

Regional Focus



Developing Key Performance Indicators for ANSPs – Improving Capacity, Efficiency and Punctuality in Asia Pacific

Wednesday 12 May 2021

04:00 – 06:00 UTC

Moderator



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Creating Information and assessing
the effect of changes


Speaker



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A small blue triangle pointing to the right, located in the top left corner of the slide.

CREATING INFORMATION & ASSESSING THE EFFECT OF CHANGES

Runway Occupancy Time – Auckland Airport

Nigel Fitzhardinge
Manager Workforce Planning & Performance
Airways NZ

TOPICS COVERED

AIRWAYS

Introduce AKL

Establish problem statement

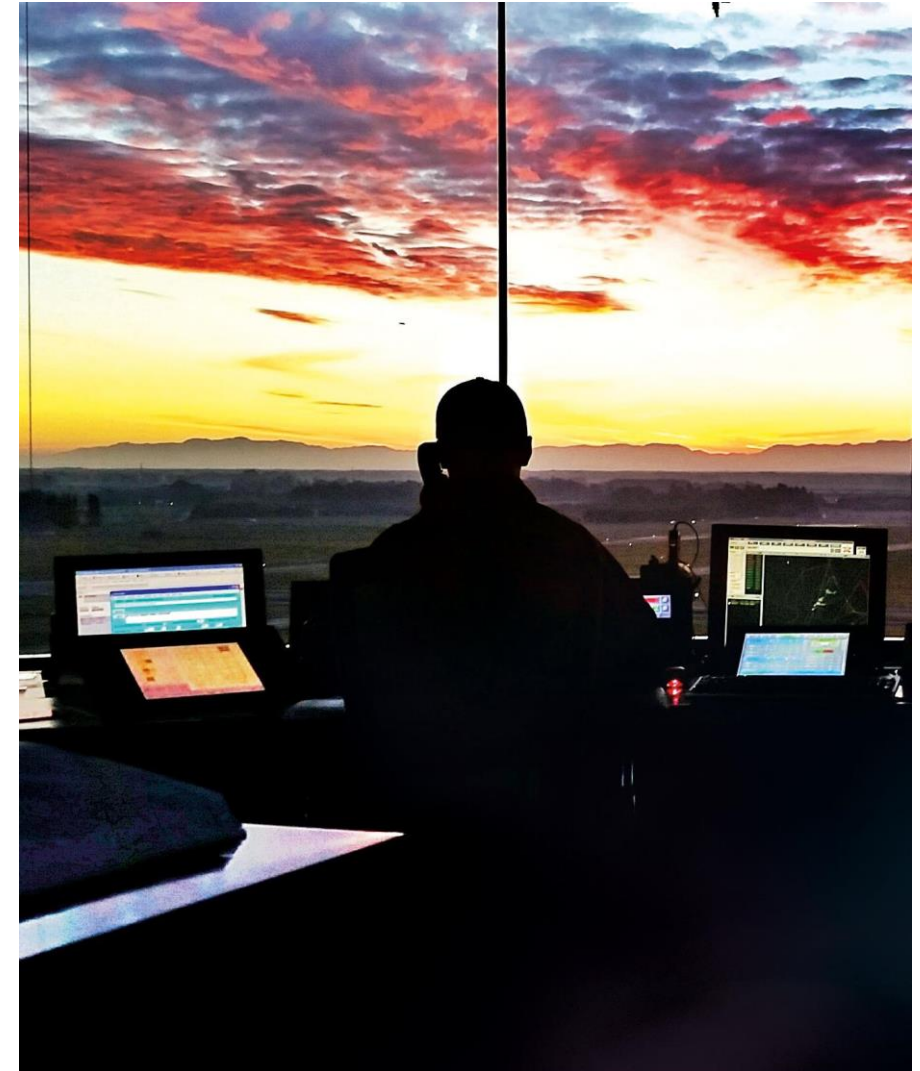
Our initial journey

What we learned

What we did differently second time around

Outcomes and results

Advice for developing metrics



making your world possible

AUCKLAND AIRPORT

AIRWAYS



First opened in January 1966

Major international gateway to New Zealand

The runway had an operational length of 2,590m and all air traffic control services were visual and/or procedural.

In the early 1970s the runway was lengthened and Primary radar was installed to monitor and separate traffic on approach and departing the airport.



making your world possible

AUCKLAND AIRPORT

AIRWAYS

In 2019

>178,000 movements

>21 million passengers

Operational runway length of 3,600m

Can handle up to 650 movements per day

Traffic mix varied from A380 down to P68

Tech specs

PSR

SSR

ADSB

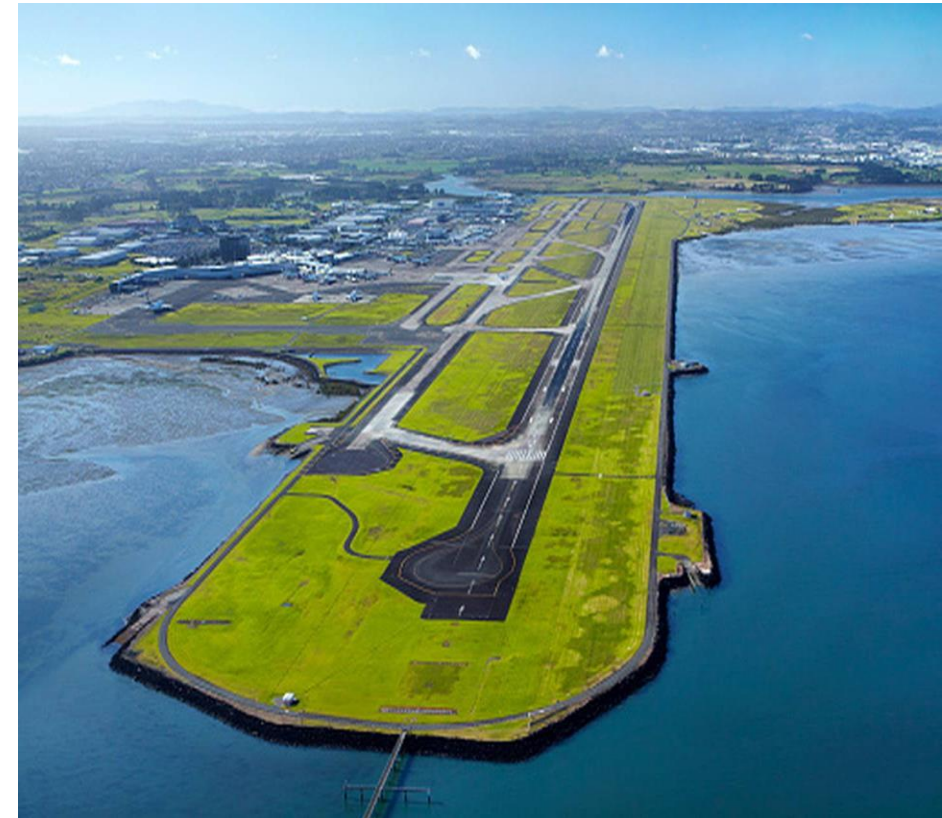
Multilateration

PBN procedures

AMAN

CFM

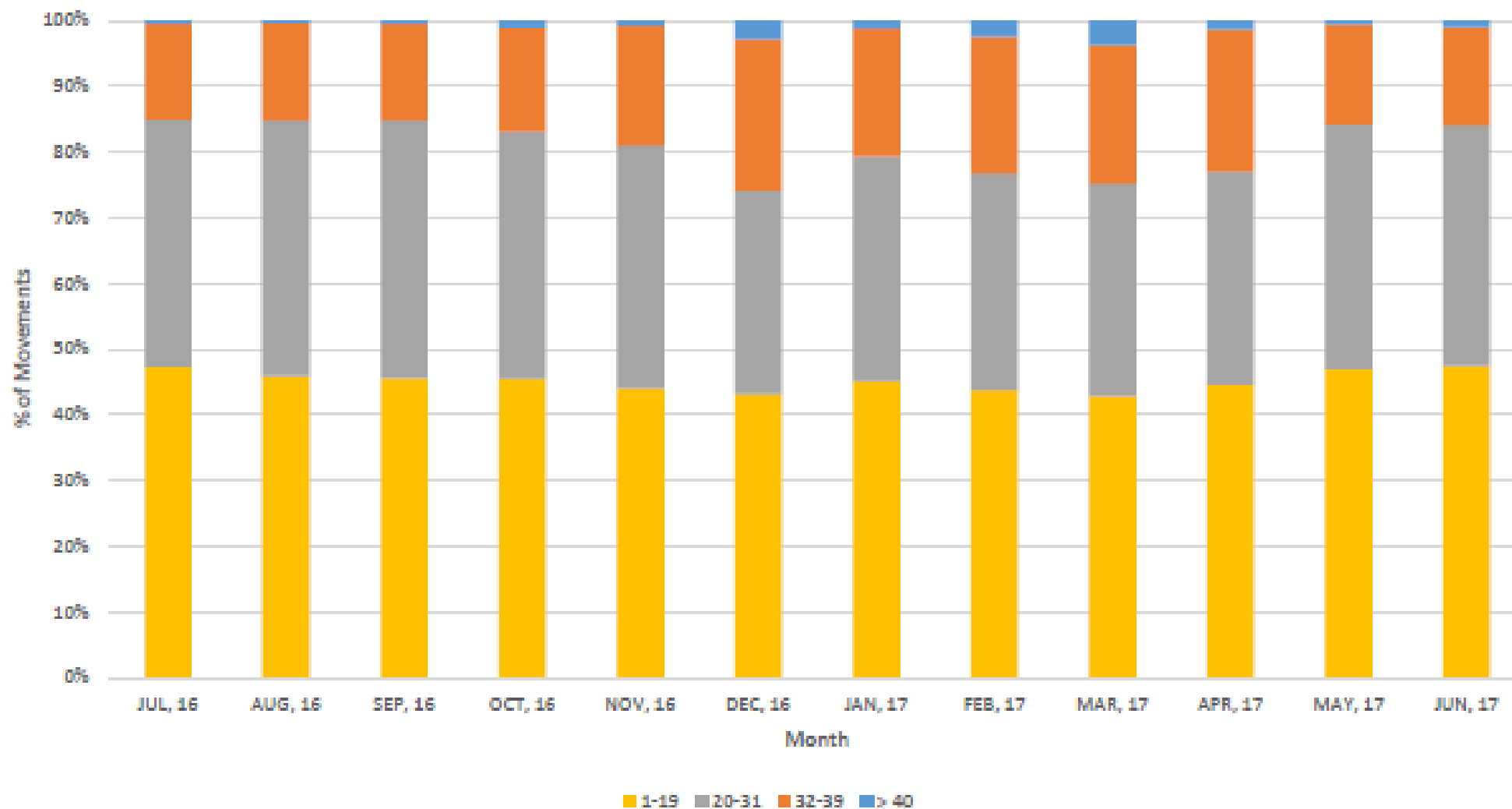
ILS (cat II/III on 23L)



