

# MET Symposium

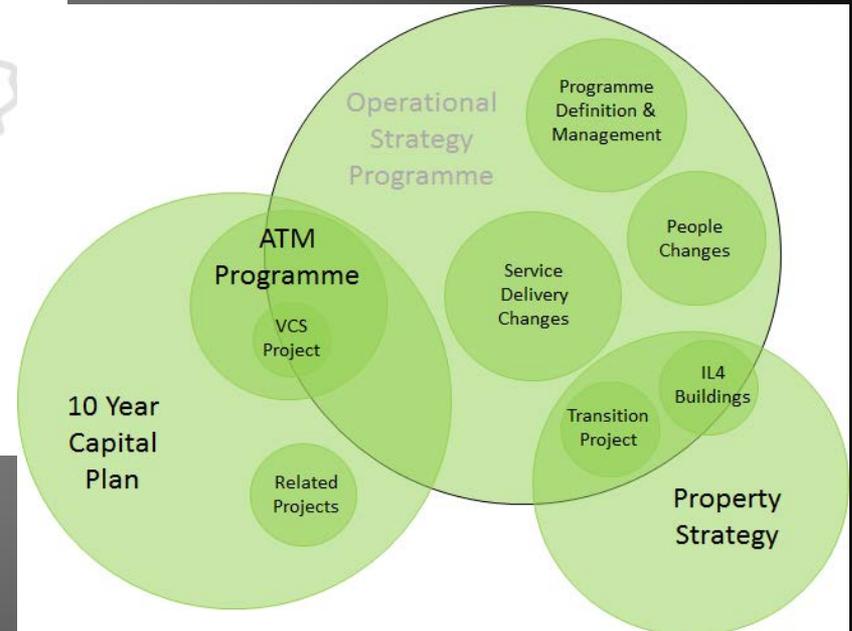
Airways NZ view of future use of  
MET information

31 August 2017

# Future Operational Context



## Programme of Change



# Major Technology Changes

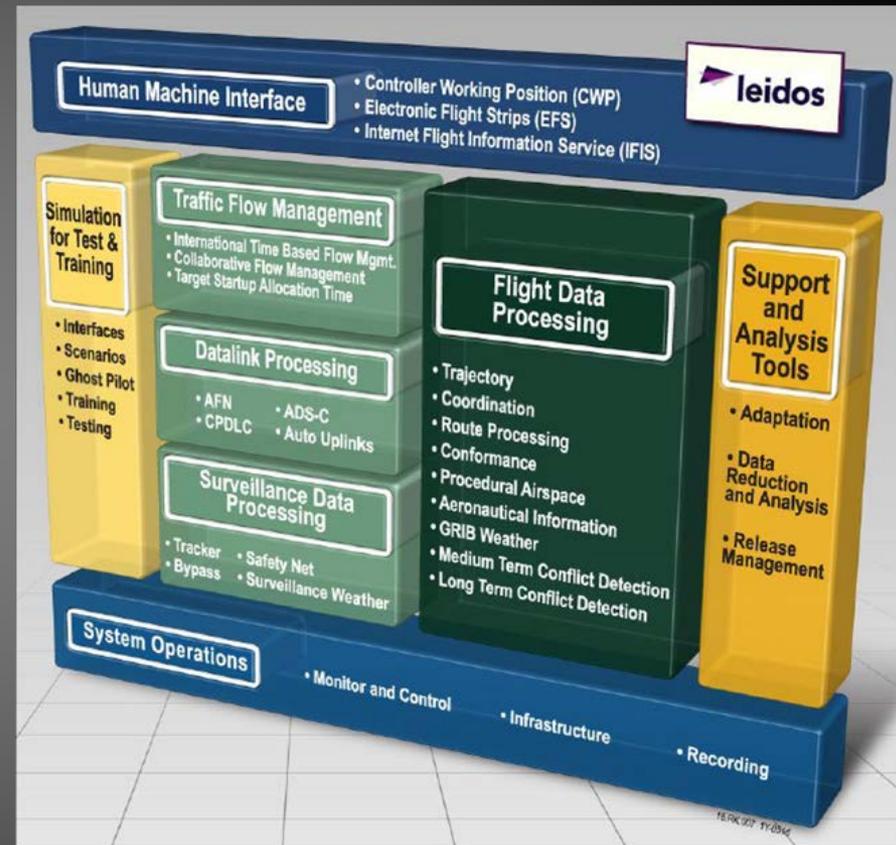
Underway now:

