolled airspace, below 10,000ft.
- Susceptible to adverse/changing weather and freezing level. Can be limited in alternate options because of relatively short endurance.
- Pilots conduct their own flight planning and use electronic flight bags.

Aspects typically of importance for commercial IFR users

99. The following describes the information typically important for other commercial IFR users:

- Data presented graphically on one device.
- Ability to access data that is changing rapidly or not available/stale at point of departure e.g. Met data. Need to access this information during the flight.
- Information is available ideally from a common source as much as possible.
- NZ supplier of state data sources will be compliant with ICAO standards.
- Open architecture setup.
- Directly relevant information only, ability to filter.

Information required by typical commercial IFR user

100. The following describes the expected typical use of aeronautical data by other commercial IFR users:

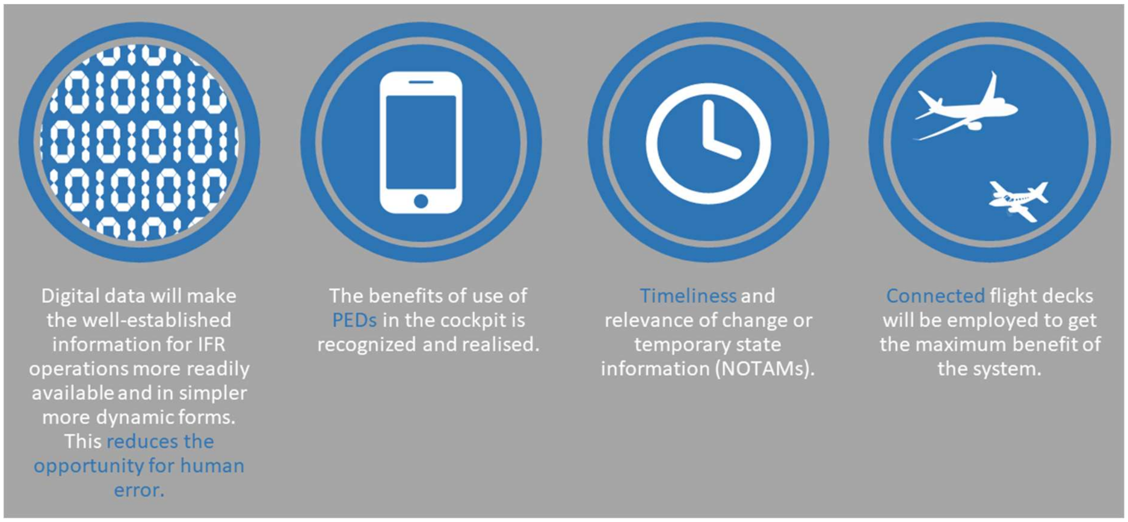
- Digital Charting – on mobile device or paper (IFR and VFR)
- Computer flight plan - presented on a mobile device and formatted interactively.
- NOTAM information package - route specific information formatted digitally, interactive object on display, full information available as required.
- Weather package including OPMET/ Volcanic Ash Advisories - similar to NOTAM information system, referenced to flight plan and presented only if relevant.
- RAIM and GPS operational information – as above
- Take-off and landing performance tools e.g. CAT A

Information benefits and challenges for typical commercial IFR user

101. The following describes the expected benefits and challenges of AIMS CONOPS for other commercial IFR users:

- Benefits:
  - Reduced opportunity for human error;
  - The benefits of use of PEDs in the cockpit is recognised and realised;
  - Timeliness and relevance of change or temporary state information (NOTAMs); and
  - Connected flight decks will enable maximum benefit of the system.
- Challenges:
  - The rate of change of tech outstrips the owner's ability to keep up with aircraft modifications;
  - Information overload - masses of data / hard to process into information on the flight deck;
  - Integrity and security of system management;
  - Change risk - getting the right behavioural/cultural changes; and
  - Benefits may not be universally realised, due to connectivity and the display/interface.

Rotary/EMS User Case



Representative rescue operations and context

102. The following describes the expected typical application developer's operation and context:

- Flights will be low level, below 10,000 feet and time is often critical as the team needs to commence searches and airlift patients with life threatening conditions.
- Helicopter IFR/VFR flights that maybe at any time of the day or night, sometimes in marginal weather and using night vision enhancement. Tendency to stay VFR if possible. Often transition between IFR and VFR and vice versa.
- Going to and from airports and Hospitals as well as urban and rural areas.