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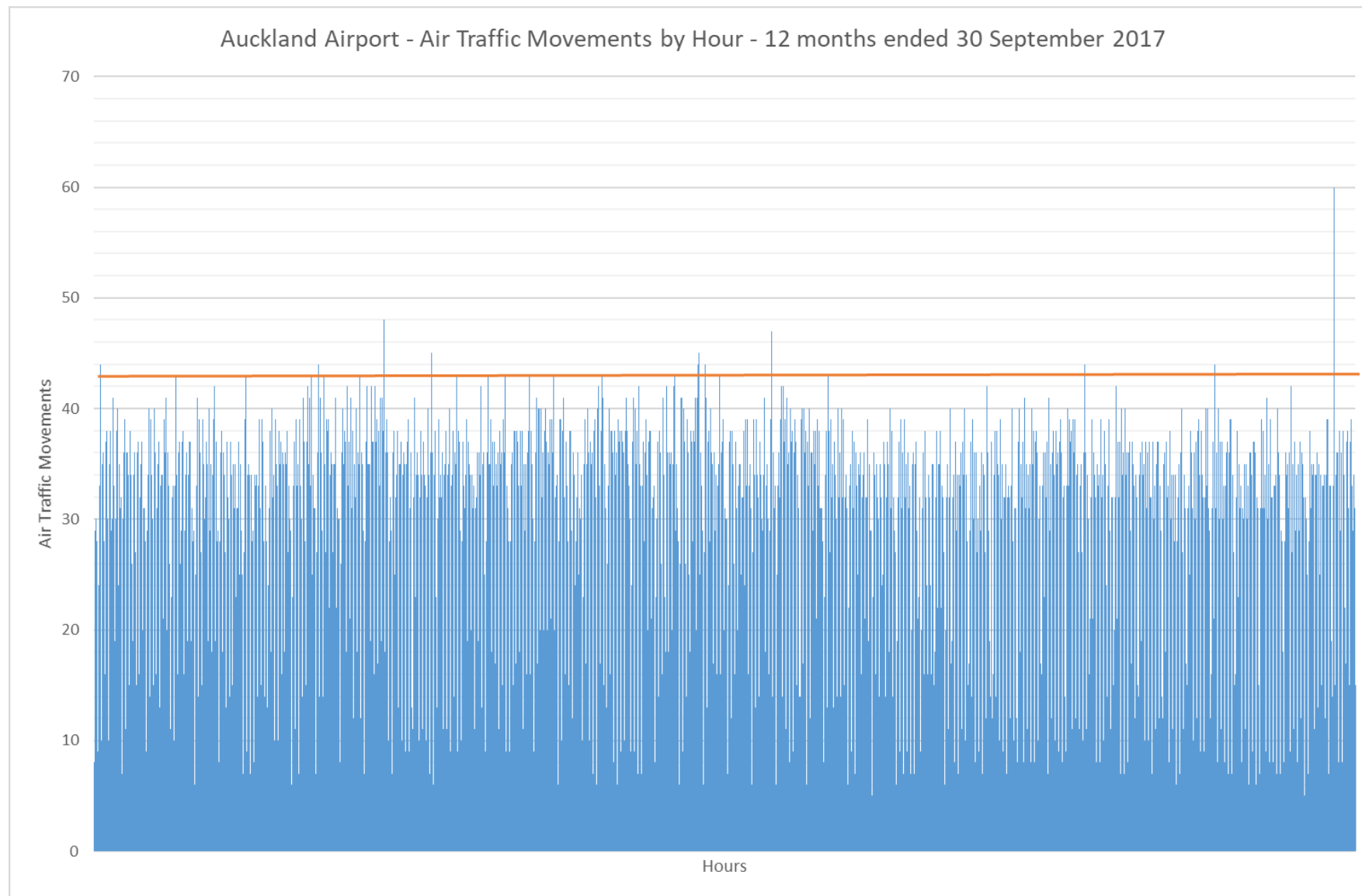
CAPACITY ANALYSIS

FY17 - Hourly Distribution of AKL Runway Movements



CAPACITY ANALYSIS

AIRWAYS

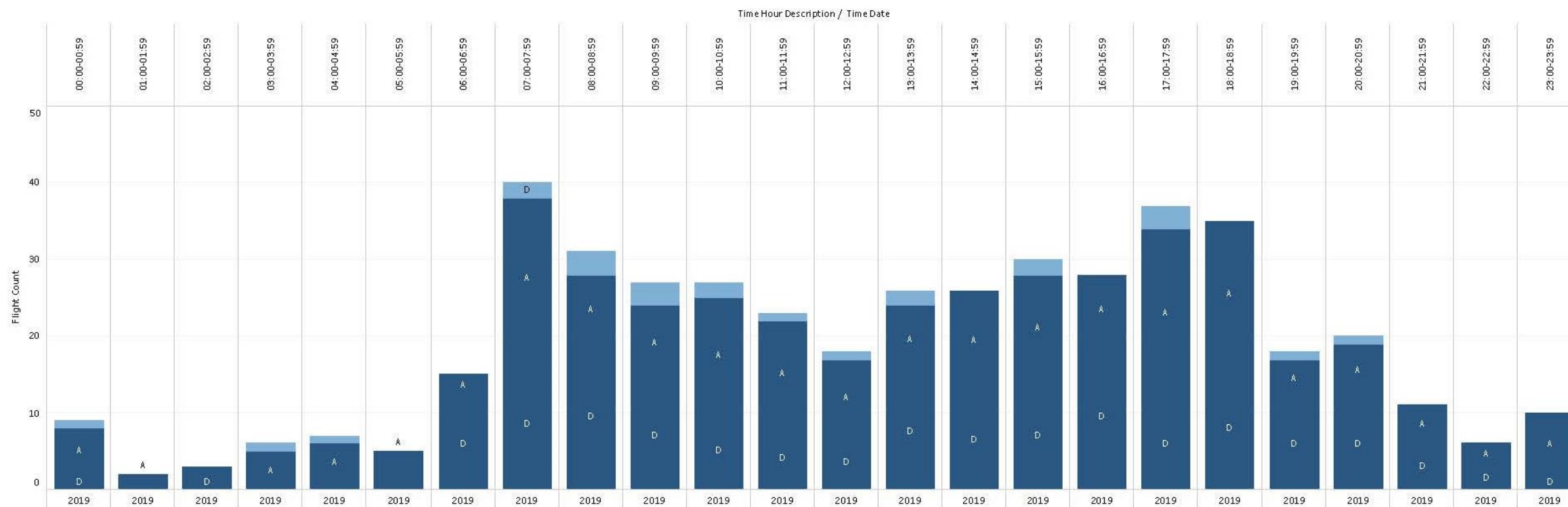


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CAPACITY ANALYSIS

VFR
IFR

NZAA Tuesday Movements by Hour (18/06/2019)



WHY WORK ON CAPACITY ?

Indicative design and construction timings for the Northern Runway indicate that it will take 10 years to design and construct the Northern Runway.

Previous analysis from 2012 had estimated a new runway would be needed in 2025 (+/- 3 years)

Growth rate in 2019

3-4% overall

11% international flights

Estimated approx. \$80m in cost avoidance for each year the construction wasn't started



AIRPORT CAPACITY ENHANCEMENT

AIRWAYS

ACE was re-established to focus on maintaining growth

Develop KPIs to measure performance

Identify areas of focus to maximise capacity of the single runway

Participants from industry including Airport, Air Traffic Control, Airlines and their representative body as well as regulator

