



BUSINESS CASE PROCESS

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Success Story: From Business Case to Actual Improvement



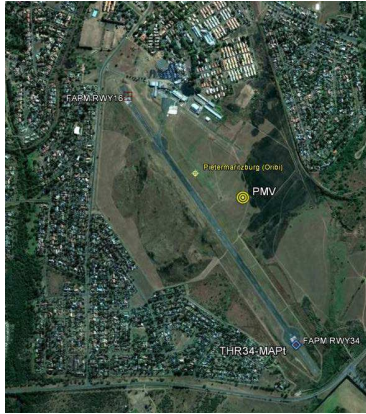
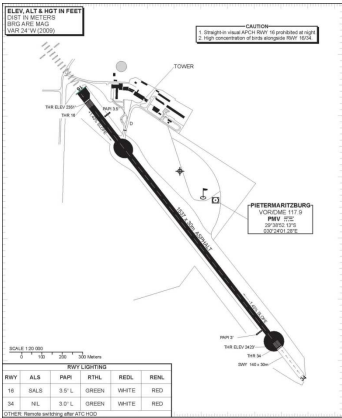
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Pietermaritzburg - Oribi Airport




3

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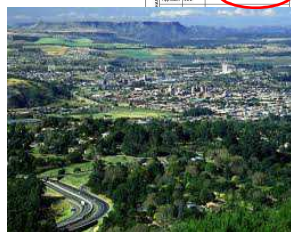
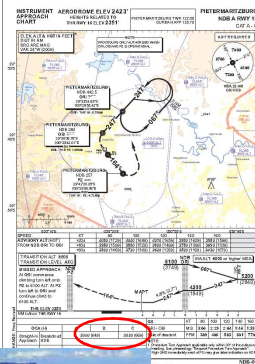
- Single runway 16/34, 1537 X 30 M
- NAV AIDS – 1 X VOR/DME, 3 X NDBs
- Instrument Approaches – 2 NDB procedures (High Minima 650', Dive and Drive)
- Many missed approaches and diversions

4

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Challenges

- NDBs obsolete (50+ years old) – un-reliable
- Step down NDB procedures – dive and drive
- Airport in a bowl – high ground on extended center-line of Rwy 16)
- Obstacle rich environment (transmission mast on extended center-line of Rwy 16)
- Bad Weather runway – Rwy 16
- Bad Weather cloud base < existing NDB minima
- Many flight cancellations and/or diversions
- Un-reliable air service for the flying public
- Airport not financially viable

