



Update of Airspace Optimization in the CAR Region

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ePPRC/05

Agenda Item 2.1

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Optimization

- ✈ Began with “what we have now, no investment”
- ✈ If you can't support what was requested, “What can you support?”
- ✈ Collaboration, we are all involved

Airspace Optimization CAR Region

North American, Central American and Caribbean Working Group (NACC/WG)
Air Space Optimization Task Force

- Working Collaboratively
- Two-Pronged Attack
- Moving to Free Route Airspace
- Results



SAFETY

EFFICIENCY

ENVIRONMENTALLY - FRIENDLY

Airspace Optimization CAR Region

North American, Central American and Caribbean Working Group (NACC/WG)
Air space Optimization Task Force

- States
- CADENA
- IATA
- ICAO

Working Collaboratively - CIIFRA

CADENA IATA ICAO Free Route
Airspace

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Two-Pronged Attack

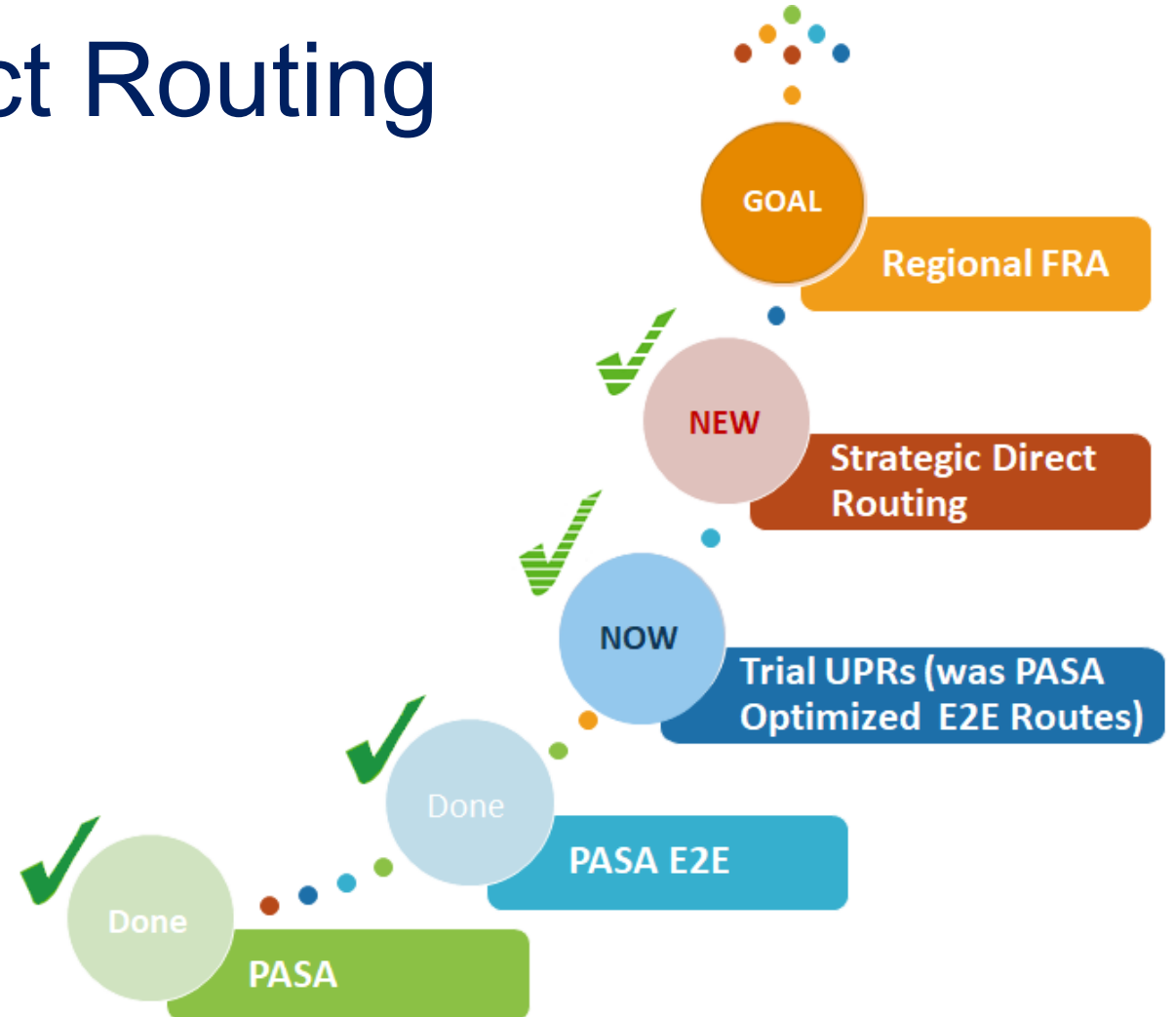
- End to End route Optimization
- User Preferred Route
- Free Route Airspace