Areas of Focus

5

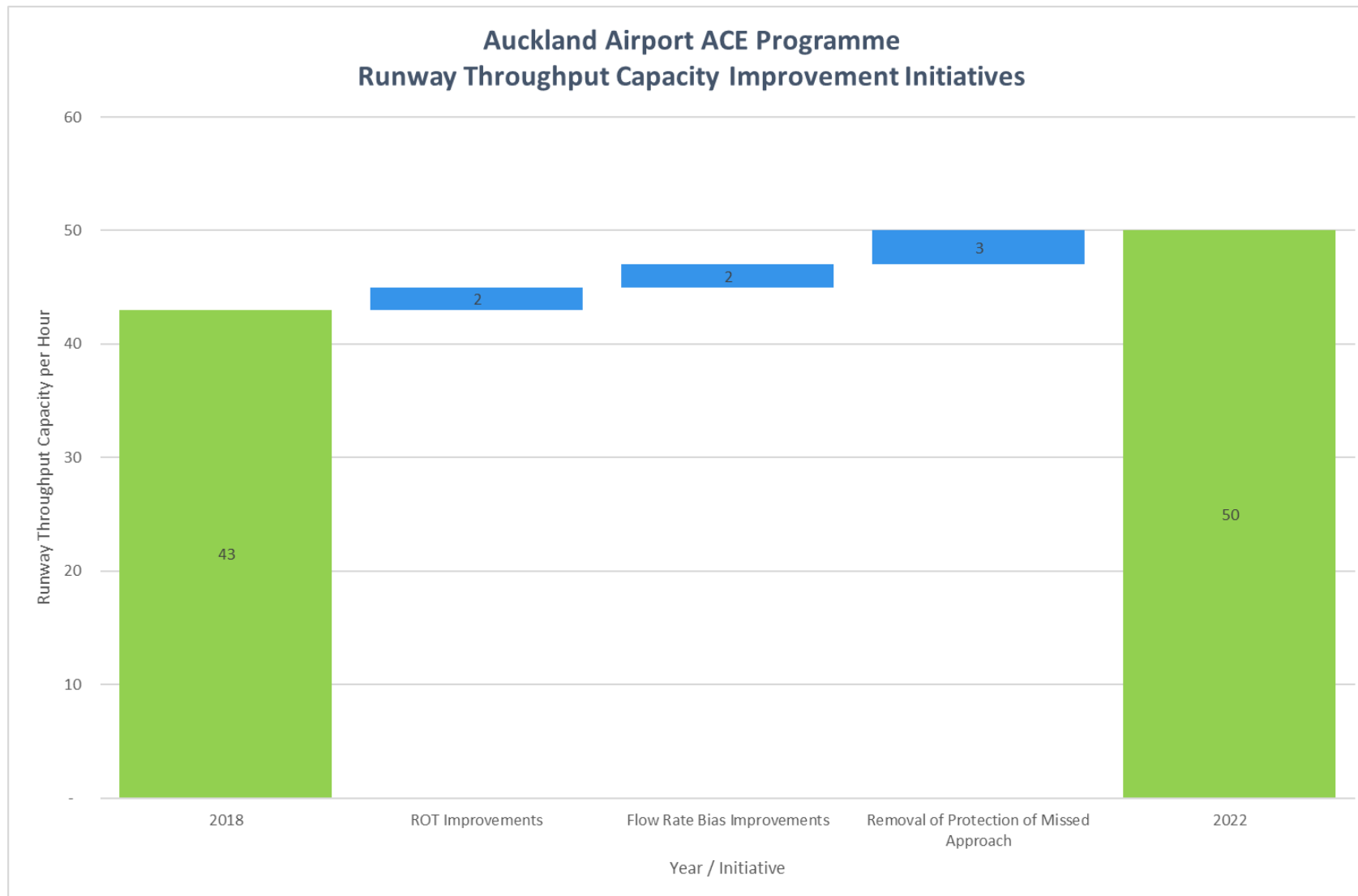


A Auckland
Airport

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AIRPORT CAPACITY ENHANCEMENT

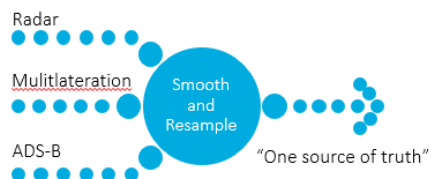
AIRWAYS



Method

Data:

- Merge all available surveillance data in the air traffic operational metrics suite (ATOMS)

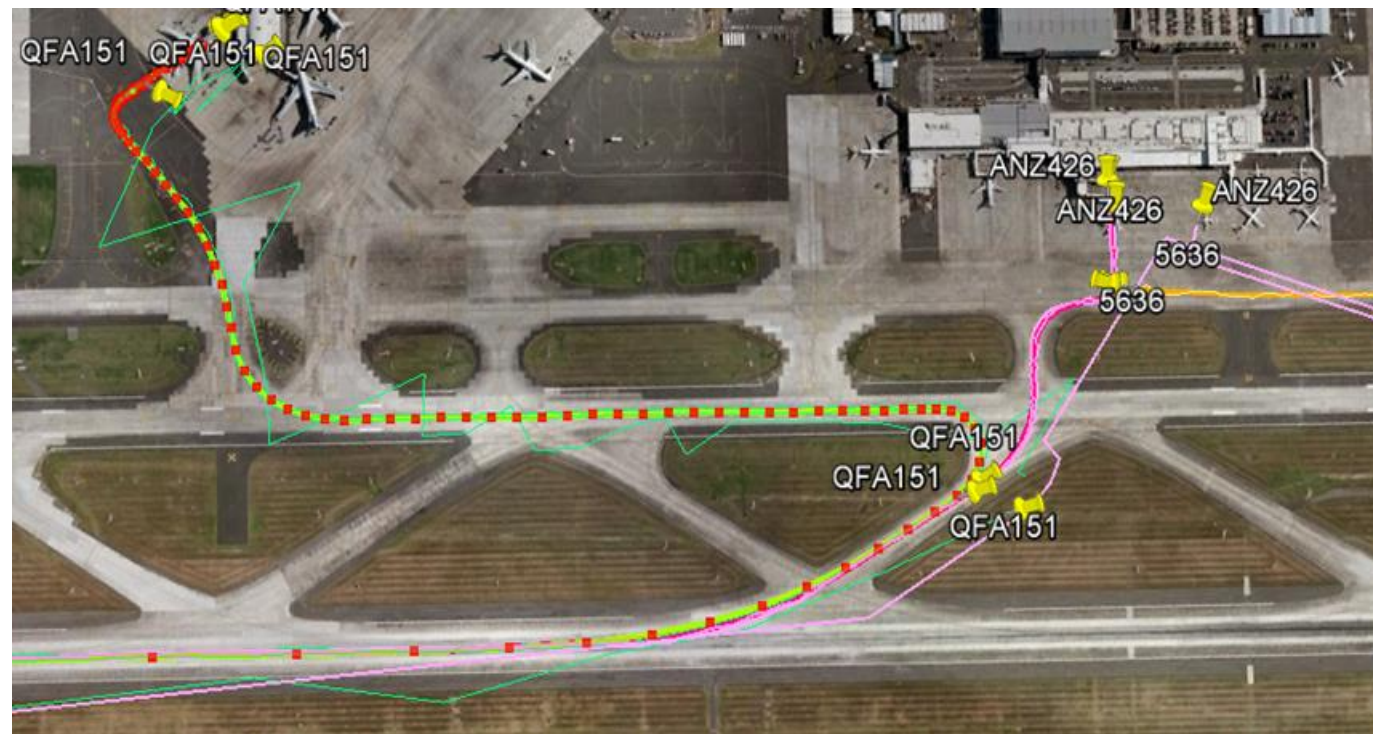
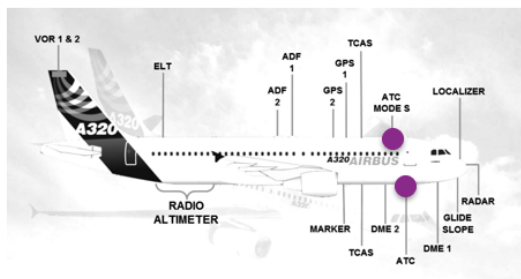


Compute:

- Entry and exit times for each scheduled movement
- Make allowance for aircraft length and antenna position

Validate:

- Small sample timed by observer in the tower for comparison

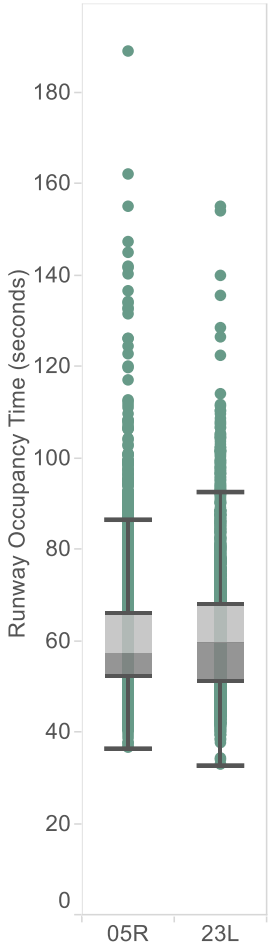




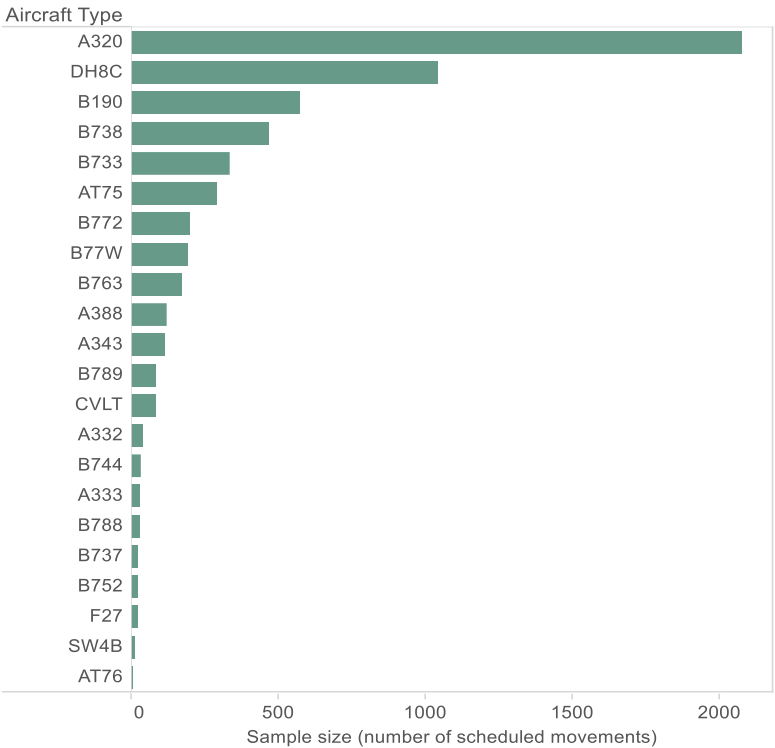
We started to see some basic outputs

Looked like we were on the right path which was encouraging

But it didn't tell much of a story or indicate any actionable change

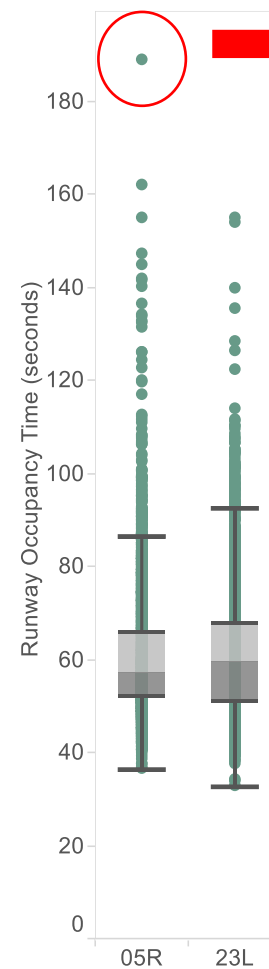
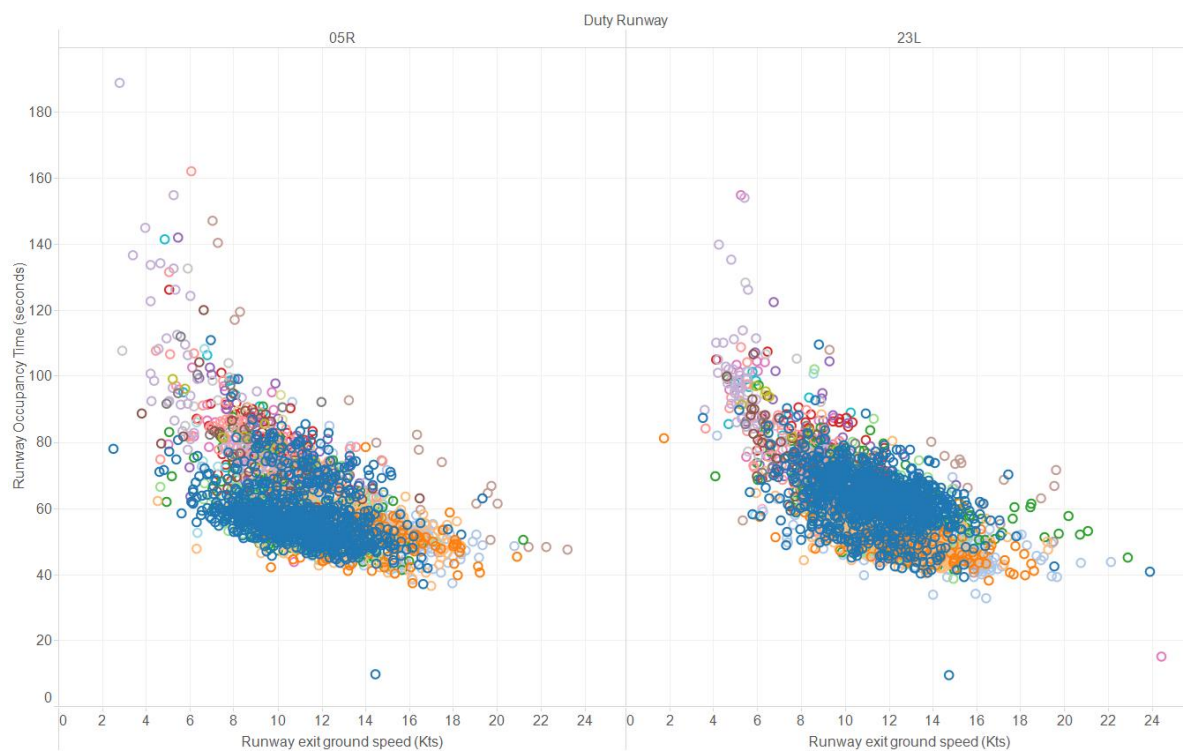


Seconds on the Runway	05R	23L
75 th Percentile	65.3	66.8
Median	56.6	57.9
25 th Percentile	50.9	49.6



ROT v 1

So we started to explore detail in search of a story and to understand



ROT v1 - POSITIVES

AIRWAYS

We were doing something!!!

It revealed some interesting observations, even operators of same fleet type had very different results



ARR	ROT for Airline A (seconds)	ROT for Airline B (seconds)	Diff. (seconds)
23L	60.5	55	5.5
05R	56.7	49.7	7

DEP	ROT for Airline A (seconds)	ROT for Airline B (seconds)	Diff. (seconds)
23L	80.75	77.5	3.25
05R	75.6	72.2	3.4



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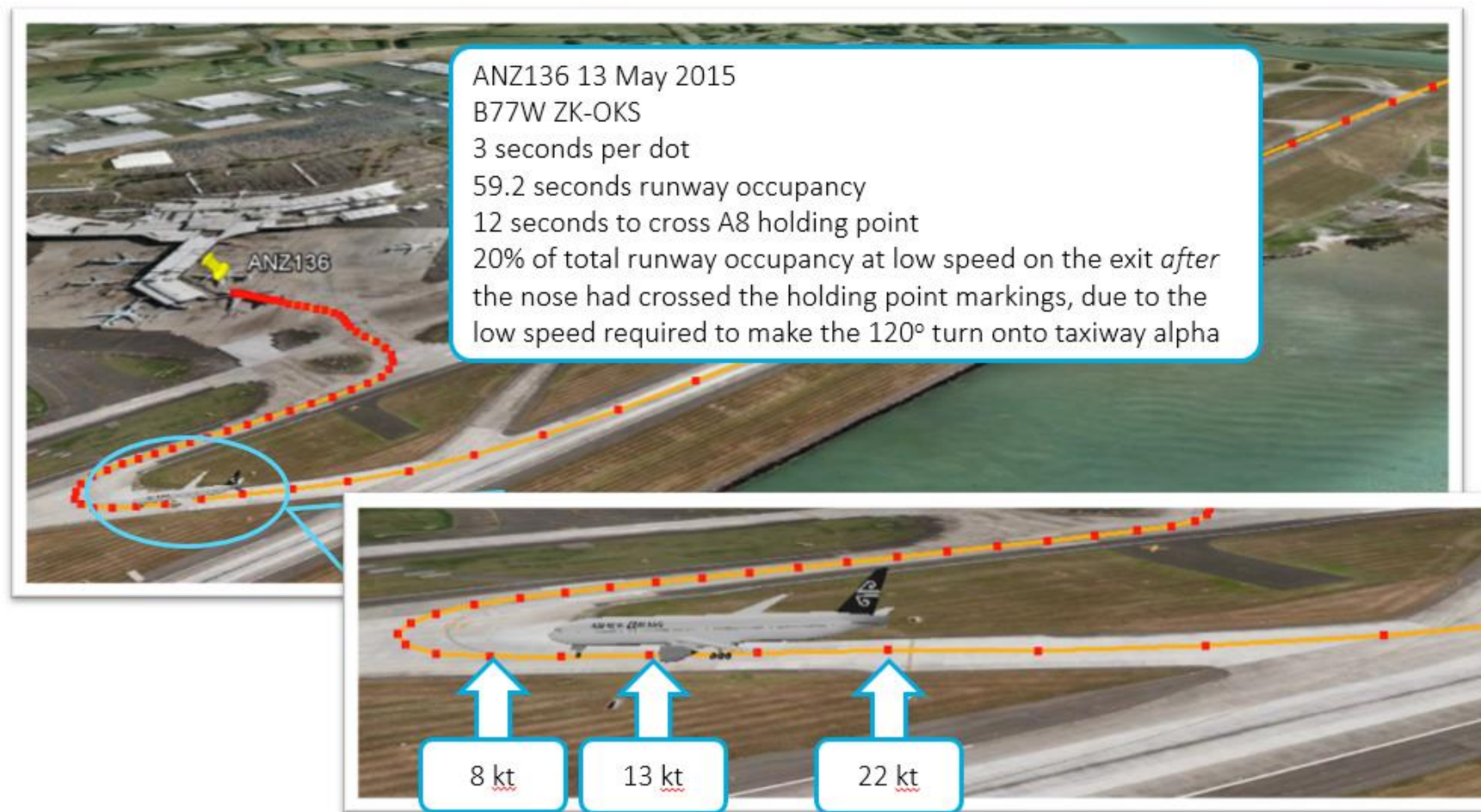
ROT v1 - POSITIVES