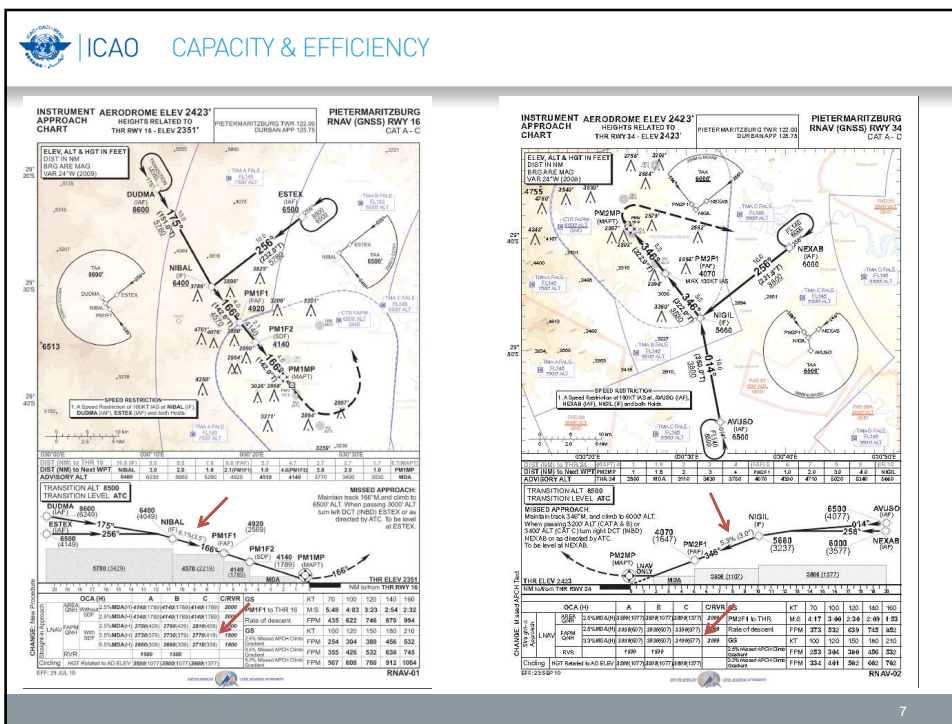
5

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The Solution

- Design straight in PBN procedures
- 2 X RNP APCH (GNSS) - LNAV
- Initial assessment indicated improved minima over existing procedures
- Improvement in airport accessibility attainable
- Operators supportive and RNAV capable

6



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A Success Story

- Implemented 2 X RNP APCH procedures (straight-in)
 - Less diversions due to WX
 - Increased airport accessibility
- Consequences:
 - Improved, more reliable air service
 - Increased passenger/cargo traffic
 - Increased aircraft movements
 - Use of larger aircraft
 - An emerging local aviation industry
 - An economic turnaround for the airport
- A positive business case

— Passengers per Arriving Flight
 — Linear (Passengers per Arriving Flight)

— Flight Diversions
 — Linear (Flight Diversions)


— Net Cash... Oribi Airport



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- To provide an overview of the Business Case Process:
 - Base Case and Options
 - Benefits and Costs
 - Scope and Business Case Elements
 - Methodology
- To identify the extent of collaboration required from all Stakeholders
- This Business Case process will focus primarily on PBN instrument procedures.
 - The concept also applies to airspace redesign

9



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Why Business Cases?

- Before approving a capital expenditure, a Business Case is normally required in order to justify the use of financial resources.
- Business Cases are important in prioritizing investment decisions, to ensure that safety and efficiency objectives are achieved.

10



Overview

- A Business Case Analysis compares the direct benefits and costs of feasible Options in relation to the Base Case.
- The Base Case generally represents the status quo or existing situation.
- The Options are all feasible instrument approach systems that would improve the usability of the airport (including satellite-based systems).
 - Eg, LNAV, LNAV/VNAV, LPV


11



Customer Benefits

- Direct benefits arise from an improvement in airport usability, resulting in fewer flight delays, cancellations or diversions.
- Some instrument approach systems may also improve safety (precision approaches, APV, for example).
- Only those aircraft that have, or are expected to have, the ability to use the approach system (avionics and training) are assessed.
 - Check fleet mix and equipment


12

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Costs

- Costs may include equipment and installation of new approach aids, design of instrument approaches, etc, as well as incremental on-going operating and maintenance expense.
- In some cases it may be appropriate to consider expenses made by others, such as customers (e.g. the aircraft avionics costs required to allow the use of the proposed instrument approach system).