Airspace Optimization CAR Region

SENEAM Strategic Direct Routing

- Aeromexico
- Delta Airlines
- United Airlines
- Viva Aerobus
- American Airlines



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Results Track A

CANSO



**The CANSO-IATA-ICAO Free Route Airspace (CIIFRA)
Trial UPRs Benefit Data
As of: January 12, 2023**

| | Baseline Flight Plan Route vs Trial UPRs Reported Data Projected to 1-Year Savings |
|-----------------|---|
| Savings: | |
| Flight min | 19,535 min |
| Fuel (lb) | 3,806,672 lb |
| CO2 (kg) | 6,273,658 kg |
| Cost (\$ USD) | \$ 3,260,444 |

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Results Track B

Estimation of 1-year savings based on 12 days of data
obtained from Steps 0, 1, 2, and 3

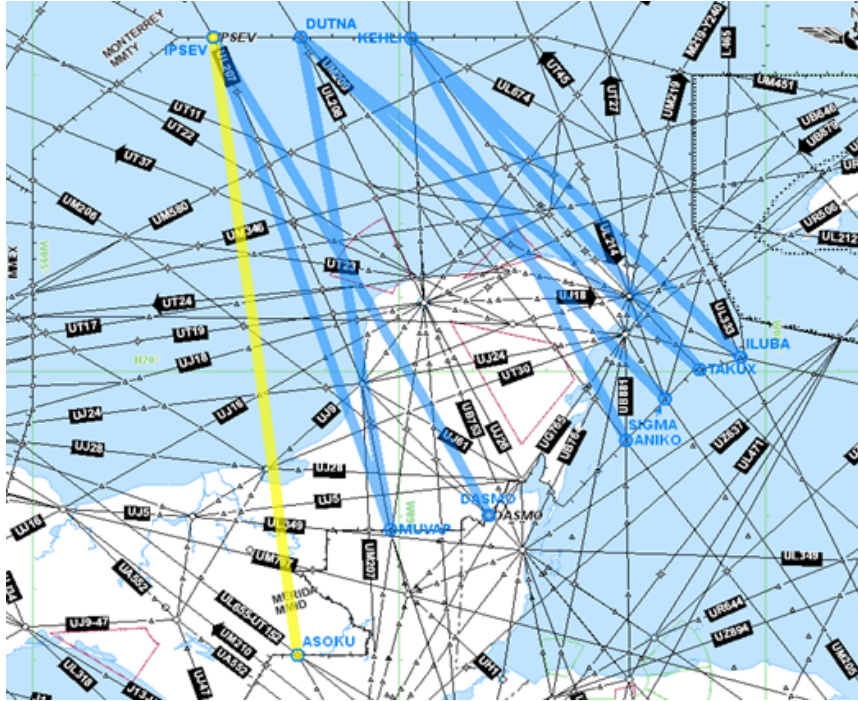
KATL-SPJC-KATL
DAL151/DAL150

| | Baseline vs UPR | |
|-------------|-----------------|---------|
| Savings | 12 Day | 1 Year |
| Flight min: | 116 | 3,528 |
| Fuel (lb): | 12,479 | 379,570 |
| CO2 (kg): | 17,887 | 544,057 |
| Cost (\$): | 15,325 | 466,138 |