Aspects typically of importance for rotary/EMS users

103. The following describes the information typically important for rescue pilots:

- Speed of planning based on earlier planning, the team needs to plan accurately, but under time pressure.
- Rapidly developing a good situational awareness of the environment the crew will be flying in from start to finish, including considerations, decision points and alternate course of action relating to my flight.
- The pilot in commend will be flying as a single pilot but as part of a multi-disciplinary team in often challenging conditions. Pilot workload needs to be managed by keeping to procedures and clarity of communications.

Information required by typical rotary/EMS users

104. The following describes the expected typical use of aeronautical data by rescue pilots:

- Digital Charting – on mobile device or paper (IFR and VFR)
- Computer flight plan - presented on a mobile device and formatted interactively.
- NOTAM information package - route specific information formatted digitally, interactive object on display, full information available as required.
- Weather package including OPMET/ Volcanic Ash Advisories/ Moon Phase - similar to NOTAM information system, referenced to flight plan and presented only if relevant.
- RAIM and GPS operational information – as above
- Take-off and landing performance tools e.g. CAT A

Information benefits and challenges for typical rotary/EMS users

105. The following describes the expected benefits and challenges of AIMS CONOPS for this user group

- Benefits:
    - Connected flight decks will be employed to get the maximum benefit of the system;
    - The benefits of PEDs in the cockpit is recognised and realised;
    - Timeliness and relevance of change or temporary state information (NOTAMs); and
    - Reduced opportunity for human error.
- Challenges:
    - The rate of change of tech outstrips owner's ability to keep up with aircraft modifications;
    - Information overload - masses of data - some not time or situationally relevant. Hard to process into information within the high work-load environment;
    - Management of integrity and security of system;
    - Risk to getting the right behavioural/cultural changes; and
    - Benefits may not be universally realised, due to connectivity and the display/interface.

Aerodromes

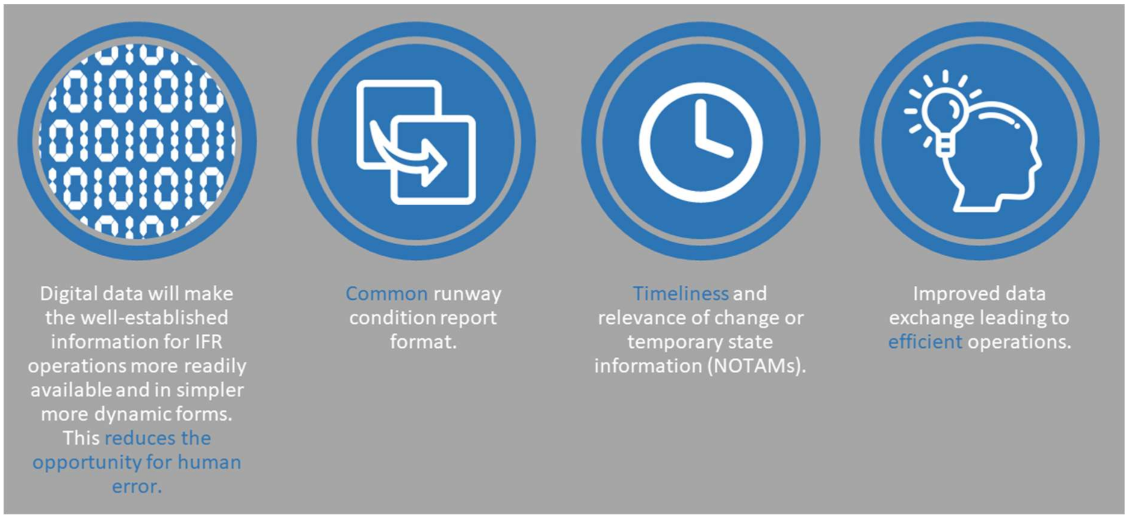
Context

106. New Zealand as a small country isolated from other countries and large populations relies on aviation for business, tourism and economic growth.