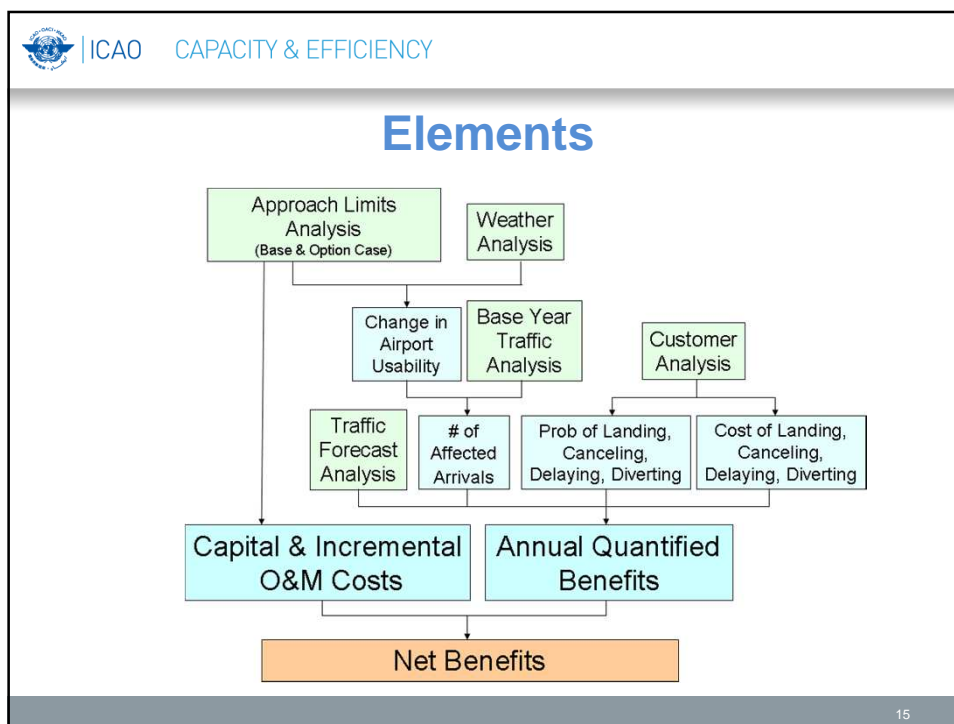
13

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Scope

- The Business Case includes the direct impacts on the major commercial operations – carrier, cargo
 - private VFR operations are not affected.
- Secondary impacts are not quantified (i.e. ripple effects of early or lengthy delays, lost demand) as these are very difficult to assess.
- Economic impacts on local community and value of passenger time are also excluded from the Business Case.

14





Weather Analysis

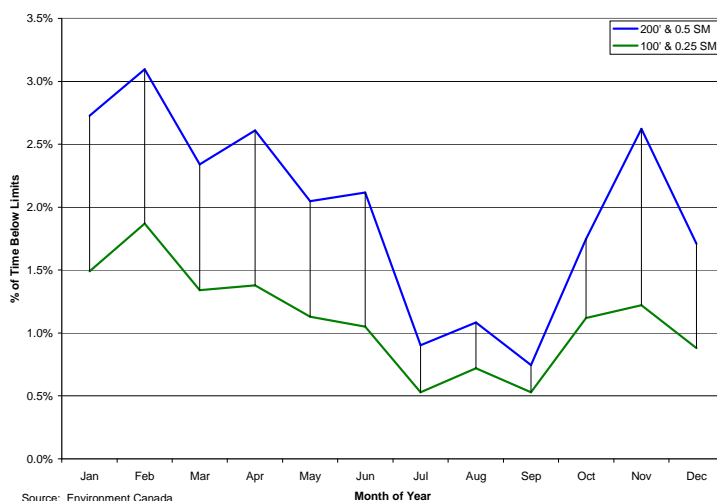
- Airport usability is also affected by weather -- visibility, ceiling and wind.
- Interested in:
 - seasonal and daily patterns (i.e. when does the bad weather occur?)
 - duration of “below minima” conditions
- Improvement in usability must recognize crosswind and tailwind limits relative to the runway under review.

