International Civil Aviation Organization
South American Regional Office
Fourteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/14) – Regional Project RLA/06/901
(Lima, Peru, 10 to 14 November 2014)

Agenda Item 2: State industry collaborative process for the transition of the current systems in those specified in the ASBU

State industry collaborative process for the transition of the current systems in those specified in the ASBU

(Presented by IATA and RTCA)

SUMMARY

Consistent with the Aviation System Block Upgrade (ASBU) framework, and through the Bogota and Port-of-Spain Declarations, the Civil Aviation Authorities of the SAM and NACC ICAO Regions have committed to mutual and regular collaboration in order to secure the highest practicable degree of uniformity in regulations, standards, procedures and organization for aircraft, personnel, airways and auxiliary services, and any other areas in which uniformity facilitates and improves air navigation.

One of the main challenges to achieve the goals defined in these Declarations is the transition from current systems to the ones specified in the ASBU framework.

The U.S. NextGen program faced these same challenges when it first published its 2025 vision for NextGen. With the assistance of RTCA, the FAA established a government-industry Task Force to define the steps needed to implement NextGen near-term and mid-term operational capabilities. The Task Force stressed the importance of implementing operational capabilities verses technologies, and deriving benefits from existing equipage.

The meeting is invited to review and agree to the Suggested Action of this WP found in Section 3.

REFERENCES:

- Global Air Navigation Plan (ICAO Doc 9750)
- Bogota Declaration
- Port of Spain Declaration
- RTCA NextGen Mid-Term Implementation Task Force
- GREPECAS/17-IP/15 - Presented by Brazil, United States, ALTA, IATA, IFALPA, RTCA

1. Introduction

1.1 The Thirty-eighth Session of the ICAO Assembly approved a new version of the Global Air Navigation Plan, incorporating the Aviation System Block Upgrades (ASBU) framework.

1.1.1 The Aviation System Block Upgrade concept was established with the objective of facilitating worldwide interoperability, harmonization, and modernization of air transportation.

1.1.2 Aviation System Block Upgrades comprise a suite of capabilities, called modules, each having the essential qualities of:

- A clearly-defined measurable operational improvement and success metric;
- Necessary equipment and/or systems in aircraft and on ground along with an operational approval or certification plan;
- Standards and procedures for both airborne and ground systems; and
- A positive business case over a clearly defined period of time.

1.2 In alignment with the ASBU framework, the Civil Aviation Authorities of the SAM and NACC regions have committed to mutual and regular collaboration in order to securing the highest practicable degree of uniformity in regulations, standards, procedures and organization for aircraft, personnel, airways and auxiliary services, and any other areas in which uniformity facilitates and improves air navigation.

1.3 In order to facilitate implementation of these ASBU operational improvements ensure a seamless operation across both Regions and realize their full benefit, all aviation stakeholders must be involved in the process.

2 Discussion

2.1 One of the main challenges to achieve the goals of the Declarations is the inherent issues in transitioning from current systems to the ones specified in the ASBU framework.

2.2 The U.S. NextGen program faced these same challenges when it first published its 2025 vision for NextGen.With the assistance of RTCA, the FAA established a government-industry Task Force to define the steps needed to implement NextGen near-term and mid-term operational capabilities. The Task Force stressed the importance of implementing ***operational capabilities*** verses technologies, and deriving benefits from ***existing equipage***.

2.3 The NextGen Mid-Term Implementation Task Force had over 300 people from over 140 organizations of the aviation community and developed the following strategic framework:

- **"Who":** Identify capabilities for which at least one operator would commit to invest.
- **"Where"**: Identify locations where capabilities would need to be implemented to attract participation of at least one operator.
- **Available Equipage**: Define what avionics are presently available.
  - Identify the performance level of equipage in the current fleet.
- **Procedures:** Identify new processes or changes to existing processes and procedures that could help gain capacity and expedite the transition to NextGen**.**
  - Define deterrents or barriers to said operational use and work to mitigate them.
- **Aircraft:** Identify any airborne equipage that doesn't require complementary ground infrastructure.
- **Leveraging Present Equipage**: Determine how present equipage may be applied for new, beneficial use, focusing primarily on next 3-5 years.

- Is there ground decision support needed?
- Is there any additional training needed for controllers, pilots or dispatchers?
- Are any additional procedures needed?

2.4 Even though the operational environment in the SAM and NACC regions are different in terms of operational requirements, the framework established and processes used by the NMTI Task Force can be easily adapted to facilitate the implementation of ASBU elements in support to the existing regional plans.

2.5 One of the main lessons learned from the RTCA Task Force is the benefit of the government-industry involvement throughout the process.

2.6 This subject was presented at the Seventeenth Meeting of the CAR/SAM Regional Planning and Implementation Group where the meeting agreed that the SAM/IG and ANI/WG regional implementation groups may consider the best options of the proposed framework, approve a coordinated Pan-American approach, and that the suggestion be presented to the PPRC.