Mexico's SDR Trial

Strategic Direct Routing (SDR) – SDR allows users to plan a route using any named waypoints within a specified volume of airspace as long as the route complies with parameters set by the State. The parameters may include restrictions such as hours in which SDR rules apply, at or above altitude requirements and maximum distance between waypoints. Users must file flights via authorized (i.e., published) routes to the entry and exit point at the boundaries of the SDR airspace volume; that is, the SDR system only applies inside the defined volume of airspace. SDR is considered to be a transition to the implementation of the Free Route Airspace (FRA) concept.

SENEAM SDR – UAL 4-Month Data



| MONTHLY SDR USAGE BY FLIGHT | | | | | | | | | |
|-----------------------------|-----------|-----------|------------|------------|-----|-----|-----|-----|--------------|
| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | TOTAL/FLIGHT |
| UAL63 SBGR-KIAH | 10 | 10 | 24 | 25 | | | | | 69 |
| UAL818 SAEZ-KIAH | 22 | 24 | 23 | 26 | | | | | 95 |
| UAL128 SBGL-KIAH | 12 | 16 | 25 | 24 | | | | | 77 |
| UAL855 SPJC-KIAH | 6 | 0 | 0 | 0 | | | | | 6 |
| UAL846 SCEL-KIAH | 22 | 20 | 16 | 26 | | | | | 84 |
| UAL206 SKBO-KIAH | 5 | 3 | 10 | 10 | | | | | 28 |
| UAL2083 SEQM-KIAH | 7 | 4 | 1 | 2 | | | | | 14 |
| UAL1907 MGGT-KIAH | 3 | 0 | 28 | 28 | | | | | 59 |
| TOTAL/MONTH | 87 | 77 | 127 | 141 | | | | | |

| SDR USAGE BY DCT SEGMENTS | | | | | | | | | |
|---------------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|-----------|
| | UAL63 SBGR-KIAH | UAL818 SAEZ-KIAH | UAL128 SBGL-KIAH | UAL855 SPJC-KIAH | UAL846 SCEL-KIAH | UAL206 SKBO-KIAH | UAL2083 SEQM-KIAH | UAL1907 MGGT-KIAH | TOTAL/DCT |
| TAKUX-KEHLI | 49 | 4 | 54 | | | | | | 107 |
| TAKUX-DUTNA | | | 2 | | | | | | 2 |
| ILUBA-KEHLI | 13 | | 17 | | | | | | 30 |
| SIGMA-DUTNA | 4 | | 2 | | 1 | 10 | 9 | | 26 |
| MUVAP-IPSEV | | 71 | | 6 | 72 | 1 | 3 | | 153 |
| MUVAP-DUTNA | | 18 | | | 7 | | 1 | | 26 |
| ANIKO-KEHLI | 3 | 2 | 2 | | | 15 | | | 22 |
| DASMO-IPSEV | | | | | 4 | 2 | 1 | | 7 |
| ASOKU-IPSEV | | | | | | | | 59 | 59 |
| TOTAL/FLIGHT | 69 | 95 | 77 | 6 | 84 | 28 | 14 | 59 | |