17

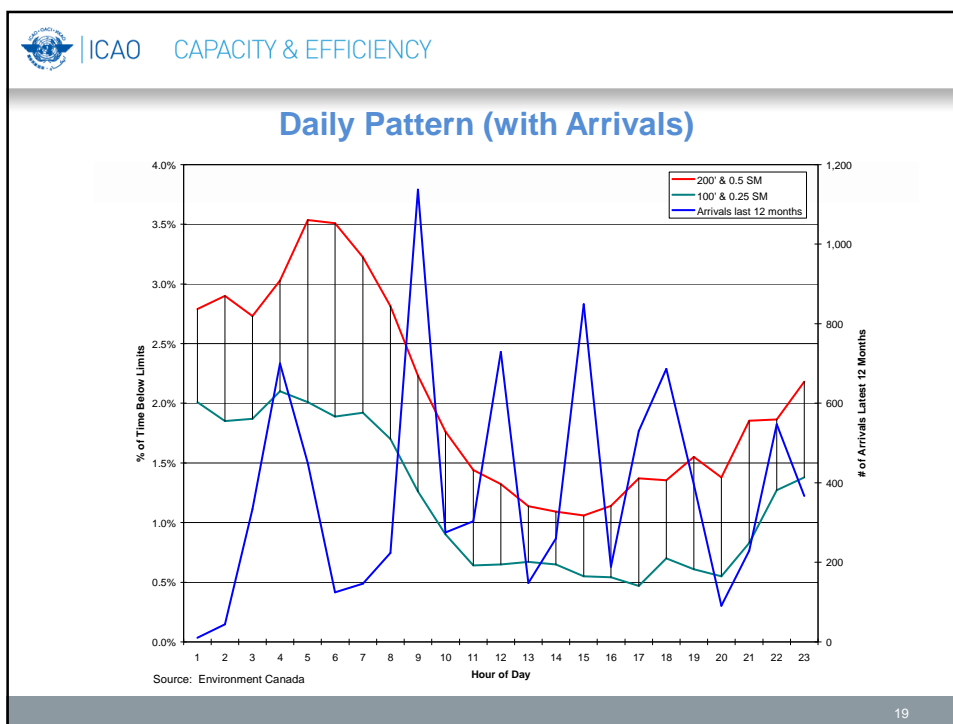


Weather Analysis

(Example) Seasonal (Monthly) Pattern



18

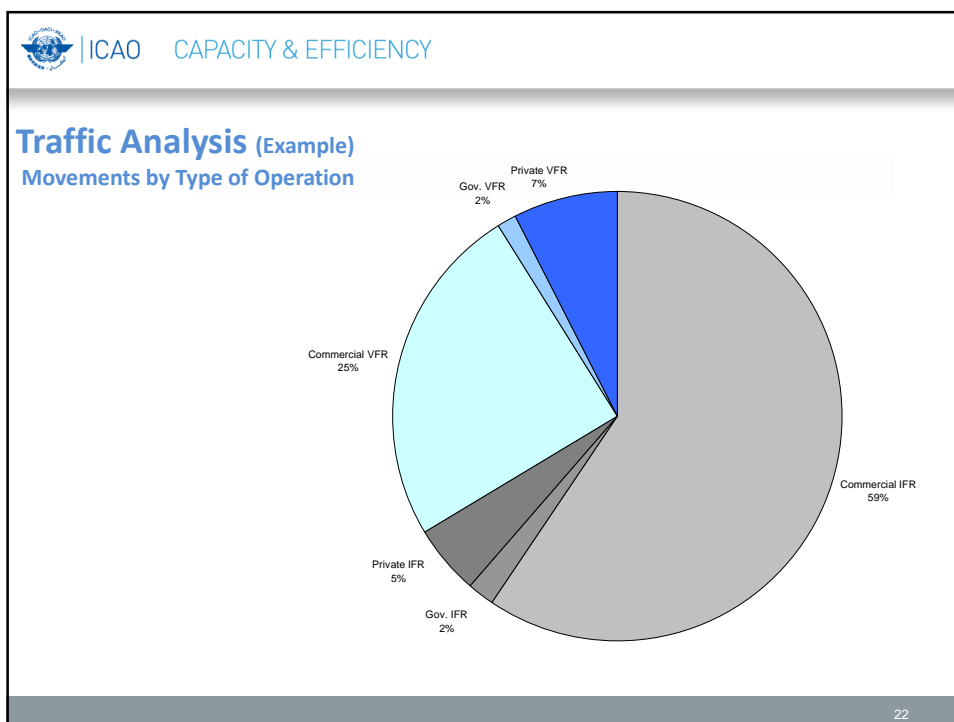
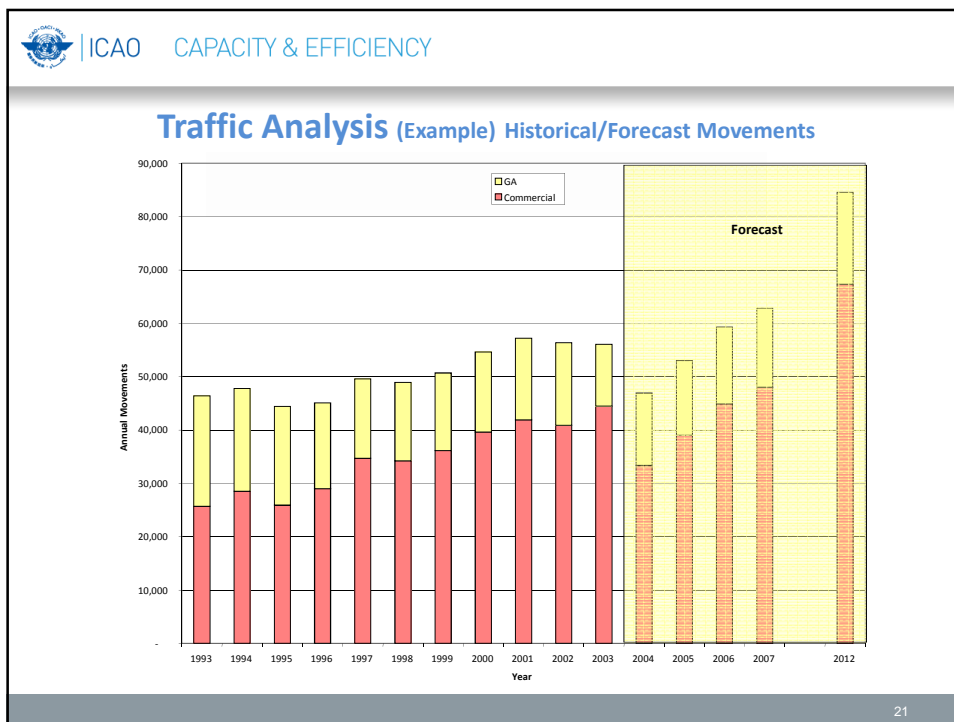