Some observations we could potentially influence

E.g. airline behaviour

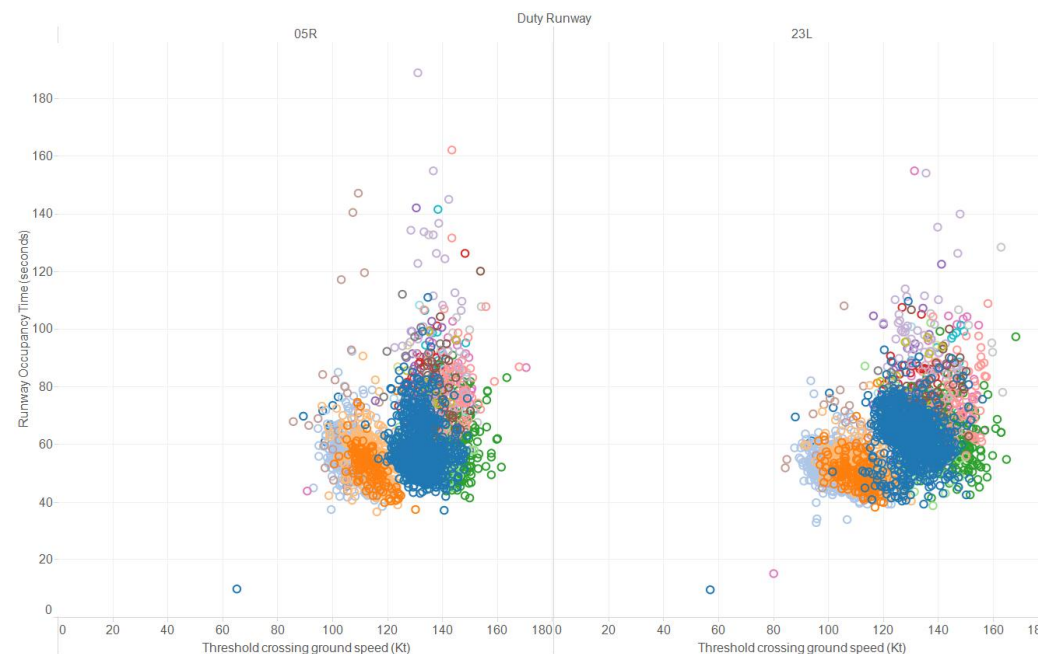
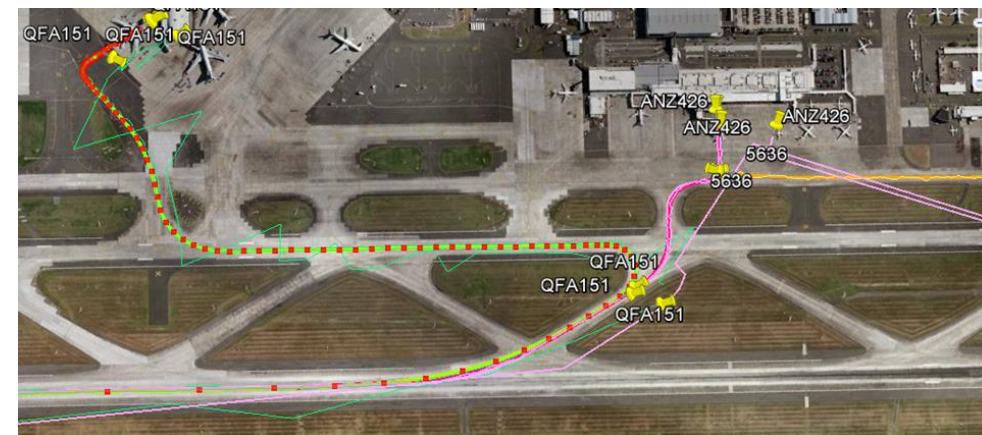
Other observations not so easily changed

E.g. airport layout or fleet expenditure



IT infrastructure not in place to support complexity

Lots of manual processes both in creation and reporting



ROT v1 - LESSONS LEARNED

AIRWAYS

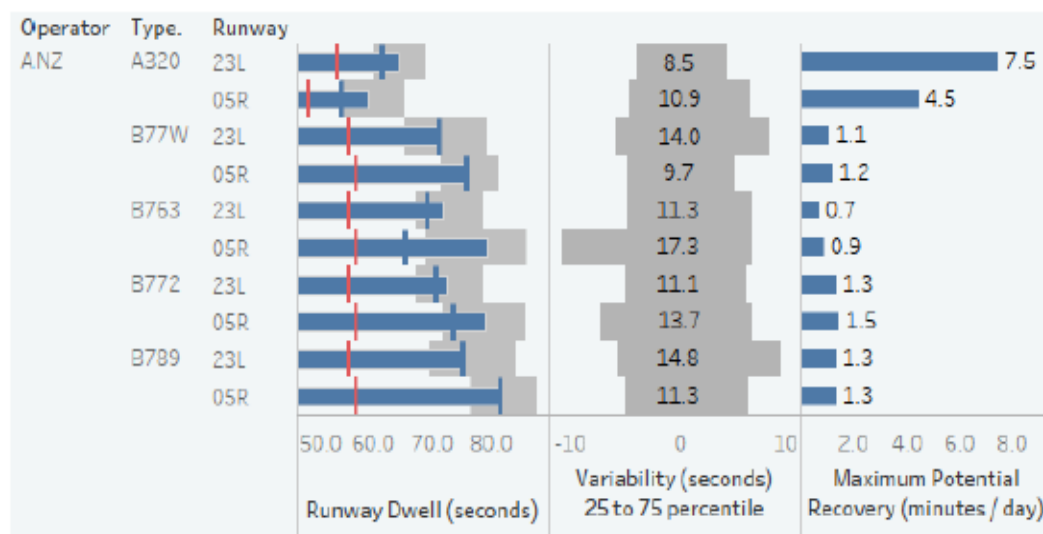
Graphical output looked fancy but to the average reader meant nothing

Wrong audience

Introduced new terminology

Consumers didn't know what to do with reports

Runway occupancy time performance for ANZ (AIR NEW ZEALAND LTD)



Runway Dwell



Median, upper and lower quartiles

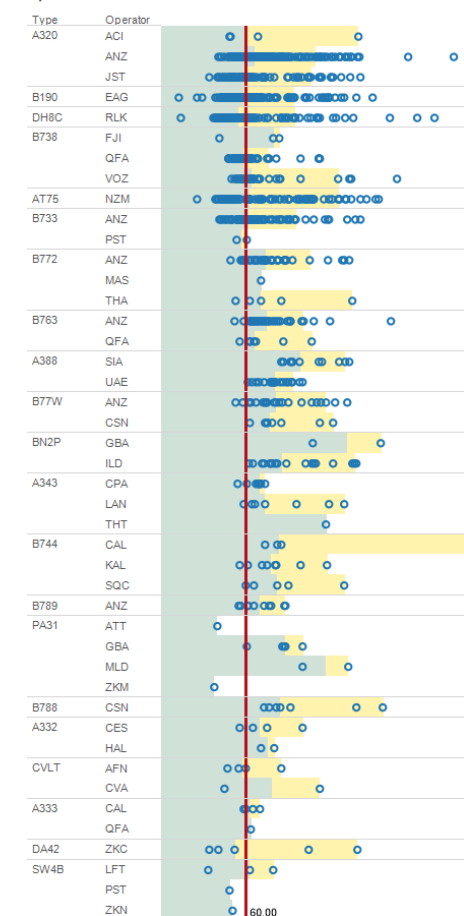


Best median for type

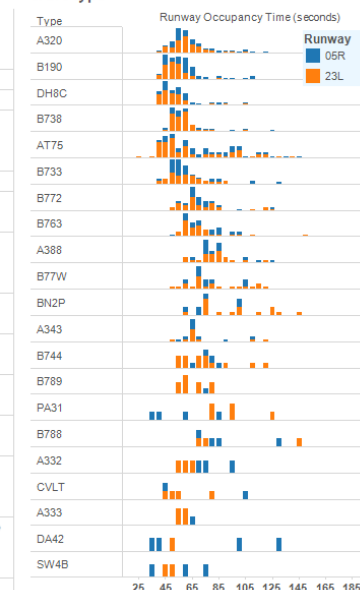


Minimum standard time for aircraft category

Operator Variations



Spread of runway occupancy times by aircraft type



Runway Occupancy Times

Type		Runway					
		05R			23L		
		Number of Landings	Average (sec)	95th percentile (sec)	Number of Landings	Average (sec)	95th percentile (sec)
A320	118	71.81	123.6	227	69.10	114.4	
B190	89	67.23	110.3	111	59.26	112.4	
DH8C	62	64.43	117.5	101	58.79	105.5	
B738	25	68.16	118.7	74	64.17	106.4	
AT75	34	81.86	137.2	60	69.02	124.4	
B733	37	67.21	113.1	52	67.99	103.4	
B772	18	76.75	124.8	31	75.63	123.0	
B763	15	76.63	103.1	27	76.31	113.3	
A388	13	88.96	125.9	19	84.82	122.7	
B77W	9	81.39	107.9	20	84.71	124.5	
BN2P	6	81.36	103.2	14	100.94	146.1	
A343	8	75.12	110.4	9	77.00	122.7	
B744	4	79.46	86.5	13	89.11	199.6	
B789	1	75.74	75.7	9	68.14	85.0	
PA31	4	56.44	84.0	5	97.13	124.0	
B788	4	93.05	128.6	3	100.68	144.6	
A332	3	82.54	95.6	3	62.92	68.9	
CVLT	2	76.59	104.1	4	61.02	81.0	
A333	1	68.51	68.5	4	61.35	64.4	
DA42	4	77.31	129.8	1	52.68	52.7	
SW4B	3	58.28	76.7	2	50.16	50.9	

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ROT 2.0

AIRWAYS

Redefined what we set out to measure and produce

KISS principle

Simple data capture

Simple easy to understand reporting

THE KISS PRINCIPLE
**KEEP
IT
SIMPLE,
STUPID**

Change the target audience

Augment with support material

Cheat sheet for reading reports

Brochure for pilots



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ROT 2.0

A lot of reporting can be done with just 2 data points

E.g. Flight duration = Actual time of arrival – actual time of departure

So we set off to do the same with runway occupancy

Dispensed with the intensive process of smoothing data from surveillance tracks and replaced processing with averages

Dispensed with geospatial polygons to identify when an aircraft was occupying the runway

Replaced with repeatable data points

Arrivals = time at holding point – time at threshold

Departures = time of positive rate of climb – time at holding point

Filtered out lowest 7% and highest 7% of ROT values from reports

Outliers were skewing the results

Sending us down rabbit holes which weren't going to yield systemic results/change



ROT 2.0 REPORTING

Reports previously sent to airline representative body who was then on-distributing to airlines for a level of privacy and to avoid name & shaming

Replaced with one file per operator
Broken down into fleet type to target Fleet Captains

Report output matching the pilot brochure
Consistent
Line pilot can understand

Simple data points
Includes current performance
Includes trends

Created good engagement with all parties

Runway Occupancy Time Auckland International Airport

AIRWAYS
making your world possible



ANZ - Air New Zealand - Arrivals

Runway Occupancy Time (Secs) by Aircraft Type & Runway

Aircraft Category	Runway	Min	Avg	Max	3mth Avg
Heavy Jet	23L	47	62	72	64
Medium Jet	23L	44	59	72	60
Heavy Jet	05R	44	64	72	66
Medium Jet	05R	44	55	72	55