Mexico's SDR Trial – UAL Benefits

| Oct 3 - Dec 3, 2022 | | | | | | | | | |
|---------------------|---------------|--------------|----------------|------------------|----------------|------------|-----------|----------|-----------|
| | | Saved | | | | Per Flight | | | |
| | No. | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) |
| SBGR-KIAH | 20 | 42.0 | 13,360 | 41,416 | 7,644 | 2.1 | 668 | 2,071 | 382 |
| SAEZ-KIAH | 46 | 59.0 | 22,437 | 69,555 | 12,390 | 1.3 | 488 | 1,512 | 269 |
| SBGL-KIAH | 28 | 57.0 | 10,451 | 32,398 | 9,918 | 2.0 | 373 | 1,157 | 354 |
| SPJC-KIAH | 6 | 6.0 | 1,547 | 4,796 | 1,044 | 1.0 | 258 | 799 | 174 |
| SCEL-KIAH | 41 | 53.0 | 12,060 | 37,386 | 9,222 | 1.3 | 294 | 912 | 225 |
| SKBO-KIAH | 8 | 19.0 | 2,258 | 7,000 | 1,843 | 2.4 | 282 | 875 | 230 |
| SEQM-KIAH | 11 | 26.0 | 2,889 | 8,956 | 2,522 | 2.4 | 263 | 814 | 229 |
| MGGT-KIAH | 3 | 9.0 | 969 | 3,004 | 1,800 | 3.0 | 323 | 1,001 | 600 |
| Total | 163 | 271.0 | 65,971 | 204,510 | 46,383 | | | | |
| | | | | | | | | | |
| | 1 Year | 1,626 | 395,826 | 1,227,061 | 278,298 | | | | |

NOTE: To calculate cost benefits, equipment types were taken into the consideration.

Mexico's SDR Trial – DAL Benefits

SENEAM SDR Data (DAL - through October 15, 2022)

| | No. | Saved | | | | Per Flight | | | |
|-----------|---------------|------------|----------------|----------------|---------------|------------|-----------|----------|-----------|
| | | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) |
| KLAX-MROC | 6 | 15 | 3,440 | 4,931 | 2,773 | 2.5 | 573 | 822 | 462 |
| KLAX-MSLP | 2 | 2 | 299 | 429 | 311 | 1.0 | 150 | 214 | 155 |
| Total | 8 | 17 | 3,739 | 5,359 | 3,084 | | | | |
| | | | | | | | | | |
| | 1 Year | 517 | 113,728 | 163,012 | 93,805 | | | | |

NOTE: To calculate cost benefits, equipment types were taken into the consideration.

Mexico's SDR Trial – AMX Benefits

SENEAM SDR Data (AMX - through November 15, 2022)

| Oct 16 - Nov 29, 2022 | | Saved | | | | Per Flight | | | |
|-----------------------|-----|------------|-----------|----------|-----------|------------|-----------|----------|-----------|
| | No. | Time (min) | Fuel (kg) | CO2 (kg) | Cost (\$) | T (min) | Fuel (kg) | CO2 (kg) | Cost (\$) |
| MMTJ-MMGL | 9 | 34.0 | 1,891 | 5,976 | 4,951 | 3.8 | 210 | 664 | 550 |
| MMTJ-MMMX | 21 | 26.0 | 1,009 | 3,188 | 3,427 | 1.2 | 48 | 152 | 163 |
| CYVR-MMMX | 14 | 84.0 | 3,407 | 10,766 | 11,194 | 6.0 | 243 | 769 | 800 |
| Total | 44 | 144.0 | 6,307 | 19,930 | 19,572 | | | | |
| 1 Year | | 1,168 | 51,157 | 161,655 | 158,749 | | | | |

As of January 2022, the price of Jet A1 was approximately \$816 per metric tonne. This equates to about \$0.82 per KG.
 Data Source (Nov 5, 2022): <https://www.flightdeckfriend.com/>

NOTE: To calculate cost benefits, equipment types were taken into the consideration.