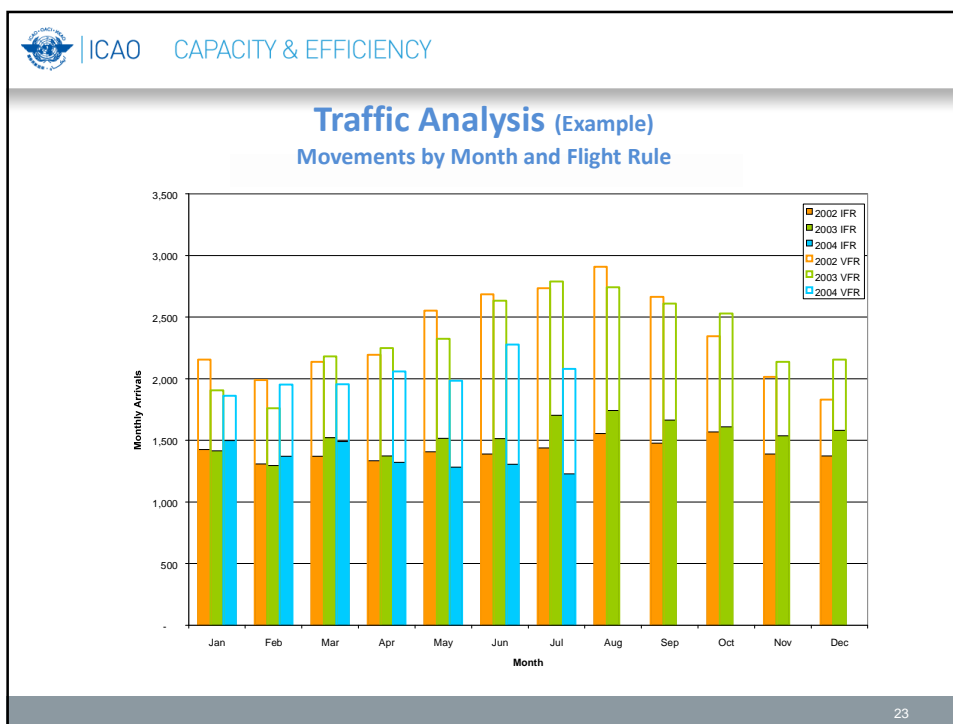
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Traffic Analysis

- Determines the number of potentially affected arrivals when combined with the percent change in airport usability
- Interested in:
 - seasonal and daily patterns (to compare with weather)
 - fleet and operator mix (for aircraft capability and impact on operator)
 - forecast growth in traffic (affects future benefits)

20






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Customer Analysis

- Identifies the possible dispatch choices and associated probabilities when the weather is observed to be below landing limits:
 - Divert to alternate, delay or cancel departure
 - A certain proportion may attempt and successfully land
- Determine the impact of these choices on:
 - Aircraft, crew, and passenger/cargo costs
 - Net revenue on cancelled flights

24


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Methodology

Customer Benefits

- Customer benefits are computed annually and projected over an appropriate time horizon (usually the useful life of the asset) using traffic growth forecasts.
- Annual Affected Arrivals
 - Based on weather and traffic analyses, by hour of day and month of year
- Annual Benefit (Avoided cost)
 - Based on annual number of affected arrivals and customer analysis, by customer capable of using the proposed approach system.