107. Aerodromes are both users and providers of aeronautical information.

108. The size of an aerodrome is material to its resources and capability to contribute aeronautical information

Attended /Controlled Aerodrome User Case



Representative large aerodrome user operations and context

109. The following describes the expected typical controlled or attended aerodrome:

- An “originator” of material - publish aeronautical information relating to the airport.
- Use AIMS for traffic and planning.
- Use AIP information as part of compliance management and aerodrome development.
- Primarily AIMS interest is about compliance, required to provide safety information.

Aspects typically of importance for large aerodrome users

110. The following describes the information typically important for by controlled or attended aerodrome:

- Ease of access and timeliness to publish AIP and access to specialist help to publish unusual situations
- Ease of access to AIP material
- Changes to processes/procedures notified to aerodrome operators before publishing.
- Timeliness and accuracy (and currency) of data
- Need to know flights which have been diverted to the arrival aerodrome to facilitate their arrival. Ground facilitators need to be kept in the loop. Manage passengers and capacity on the apron.
- Met information – influences capacity and health and safety etc.
- Dynamic, agile publishing of data.

Information required by typical large aerodrome user

111. The following describes the expected typical use of aeronautical data by controlled or attended aerodrome:

- NOTAM information; AIP Aerodrome Charts; Obstacle limitation data;
- To manage the airport effectively, the airport team needs access to all AIP published material that impacts flights into or out of the airport, including Flight Procedures; twilight times at the airport; noise abatement procedures;
- Need to convey runway condition reports (in Global Reporting Format) to aircraft intending to use the airport
- Need to communicate current MoWPs to aircraft operators that use the airport. However, these MoWPs must contain only the information directly relevant to the operators.
- Need to communicate relevant information to aircraft using the airport (e.g. allocated gate)
- Need to have oversight and control of who can publish AIP material regarding the airport and notification of intent to issue information that affects the airport (including NOTAM information and IFP to ensure RMA compliance amongst other things)
- Need for digital flight information (from airlines).

Information benefits and challenges for typical large aerodrome user

112. The following describes the expected benefits and challenges of AIMS CONOPS for other commercial IFR users:

- Benefits:
    - Timeliness and accessibility of NOTAM information;
    - Improved data exchange leading to efficient operations;
    - Digital data will make the well-established information for IFR operations more readily available and in simpler more dynamic forms. This reduces the opportunity for human error; and
    - Common runway condition report format.
- Challenges:
    - Adoption of new procedures and methods by aerodrome staff who may not have an aviation background;
    - ‘Old technology’ for updating information – not realising all benefits;
    - Lack of clarity around scope of responsibilities. Need for collaborative approach; and
    - Singular owner for information prevents organisational flexibility.
    - Cost of change.

Unattended Aerodrome User Case

Representative unattended aerodrome user operations and context

113. The following describes the expected typical unattended aerodrome:

- An “originator” of information that publishes aeronautical information relating to the airport.
- Use AIP information as part of compliance management and aerodrome development.

Aspects typically of importance for unattended aerodrome users

114. The following describes the information typically important for unattended aerodrome:

- Ease of access and timeliness to publish AIP and access to specialist help to publish unusual situations
- Ease of access to AIP material
- Changes to processes/procedures notified to aerodrome operators before publishing.
- Timeliness and accuracy (and currency) of all data
- Met information – influences capacity and health and safety etc.