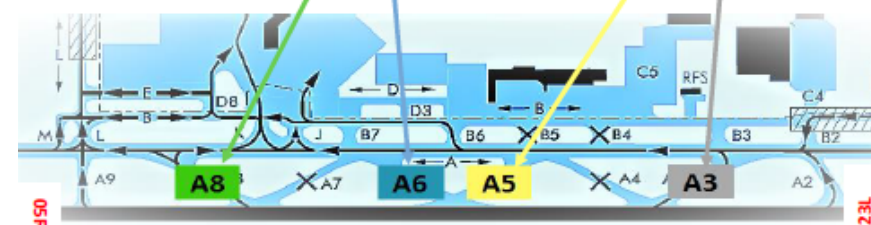
Measured from Threshold to Holding Point on taxiway

Taxiway Utilisation

RWY23L	
A4	0.0%
A6	9.9%
A8	90.1%
A9	0.0%
A10	0.0%

RWY05R	
A7	0.0%
A5	64.7%
A3	35.3%
A2	0.0%
A1	0.0%

Taxiway Layout



ANZ - Air New Zealand - Departures

Runway Occupancy Time (Secs) by Aircraft Type & Runway

Aircraft Category	Runway	Min	Avg	Max
Heavy Jet	23L	70	92	110
Medium Jet	23L	58	79	109
Heavy Jet	05R	72	93	110
Medium Jet	05R	58	75	109

Measured from Holding Point on taxiway to a Point of Positive Climb



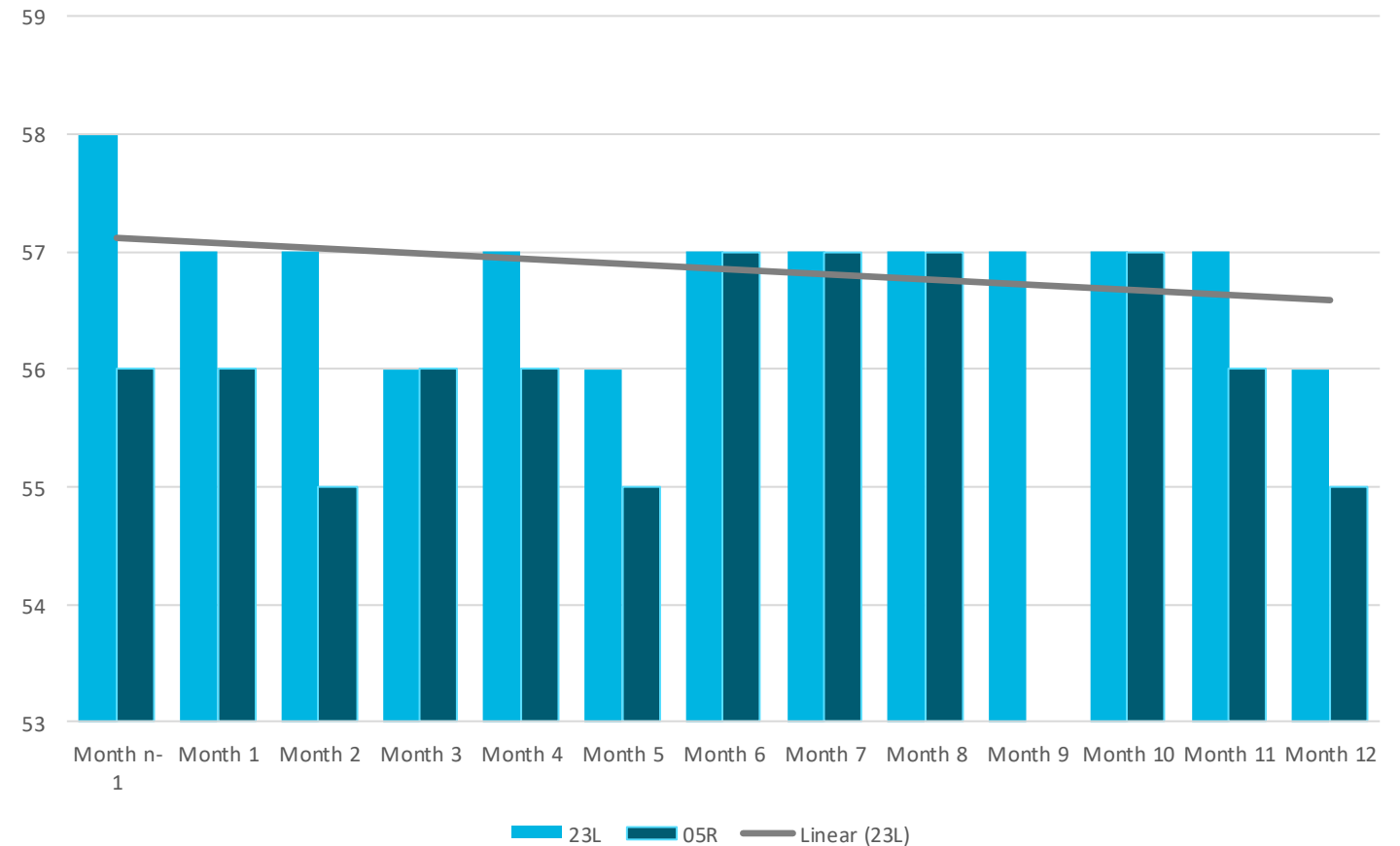
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ROT 2.0 ASSESSING IMPACTS

Arrival Runway	ROT at Month n-1 (seconds)	ROT 12 month average (seconds)	Change (seconds)
23L	58	56	↓ 2
05R	56	55	↓ 1

Month	2019 Reported ATC ground delay (minutes)	2019 Reported ATC ground delay (minutes)	Change (minutes)	Change (%)
February	615	323	↓ 292	↓ 47.4%
March	719	232	↓ 487	↓ 67.7%