- PBN
- ADS-B / Mode S Radar
- A-CDM
- AMHS

Implications:

- More real-time data
- More connectedness
- More strategic decision-making
  - Improved use of capacity
  - Less intervention

Future: Air Traffic Management System



# Skyline-X : use of weather data

## Wind & temperature forecasts

- Aircraft trajectory prediction
  - ETA for AMAN and A-CDM
  - Conflict probes

## Terminal forecasts

- Airport arrival rate prediction
- Runway direction planning

## Weather Radar

- Potential for use by controllers to enhance situational awareness

# SkyLine-X : Weather In / Weather Out

Airways ATM systems : consumers of weather data

|            |                                       |
|------------|---------------------------------------|
| Weather In | Wind & Temperature Forecasts (GRIB/2) |
|            | Terminal Forecasts (TAF)              |
|            |                                       |

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|            | Weather Radar                         |

Airways ATM systems : producers of weather data

|             |                                       |
|-------------|---------------------------------------|
| Weather Out | Reports from ADS/C aircraft (Oceanic) |
|             | PIREP                                 |
|             |                                       |

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|            | Weather Radar                         |

Airways ATM systems : producers of weather data

|             |   |
|-------------|---|
| Weather Out | Reports from ADS/C aircraft (Oceanic)       |
|             | PIREP                                       |
|             | Derived wind / temperature from mode-S DAPs |