25


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Methodology

Service Provider Costs

- One-Time
 - includes equipment, system installation, testing, training, travel, site preparation, procedure development, flight certification.
- Annual Operating and Maintenance
 - incremental O&M for flight checks, preventive and corrective maintenance.

26


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Methodology

Benefits/Costs Comparison

- The annual cash flow of quantified benefits (avoided costs) are compared with the one-time and on-going O&M costs.
- Annual net benefits (benefits minus costs) are discounted to reflect the time value of money.
- Sum of the discounted annual net benefits yields the Net Present Value (NPV).
- The option yielding the largest positive NPV is the preferred option from an economic perspective.

27

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A Collaborative Approach

- Business Cases are undertaken as a collaborative effort, involving relevant “stakeholders” as follows:
- Customers
 - Assist in quantifying benefits
 - Key dispatch choices
 - Associated probabilities and cost impacts
 - Fleet plans, current and planned avionics capability and associated upgrade costs
 - Validate results (assessed benefits)
 - Information is treated in strict confidence

28



A Collaborative Approach

- **Airport Operator**
 - Coordination to ensure completion of their areas of responsibility:
 - Runway Lighting and Certification Plans
 - Zoning and land use restrictions
 - Land access
- **Weather Service**
 - Climate data at the airport (usually 10 years of observed weather).
- **Regulator**
 - Traffic forecasts

29



Class Exercise



Example of Traffic and Weather Analyses



Weather Summary – Airport Usability

Runway	IAP	Limits	Non-RNAV Aircraft		RNAV Aircraft	
			Base Case 1	Next Best IAP	Base Case 2	Next Best IAP
5	ILS	200/0.5	X		X	
	NDB	500/1.0		X		
	LPV (NEW)	200/0.5				X
23	LOC(BC)	400/1.25	X		X	
	VOR	400/1.25		X		
	LPV (NEW)	200/0.5				X
% UNUSABILITY			1.92%	3.46%	1.92%	1.80%
CHANGE IN USABILITY				-1.54%		0.12%

Ceiling Limits are rounded up to the nearest 100 feet.
Assumes LPV minima of 200' and ½ sm on both ends of runway

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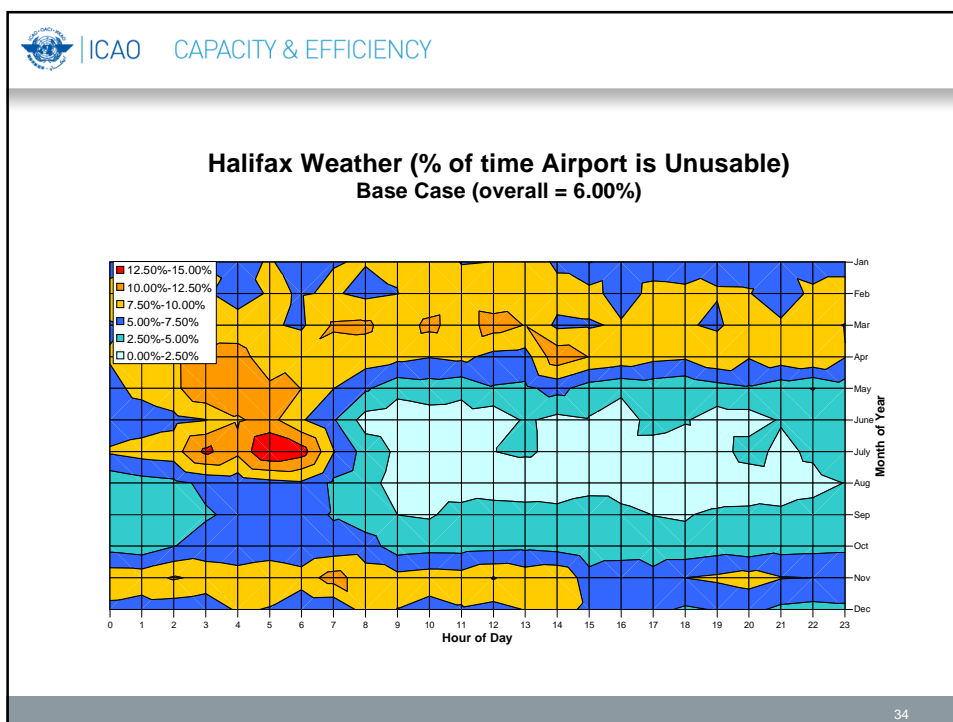
Estimated Impacted Arrivals by Month