Average Runway Occupancy by Runway



ROT 2.0 ASSESSING IMPACTS

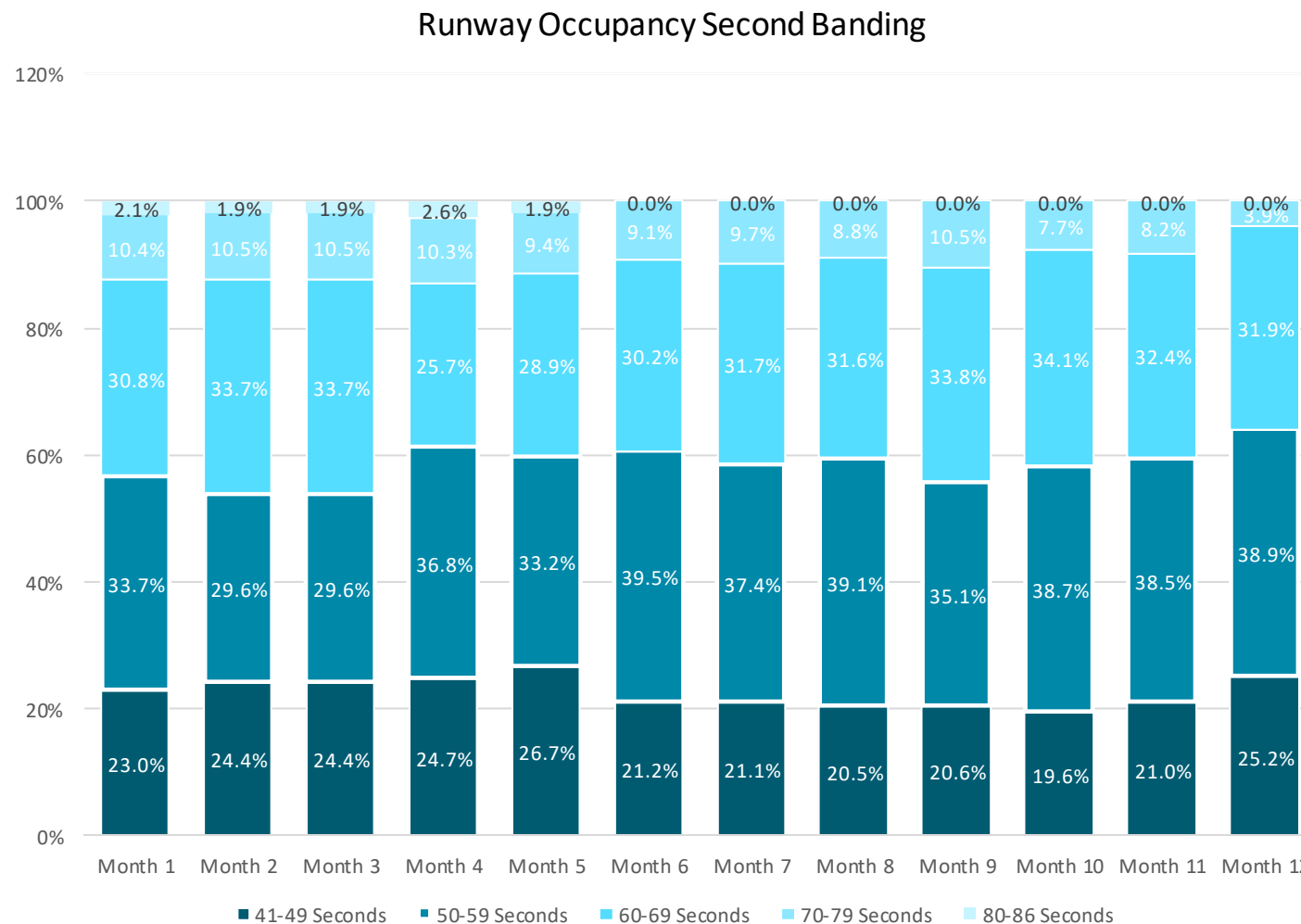
Predictability increased

Average at month 1 had 56.7% with ROT of 59 seconds or less

Average at month 12 has 64.1% with ROT of 59 seconds or less

Showing 7.4% in positive change

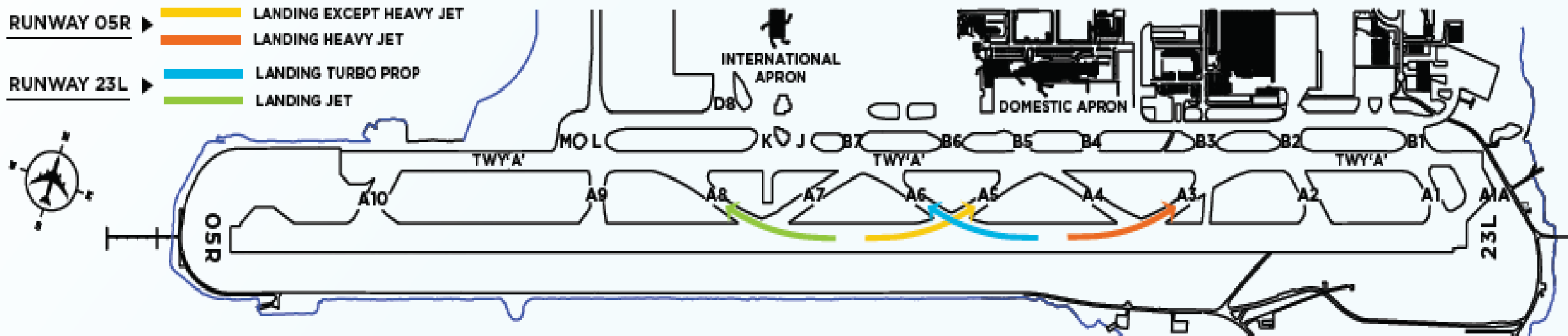
Trend for ROT of 70+ seconds reduced from 12.5% down to 3.9%



ROT 2.0 ASSESSING IMPACTS

23L Arrivals	Month 1	12 month average	Change
A4	2.4%	2.6%	↑ 0.2%
A6	35.9%	39.7%	↑ 3.8%
A8	59.9%	55.5%	↓ 4.4%
A9/A10	1.7%	2.1%	↑ 0.4%

05R Arrivals	Month 1	12 month average	Change
A7	0.4%	2.0%	↑ 1.6%
A5	67.4%	68.3%	↑ 0.9%
A3	31.8%	29.5%	↓ 2.3%
A2/A1	0.4%	0.2%	↓ 0.2%



ADVICE FOR METRIC DEVELOPMENT

AIRWAYS

Make a start!

Start small

Keep it simple

**If you have a problem/question to
solve even better**

**Acknowledge data wont be perfect
and cater for it**

Insights will come



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CANSO Operational Performance Working Group (OPWG) Metrics Survey

Speaker



Maarten Tielrooij
Senior Senior Aviation Consultant


To70

CANSO Operational Performance Working Group (OPWG)


- Place
 - Working group under CANSO Operations Standing Committee (OSC)
- Mandate
 - “Assist CANSO Members to improve their air traffic management through using harmonised indicators to measure operational performance in the areas of capacity, flight efficiency and predictability.”

<https://canso.org/document/tor-opwg-20190408/>

Express our gratitude

- Organisers of the APAC region webinar
 - Contributing ANSPs
 - Operations Standing Committee
 - Operational Performance Working Group Members
- 

Background

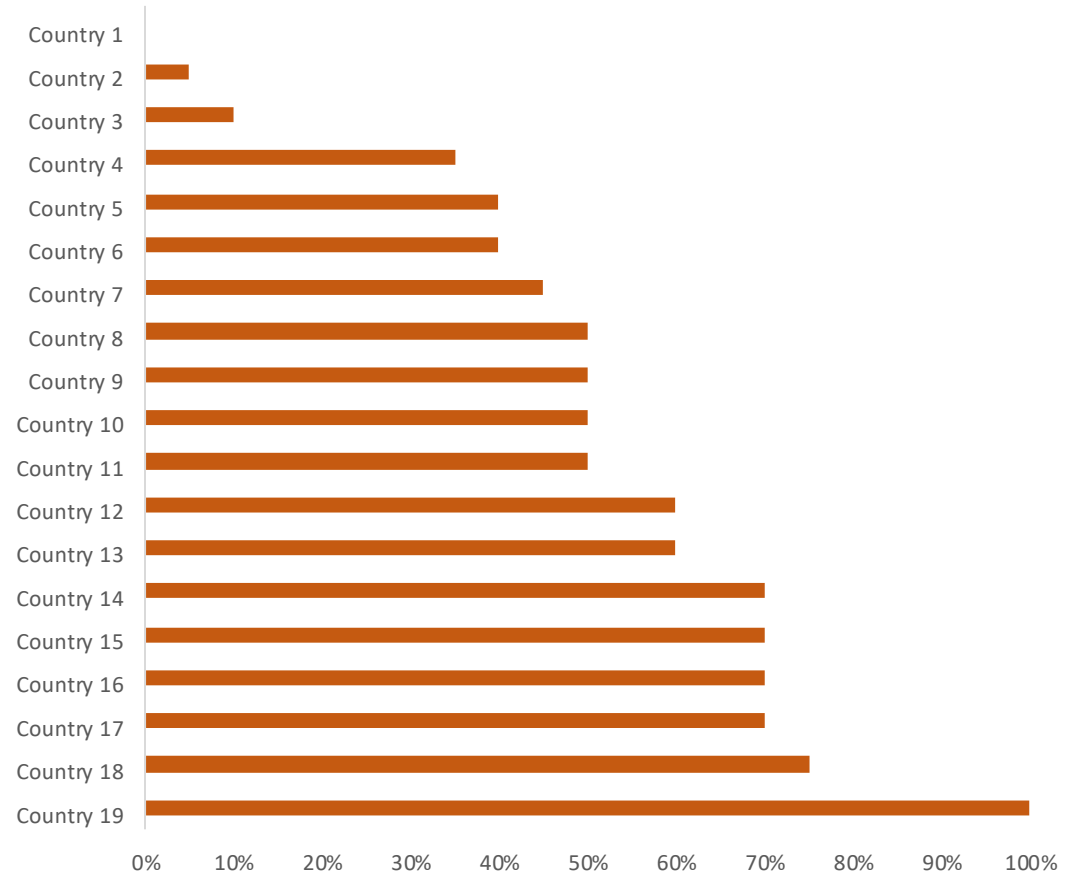
- Operational performance KPIs
 - Wide variety within industry
 - Cross-industry data analysis and benchmarking is challenging
 - A survey into implementation of KPIs
 - Help identify key datasets
 - Perform more effective data analysis
 - Share global and regional trends
- 

Response

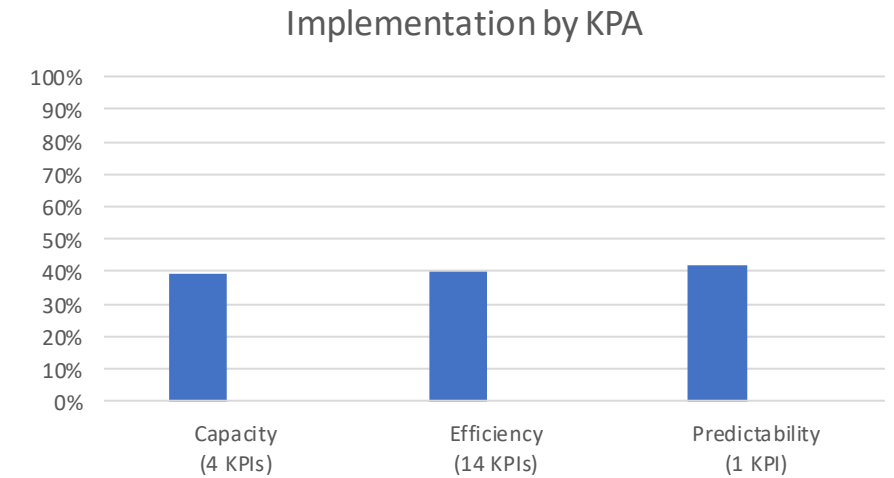
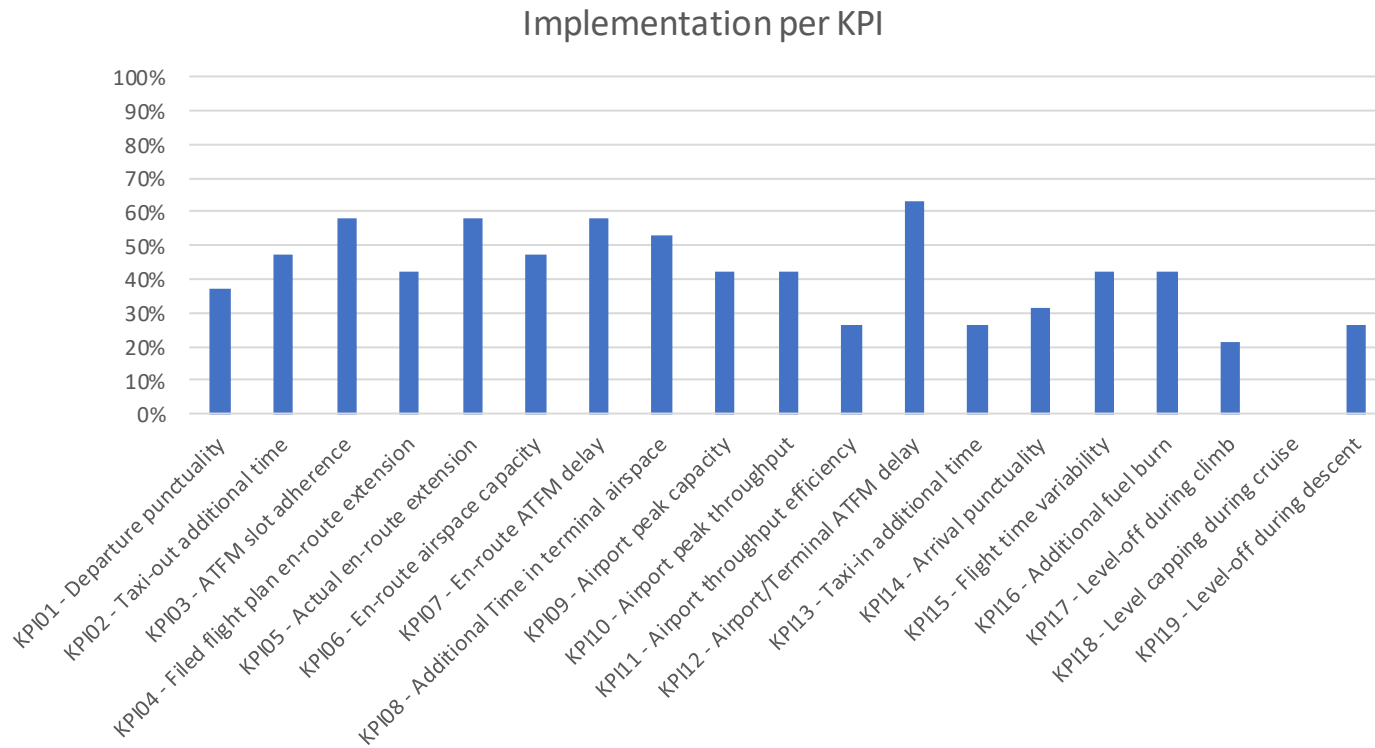
17 ANSPs + 2 Aviation analytics companies