# SkyLine-X : Weather from Mode-S

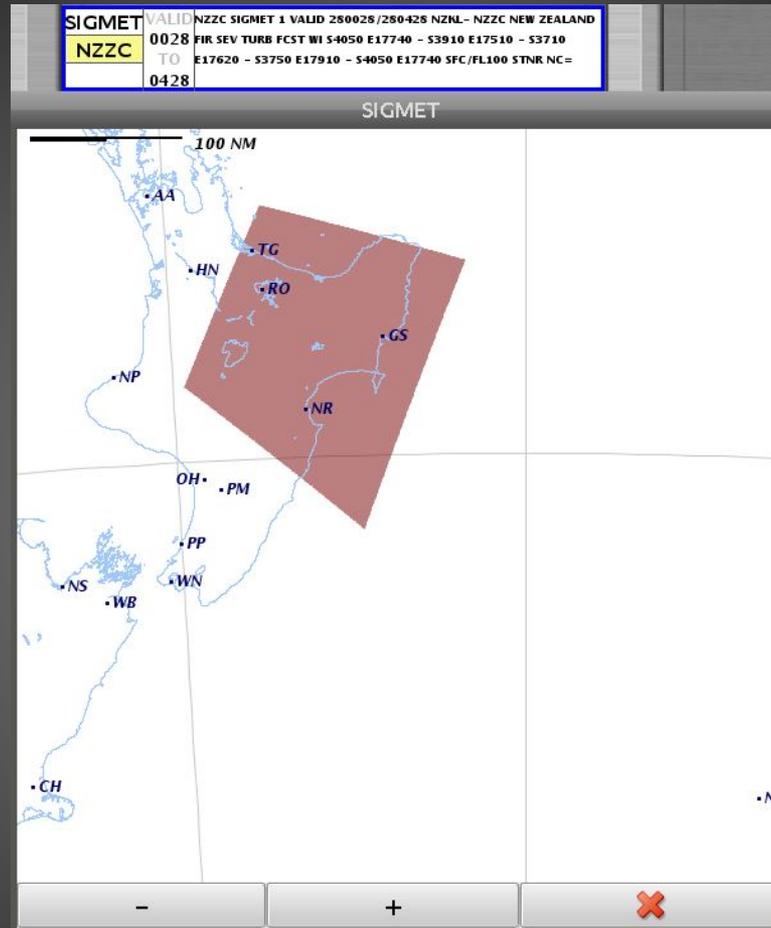
External Data Close

| FL150      | FL250      | FL350      |
|------------|------------|------------|
| 250020 M19 | 230040 M38 | 260055 M48 |
| 220015 M21 | 190040 M39 | 240035 M50 |
| 250020 M21 | 230025 M41 | 250035 M48 |
| 180020 M21 | 170045 M39 | 220030 M50 |
| 220015 M21 | 190025 M41 | 240025 M49 |
| 160025 M20 | 160050 M40 | 210025 M53 |
| 160025 M18 | 160040 M40 | 210020 M56 |

ANZ417 M A320 419  
F312↓180  
NZWN 5003  
TPAPA3B  
M:0.768 MH:157  
T:450 A:157 R:LVL  
G:416 Q:1013  
W:164/32

NZM793 M AT76 269  
F160  
NZWN 5001  
TPAPA3B  
I:225 MH:137  
T:282 A:141 R:LVL  
G:268 Q:1013  
W:087/23

# SkyLine-X : SIGMET Display



# SkyLine-X : Accurate MET is key

## Wind & temperature forecasts

- Presently SkyLine uses a very coarse grid
- SkyLine-X will use GRIB/2 = finer grid and 3-hourly forecasts within the dataset
- GRIB/2 – 6 hourly update, can this be more frequent?

## Terminal forecasts

- Is there any scope for improving the accuracy of when events will occur?

# IFIS – a true one-stop shop?

IFIS – Internet Flight Information Service

|                           |   |
|---------------------------|---|
| IFIS – as a one-stop shop | IFIS provides access to Pre-Flight Briefings (PFBs) and Flight Planning.  |
|                           | The IFIS 'Briefing' functionality provides access to NOTAM, MET and GPS RAIM prediction data.   |
|                           | Currently it provides access to textual MET reports only – METAR/SPECI, TAF, SIGMET, ARFORs and ATIS. Nearly 60,000 PFB requests per month from +/- 1000 IFIS users. 45,000+ ask for some form of MET report.           |
|                           | Textual SIGMET are hard to interpret – real need for the SIGMET area to be presented graphically. IFIS is to be modified to provide Graphical SIGMET (GSM) – either as a feed from MetService (API) or self-generated.  |
|                           | MetService have indicated that ARFORs will also be generated in graphical format.   |
|                           | Currently IFIS is close to being a 'one-stop shop' for GA pilots in terms of PFBs and Flight planning. To be 100% 'one-stop' shop we would need to add access to graphical MET data (GSM, ARFORs, Synoptic Charts etc.) |

# What is IWXXM?

IWXXM is a variant of WXXM agreed by ICAO and the WMO for the exchange of Aviation-related Weather data using XML.

|       |   |
|-------|---|
| IWXXM | IWXXM = ICAO Meteorological Information Exchange Model  |
|       | IWXXM facilitates the exchange of aviation MET data in a machine-readable form (XML). Real people need an HMI to read IWXXM data.   |
|       | Amendment 78 of ICAO Annex 3 mandates the use of IWXXM as a standard for digital MET data exchange from November 2019(?) - in addition to TAC (Text-based MET) remaining as a standard.   |
|       | IWXXM, together with the Aeronautical Information Exchange Model (AIXM) and the Flight Information Exchange Model (FIXM), provide standards for the exchange of Aviation-related information using System Wide Information Management (SWIM). |
|       | Latest version is IWXXM 2.1 (April 2017).   |
|       | Some question the operational benefit of IWXXM and will need to be convinced of the benefits before adopting its use –often a case of WIIFM!  |