1 kg = 2.20462 lb

SENEAM SDR – VivaAerobus Benefit Updates

| Nov 1 - Dec 31, 2022 | | | | | | | | | |
|----------------------|-----|------------|-----------|----------|-----------|------------|-----------|----------|-----------|
| Nov 1 - Dec 31, 2022 | | Saved | | | | Per Flight | | | |
| City Pair | No. | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) | Time (min) | Fuel (lb) | CO2 (kg) | Cost (\$) |
| KLAX-MMGL | 24 | 88.0 | 3,592 | 11,351 | 11,745 | 3.7 | 150 | 473 | 489 |
| KLAX-MMMX | 28 | 28.0 | 1,134 | 3,583 | 3,730 | 1.0 | 41 | 128 | 133 |
| KORD-MMGL | 26 | 67.0 | 2,358 | 7,451 | 8,634 | 2.6 | 91 | 287 | 332 |
| KORD-MMLO | 2 | 5.0 | 199 | 629 | 663 | 2.5 | 100 | 314 | 332 |
| MMGL-MMTJ | 22 | 26.0 | 1,930 | 6,099 | 4,183 | 1.2 | 88 | 277 | 190 |
| MMLO-MMTJ | 9 | 44.0 | 1,600 | 5,056 | 5,712 | 4.9 | 178 | 562 | 635 |
| MMMD-MMMX | 31 | 93.0 | 3,254 | 10,283 | 11,968 | 3.0 | 105 | 332 | 386 |
| MMMX-MMMD | 25 | 51.0 | 1,588 | 5,018 | 6,402 | 2.0 | 64 | 201 | 256 |
| MMMX-MMTJ | 11 | 22.0 | 1,016 | 3,211 | 3,033 | 2.0 | 92 | 292 | 276 |
| MMTJ-MMGL | 111 | 61.0 | 8,346 | 26,373 | 12,944 | 0.5 | 75 | 238 | 117 |
| MMTJ-MMMX | 48 | 265.0 | 6,678 | 21,102 | 31,976 | 5.5 | 139 | 440 | 666 |
| MMTJ-MMMY | 35 | 35.0 | 2,296 | 7,255 | 5,383 | 1.0 | 66 | 207 | 154 |
| MMTJ-MMUN | 24 | 48.0 | 2,040 | 5,095 | 6,473 | 2.0 | 85 | 212 | 270 |
| Total | 396 | 833.0 | 36,031 | 112,507 | 112,845 | | | | |
| 1 Year | | 4,998 | 216,186 | 675,040 | 677,073 | | | | |



SENEAM SDR – Benefits Summary



| 1-yr Estimate | Time (min) | Fuel (kg) | CO2 (kg) | Cost (\$) |
|--------------------|--------------|----------------|------------------|--------------------|
| AeroMexico | 1,168 | 51,157 | 161,655 | \$ 158,749 |
| Delta | 517 | 51,586 | 163,012 | \$ 93,805 |
| Emirates | 76 | 10,783 | 34,073 | \$ 16,446 |
| United | 1,626 | 178,122 | 562,865 | \$ 278,298 |
| VivaAerobus | 4,998 | 216,186 | 675,040 | \$ 677,073 |
| Total | 8,385 | 507,834 | 1,596,645 | \$1,224,371 |