With regard to how well your ANSP uses KPIs, how would you measure yourself today?



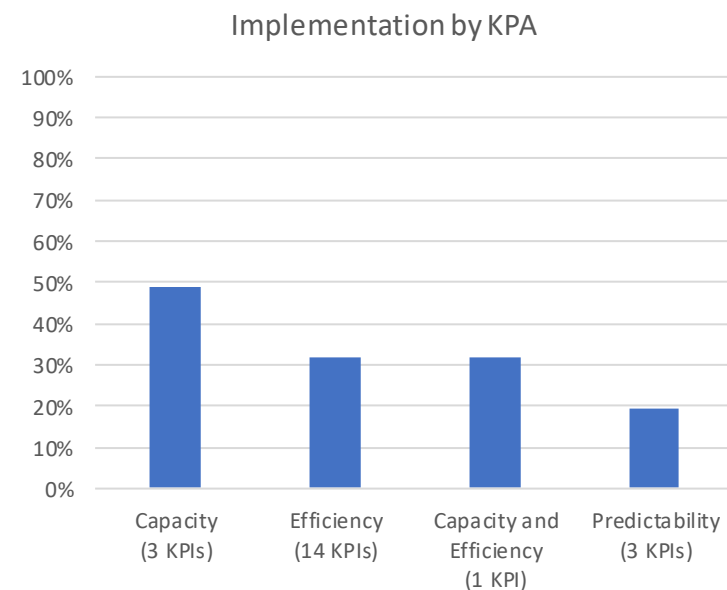
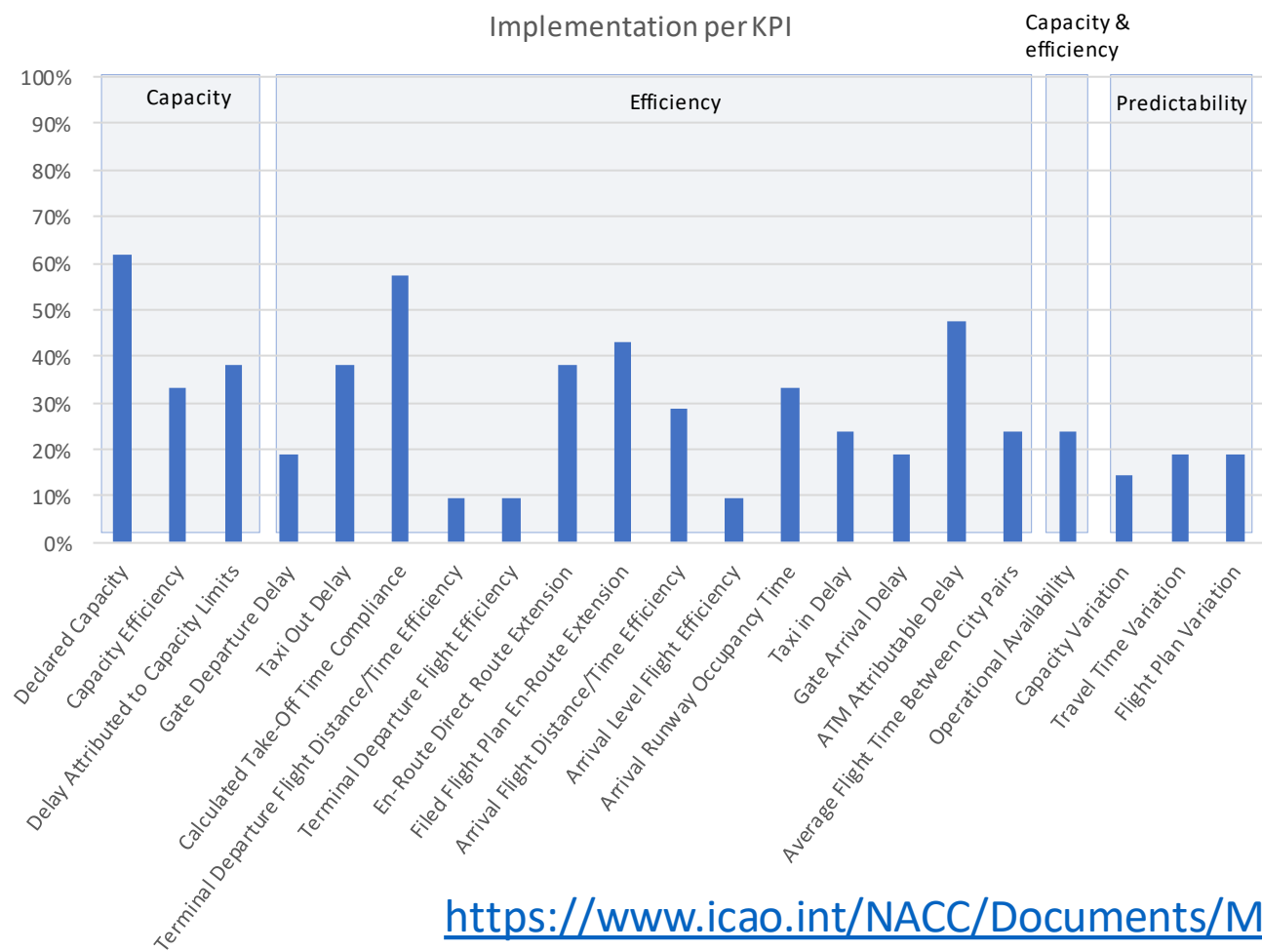
Implementation of ICAO KPI



Climb, descent, and cruise level efficiency least used KPIs

<https://www4.icao.int/ganpportal/ASBU/KPI>

Implementation of CANSO Recommended Operational Performance KPI



<https://www.icao.int/NACC/Documents/Meetings/2018/ASBU18/OD-09-RecommendedKPIforMeasuringANSOOperationalPerformance.pdf>

Reasons for KPIs not implementing

- No need
 - No regulatory requirement
 - Unclear how it will improve performance
 - Low density of traffic
- Lack of resources
 - Personnel
 - COVID delayed implementation
- Complexity of implementation
 - Lack of (reliable) data
 - Don't have technology to capture data
 - Not easy tracking interdependent data
 - KPI dependent on external factors



Other implemented KPIs

- Two countries use variations of ICAO / CANSO KPIs
- **Capacity**
 - Differentiation between regulated and non-regulated flights
 - Miles flown
 - Capacity utilisation - percentage of time runway operates above 70% of declared capacity
 - Airspace restrictions
 - Runway Capacity
- **Flight efficiency**
 - Free route performance indicators
 - CCO / CDO operations
 - CO₂ gains from ATC operations
- **Predictability**
 - Flight Punctuality, arrival and departure
 - Turn-around times
 - Taxi-out, TMA, and Taxi-in variability (Variability in ICAO KPIs 02,08,13)

Which non-implemented KPI has most interest?

- Most mentioned Key performance area
 - Predictability
 - En-route efficiency
- Advanced KPIs
 - Interdependencies between KPIs
 - Including weather/special occurrence to KPIs (normal / non-normal operations)
- New Area
 - Efficiency KPIs converted to emissions

Desired support from CANSO

- Supporting each other is the objective of CANSO
- 16/19 say they would be open to CANSO supporting KPI improvement the next 5 years
- ANSPs ask for assistance with
 - Setting up automated systems for capturing, storing, processing performance metrics
 - Providing experts and KPI document assistance
 - Setting up processes and procedures for KPI monitoring and analysis
 - Benchmarking with respect to the KPAs/KPIs
- What would your ANSP like help with?

Chair



Michael Watkins
Senior APAC Air Traffic Rep

FAA

Roundtable

Where to start? – Offering practical advice
on where to begin.



Questions and Answers

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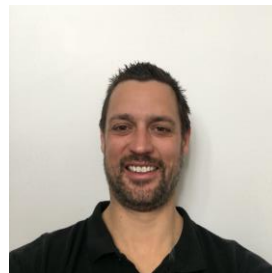
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CANSO Asia Pacific Conference 2021

19 – 20 May 2021

Host



Lead sponsor





Space-Based ADS-B Applications in Asia- Pacific: A More Dynamic, Collaborative and Harmonized Future

25 May 2021, 8:00-10:00 CEST





Recovery goes beyond the visual – Experience remote digital tower and UTM concepts.

17 June 2021, 8:00-10:00 CEST



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