NCAR

# Side by Side Example

METAR YUDO 221630Z **24004MPS** **0600** R12/1000U DZ FG  
SCT010 OVC020 **17/16** **Q1018**

```
<iwxxm:MeteorologicalAerodromeObservationRecord gml:id="or1" cloudAndVisibilityOK="false">
  <iwxxm:airTemperature uom="Cel">17.0</iwxxm:airTemperature>
  <iwxxm:dewpointTemperature uom="Cel">16.0</iwxxm:dewpointTemperature>
  <iwxxm:qnh uom="hPa">1018</iwxxm:qnh>
  <iwxxm:surfaceWind>
    <iwxxm:AerodromeSurfaceWind variableDirection="false">
      <iwxxm:meanWindDirection uom="deg">240</iwxxm:meanWindDirection>
      <iwxxm:meanWindSpeed uom="m/s">4.0</iwxxm:meanWindSpeed>
    </iwxxm:AerodromeSurfaceWind>
  </iwxxm:surfaceWind>
  <iwxxm:visibility>
    <iwxxm:AerodromeHorizontalVisibility>
      <iwxxm:prevailingVisibility uom="m">600</iwxxm:prevailingVisibility>
    </iwxxm:AerodromeHorizontalVisibility>
  </iwxxm:visibility>
</iwxxm:MeteorologicalAerodromeObservationRecord>
```

# Exchange of Weather Data

Airways provides the infrastructure for the exchange of Weather messages, e.g. METAR/SPECI, TAF, SIGMET, ARFOR and ATIS:

|              |  |
|--------------|--|
| AFTN         | Supports TAC (Traditional Alphanumeric Codes) MET messages.  |
|              | Text –based reports only, with limited character set (not full ASCII)  |
|              | X.25 Serial connections almost phased out – most AFTN connections are now IP-based.  |
| AMHS         | Supports TAC and IWXXM (XML formatted) MET messages.   |
|              | Supports exchange of Textual messages (full ASCII character set) and binary data, e.g. IWXXM (via FTBP - File Transfer Body Part).   |
|              | AMHS uses IP-based connections only.   |
| Web Services | MET data are obtained from smartAIM using Web Service requests.  |
|              | AQC (Airways query converter) allows remote clients to request MET and other data from the AIM database - either separately or in a Pre-Flight Briefing, and in different formats (text, HTTP, XML). |

# Potential for AIM support of IWXXM

Airways has a smartWeather module in its smartAIM system.

|              |  |
|--------------|--|
| SmartWeather | Current version of smartWeather installed as part of the NZ AIM system only supports textual MET reports.          |
|              | SmartWeather (SWX) 5.2 supports TAC and IWXXM forms of MET data (reception, validation, storage and distribution). |
|              | SWX 5.2 supports IWXXM Version 2.1 and is fully compliant with Amendment 78 of ICAO Annex 3.                       |
|              | SWX 5.2 currently supports METAR (LA) /SPECI (LP), TAF (LT, LC), SIGMET(LS), AIRMET (LW), VAA (LU) and TCA (LK).   |
|              | SWX 5.2 provides a Web Service (SOAP) interface which has been extended to support retrieval of IWXXM data.        |
|              | SWX 5.2. has been installed in Denmark (ANSP: NAVAIR).   |
|              | IWXXM is an optional add-on module for SWX and so will come at a cost – possibly a 6-figure cost!!                 |

# Drivers for AIM support of IWXXM?

Given the anticipated high cost of upgrading SmartWeather to support IWXXM, what drivers are there for this to happen?

Drivers for upgrade to SmartWeather Version 5.2 Which supports IWXXM?

The Airways AMHS system will support the exchange of IWXXM messages (XML component will be transferred as a FTBP). This will enable the exchange of IWXXM data between providers / recipients as long as they each have an AMHS connection.

TAC will remain a supported standard for MET data exchange, but it doesn't support digital/graphical MET data.

SWX 5.2 will allow the graphical representation of SIGMET, but there are other options e.g. provision by the MetService via an API. This would also apply to other types of graphical MET data.

Key question: Within the NZ Aviation community, what demand is there (now and in the future) for MET data to be stored, requested and returned in IWXXM format, rather than in the current TAC format which will still be supported?