Information required by typical unattended aerodrome user

115. The following describes the expected typical use of aeronautical data by unattended aerodrome:

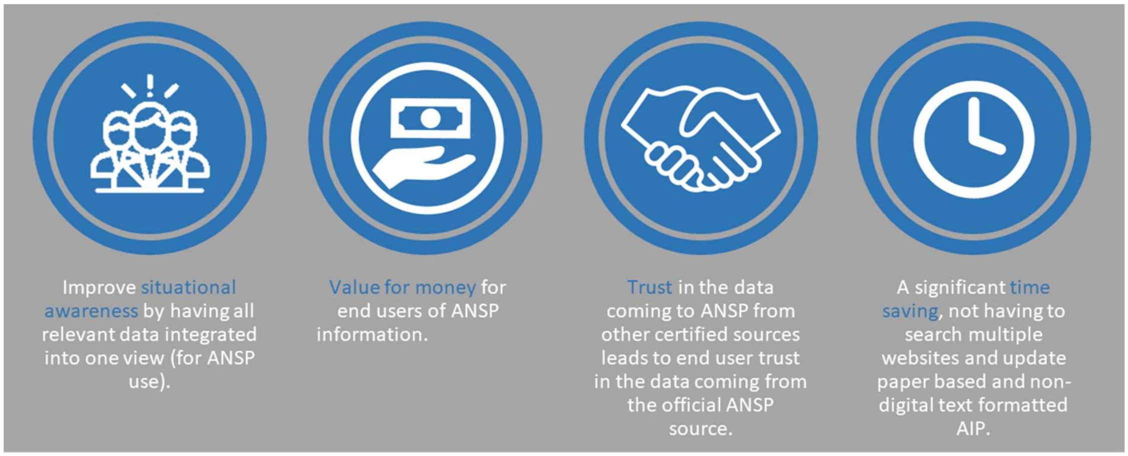
- NOTAM information; AIP Aerodrome Charts; Obstacle limitation data;
- To manage the airport effectively the airport teams needs access to all AIP published material that impacts flights into or out of the airport including Flight Procedures; twilight times at the airport; noise abatement procedures
- Need to convey runway condition reports (in Global Reporting Format) to aircraft intending to use the airport
- Need to communicate current MoWPs to aircraft operators that use the airport. However, these MoWPs must contain only the information directly relevant to the operators.
- Need to communicate relevant information to aircraft using the airport (e.g. allocated gate)
- Need to have oversight and control of who can publish AIP material regarding the airport and notification of intent to issue information that affects the airport (including NOTAM information and IFP to ensure RMA compliance amongst other things).
- Need for digital flight information (from airlines).

Information benefits and challenges for typical unattended aerodrome user

116. The following describes the expected benefits and challenges of AIMS CONOPS for

- Benefits:
    - Timeliness and relevance of change or temporary state information (NOTAMs);
    - Simpler information management and dissemination; and
    - Effective runway condition report format.
- Challenges:
    - Not realising all benefits due to inherent complexity of aviation and use of information systems by staff with limited aviation background; and
    - Management of information quality and release.

ANSP – ATC Function User Case



Controller User Case (sub-set of ANSP)

Controller operations and context

117. The following describes the Controller role:

- Responsible for controlling aircraft flying within defined areas of airspace (CTA and CTR) and on the ground at an airport.
- Need to see data from the surface to the highest altitude (Area).
- Need oversight of all the operations within area of responsibility as well as reference material for complex tasks that can be accessed quickly.

118. The following describes the information typically important for ATC function of ANSPs:

- Having a good situational awareness of the environment, so able to support all flights in from start to finish
- Considerations, decision points and alternate course of action relating to flights being tracked / monitored
- Points of interest in controlled and uncontrolled airspace
- Reduced clutter, keeping the picture simple and clear.

Aspects of importance for Controller

119. The following describes the information typically important for ATC:

- Accurate information (e.g: traffic information (identity, location, speed bearing etc)
- Data known to be from an approved source
- Access to information quickly and intuitively
- Maintaining a high level of situational awareness to keep ahead of operations

Information required by ATC

120. The following describes the use of aeronautical data by ATC:

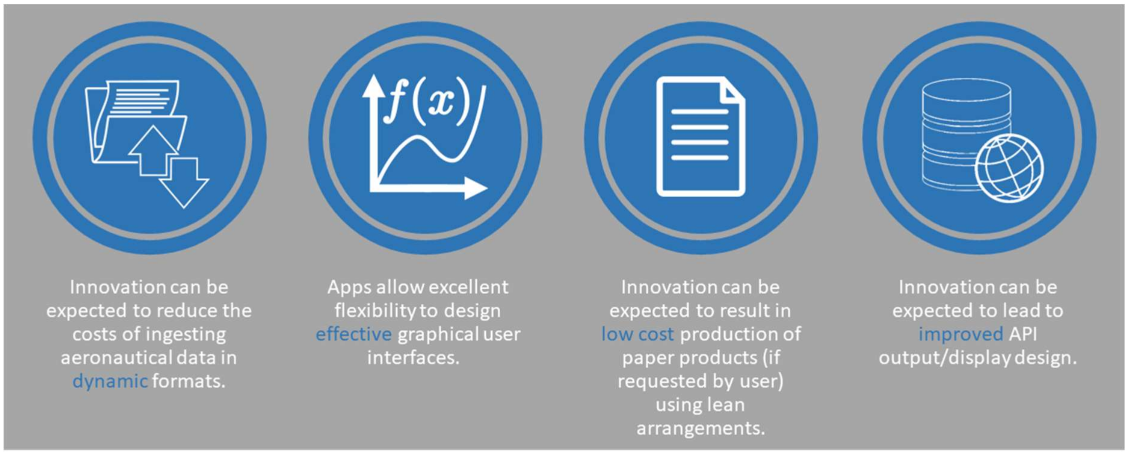
- VFR charts (including airspace, obstacles, frequencies, airports)
- NOTAM information
- Vol 4 AIP (content for airports and flight locations)
- Met forecasts/actuals (area)
- Real time local Met
- Twilight times for locations being controlled / monitored
- IFR charts
- IFR procedures
- Surveillance charts including overlays for visual reporting points
- Air traffic control sectors
- AIP content (custom flips for operating area) – this will be digital in the future
- Aerodrome maps
- Ground movement charts
- Status of aerodrome
- Runway condition reporting – digital solution
- Flight plan data/ ACDM
- Electronic flight strips
- Co-operative and non-cooperative surveillance tracks – including drone activity
- RAIM
- Space weather
- Information from neighbouring states - AIDC