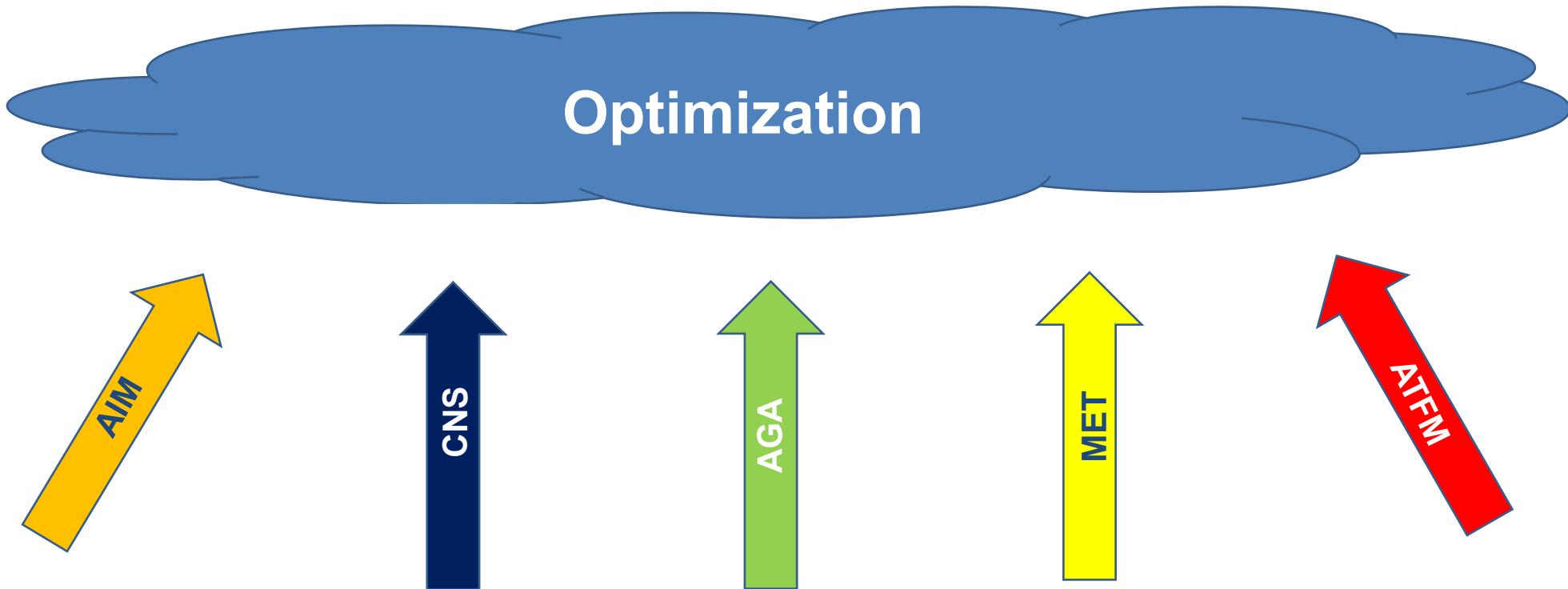
Overall Benefits

| | All phases included |
|---------------|---|
| Savings: | |
| Flight min | 31,448 min=33 round trips KATL-SPJC |
| Fuel (lb) | 4,694,076 lb |
| CO2 (kg) | 8,414,360 kg= 20,774,678 miles driven by average car* |
| Cost (\$ USD) | \$ 4,950,953 |

* USA EPA

What's Next?

- How do we support optimization?



AIM

- Enhancing AIRAC publishing cycles
- Make publications digital
- Publication of Electronic Flight Procedures
- Cost of AIPs
- eTOD
- Flight Planning REJ (Format) / FF-ICE Update (AIDC-TF)

CNS

- Synchronize and Harmonize Communication & Surveillance
- Surveillance data sharing/ redundancy for surveillance and communications.
- Regional Gap Analysis
- Network communication for ATS
- Explore alternative technologies i.e., Space-based VHF
- Estimates or CPL information for traffic in FRA
- Capability of ATM systems
- Digital ATIS

The logo consists of a solid green square with the letters 'AGA' in white, bold, sans-serif font centered within it.

AGA

- Analysis/inputs for airport planning and design.
 - Airports master planning ATM inputs.
 - Airports Coordinate construction/maintenance projects
 - Airport Airside/Landside balance and harmonization
- High speed taxi/exits.
- Utilizing airports for CDM (ATFM-CDM).
- Collaboration Technical/Operational details
 - Lighting and Ground Aids (Approach)
 - Ongoing Obstacle Analysis
 - PCN Value

MET

- Standardized Weather Reports
 - Volcanic Ash
 - Concentration Charts
 - METAR Ash Report Accuracy and Standardization
 - Airport Contingency Procedures i.e., Ash contamination Assessment/Removal
- Weather forecast and updates given from an aviation perspective
- Space Weather
- Special Weather Report Requirements for Temperature (SPECI)
- Digital ATIS
- Turbulence, Icing reports

ATFM

- Availability of ATFM Tactical Resources
- Common ATFM procedures and terminology (Doc 9971)
- Data Sharing amongst all stakeholders (Agreement & Implementation)
 - LOA's
- Data Driven Approach
 - Set Measurable Targets (KPIs)
- Real time Airport /Sector Capacity display
- Post event review