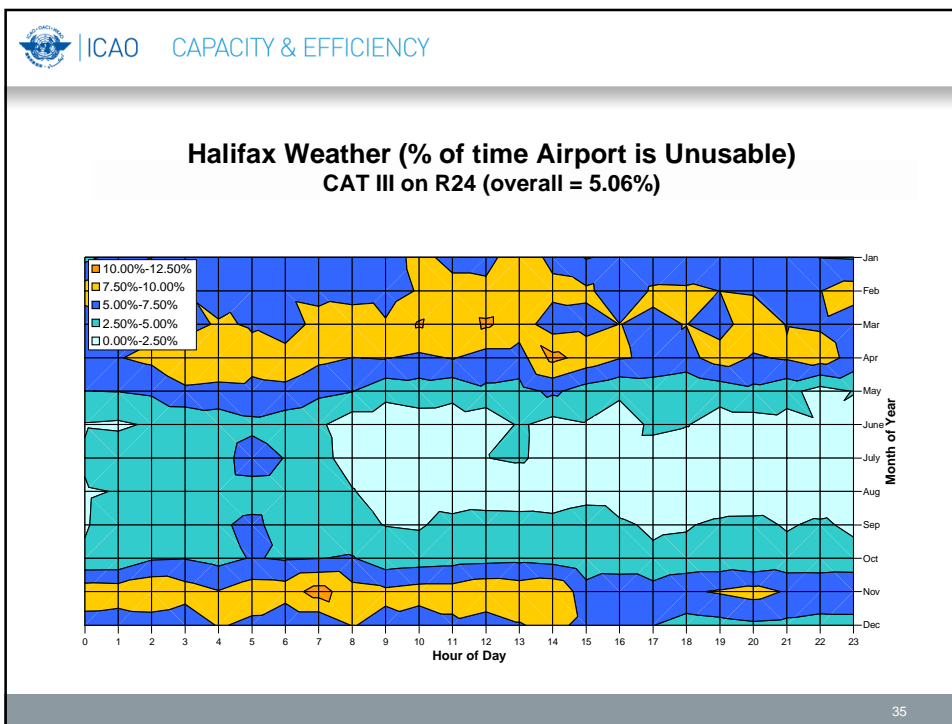
Airport Unusability	MONTH												Overall
	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	
BASE CASE	2.4%	3.5%	3.4%	2.5%	1.9%	0.8%	0.7%	0.6%	0.6%	1.2%	2.9%	2.3%	1.92%
OPTION (non-RNAV Aircraft)	3.6%	6.2%	6.1%	4.8%	3.6%	1.9%	1.0%	1.2%	1.2%	2.4%	5.5%	4.1%	3.46%
OPTION (RNAV Aircraft)	2.3%	3.4%	3.2%	2.3%	1.8%	0.7%	0.7%	0.6%	0.5%	1.2%	2.8%	2.1%	1.80%
Usability Impact													
OPTION (non-RNAV Aircraft)	-1.2%	-2.6%	-2.7%	-2.2%	-1.7%	-1.1%	-0.3%	-0.6%	-0.6%	-1.2%	-2.5%	-1.8%	-1.54%
OPTION (RNAV Aircraft)	0.1%	0.1%	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.1%	0.2%	0.12%
Estimated Impacted Arrivals													
IFR Capable Arrivals (2008)	308	346	363	276	337	370	436	312	329	318	299	301	3,995
OPTION (non-RNAV Aircraft)	4	9	10	6	6	4	1	2	2	4	8	5	60
OPTION (RNAV Aircraft)	0	0	-1	0	0	0	0	0	0	0	0	-1	-5

On average 5 movements per month are expected to be impacted by the loss of an ILS if no aircraft were RNAV (LPV) capable.

If all aircraft were RNAV (LPV) capable, then the loss of the ILS would have no impact.

33





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Mexico City

South American (SAM) Office
Lima

ICAO Headquarters
Montreal

Western and Central African (WACAF) Office
Dakar

European and North Atlantic (EUR/NAT) Office
Paris

Middle East (MID) Office
Cairo

Eastern and Southern African (ESAF) Office
Nairobi

Asia and Pacific (APAC) Office
Bangkok

Thank You