Information benefits and challenges for ATC

121. The following describes the expected benefits and challenges of AIMS CONOPS for ATC/ANSP

- Benefits:
  - Value for money for end users of ANSP information;
  - Improve situational awareness by having all relevant data integrated into one view (for ANSP use);
  - Trust in the data coming to ANSP from other certified sources leads to end user trust in the data coming from the official ANSP source;
  - A significant time saving, not having to search multiple websites and update paper-based and non-digital text formatted AIP;
  - Enhanced safety through better situational awareness by being able to see multiple complementary data sets integrated together. Combined these provide additional real-world context to supplement the core system, giving the controller better decision-making ability;
  - Ease of access to reference material;
  - Time efficient access to data and associated processes;
  - A significant time saving, not having to search multiple websites and update paper based and non-digital text formatted AIP; and
  - Backup flight data should the core system freeze or fail.
- Challenges:
  - Management and assurance of security and integrity of information and data
  - End user trust in the data coming from the official ANSP source, other certified providers and other non-certified providers.
  - Trust in the data coming to ANSP / ATC from other certified sources
  - Value for money for end users.

Application Developer User Case



Representative user operations and context

122. The following describes the expected typical application developer's operation and context:

- Certified third party aeronautical information creators
- Certified third party aeronautical information on-provider
- Certified party aeronautical information integrator and on-provider
- Non-certified information sources

123. Integrating official and other core information with a range of supplementary information from other providers and present it in a usable integrated way. Allow overlay of third-party information.

124. Require market feedback to understand exactly how pilot's access and use aeronautical information.

Aspects typically of importance for developer

125. The following describes the information typically important for application developers:

- Access to all sources of certified aeronautical and a range of non-certified data
- Cost
- Digital
- API / access

Information required by typical developer

126. The following describes the expected typical use and processing of aeronautical data by application developers:

- VFR/IFR charts (including airspace, obstacles, comms frequencies, airports)
- Approach plates
- NOTAM information
- MET forecasts/actuals
- Twilight times for all locations
- Authoritative references and data (e.g. time)

Information benefits and challenges for typical developer

127. The following describes the expected benefits and challenges of AIMS CONOPS for this user group

Benefits:

  - Innovation can be expected to lead to improved API output / display design;
  - Innovation can be expected to result in low cost production of paper products (if requested by user) using lean arrangements;
  - Innovation can be expected to enable non-standard and clumsy data formats to be converted automatically;
  - Innovation can be expected to reduce the costs of ingesting aeronautical data in dynamic formats;
  - Apps allow excellent flexibility to design effective graphical user interfaces; and
  - Working with standard digital data formats.

- Challenges
  - Intellectual property protection for App developers.
  - Difficulty for user in determining if App developer or provider needs to be and is certified which may be determined by the intended use and end user operations.
  - Less than optimal interface design and lack of accepted HMI and GUI standards – creating human factor issues.
  - Cost of ingesting aeronautical data in dynamic formats.

- Potentially small margins may result in poor quality if regulatory oversight is weak or were development may step beyond regulatory assumptions.

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