3 **Suggested actions:**

3.1 The meeting is invited to:

Agree on the creation of a government-industry taskforce to focus on the following goals:

1. Leverage on the lessons learned from the "NextGen Mid-Term Implementation Task Force" and apply a similar framework to support the task force work;

2. Serve as the mechanism for defining the steps needed to implement near-term and mid-term operational capabilities outlined in the existing Performance-Based Air Navigation Implementation Plans;

3. Report on its results to Programmes and Projects Review Committee (PPRC).

- - - - -

APPENDIX A / APÉNDICE A

A PARTNERSHIP FOR PROGRESS

IN SOUTH AMERICA

IATA - RTCA

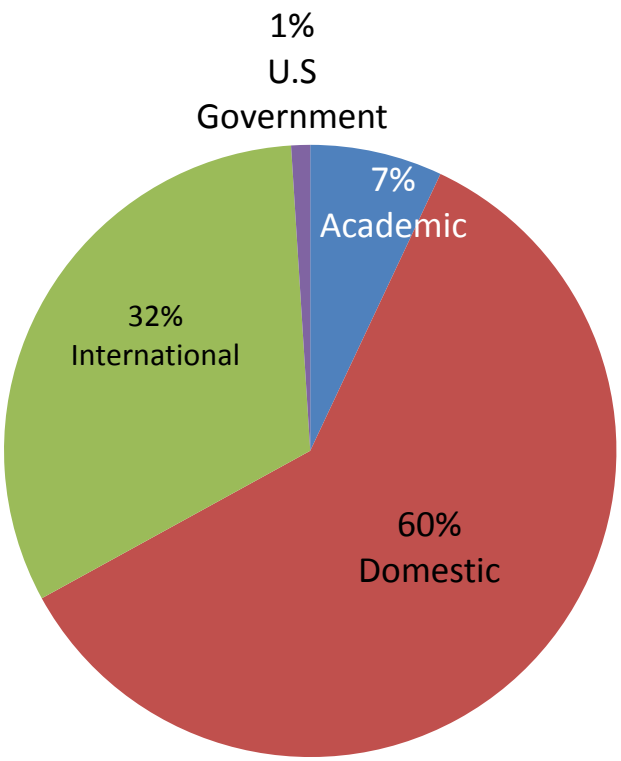
A Partnership for Progress in South America

IATA

RTCA

THE GOLD STANDARD FOR AVIATION SINCE 1935

RTCA:
A Unique Public-Private Partnership



Founded in 1935
Incorporated in 1991

~ 500 Member Organizations

- Academia
- Airports
- Aviation Service Providers & Regulators
- Government Organizations
  - FAA, DOD, TSA, NASA
- Manufacturers (OEMs and After-Market)
- Operators
  - Airlines, GA, Cargo, DOD
- Suppliers
  - Automation, Infrastructure, Avionics
- Labor
  - Pilots, Controllers, Dispatchers
- R&D Organizations

RTCA
THE GOLD STANDARD FOR AVIATION SINCE 1935

IATA

IATA INTERNATIONAL AIR TRANSPORT ASSOCIATION

Global trade association for the world's airlines
240 passenger and cargo carriers
Meeting our members' needs
84% of global air traffic

KEY OBJECTIVES

- Continually improve aviation safety
- Increase value through partnership
- Protect the interests of the industry
- Reduce environmental impact

The Task Force Goals

Globally harmonized … locally tailored

- Requisite Levels Safety and Efficiency
- Seamless Global Air Transportation System
- Timely, Positive Return on Investments

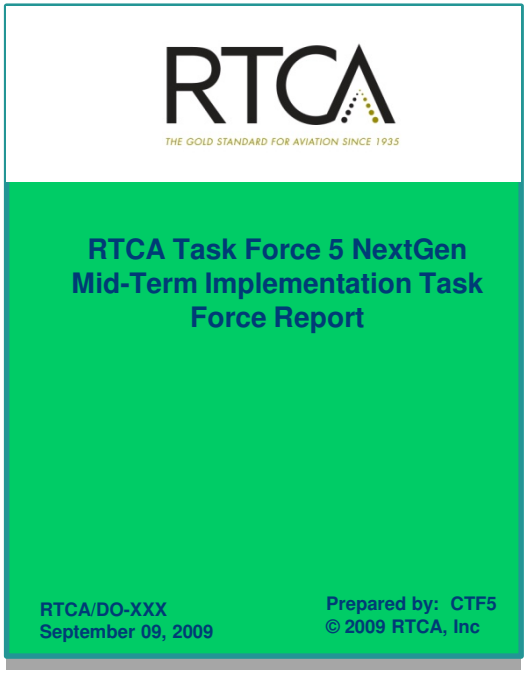
- RTCA Consensus Process Designed to:
  - Facilitate harmonization
  - Encourage innovation
  - Expand marketplace
  - Adapt solutions to local needs

South America Modernization and Harmonization Task Force

- Building on Work Already Done
  - Starts from SAM PBIP
  - Based on ICAO ASBUs
- What's New:
  - Leverage RTCA Consensus Process
  - Operator and Industry Participation
  - Operational Capability-driven
    - Beyond technology to all components required

Leveraging Lessons Learned

- NextGen Began as Technology-driven Transformation
- Influenced by Operators, RTCA TF5 Introduced:
  - Operational Capability more than technology
  - Need to close business case
  - Address all components necessary to deliver benefits
  - Stepwise introduction of capabilities
- FAA Plans Embraced TF5 Input
- "Ops Capabilities" Instantiated in ASBUs
- Investment by ANSP, Regulators & Operators



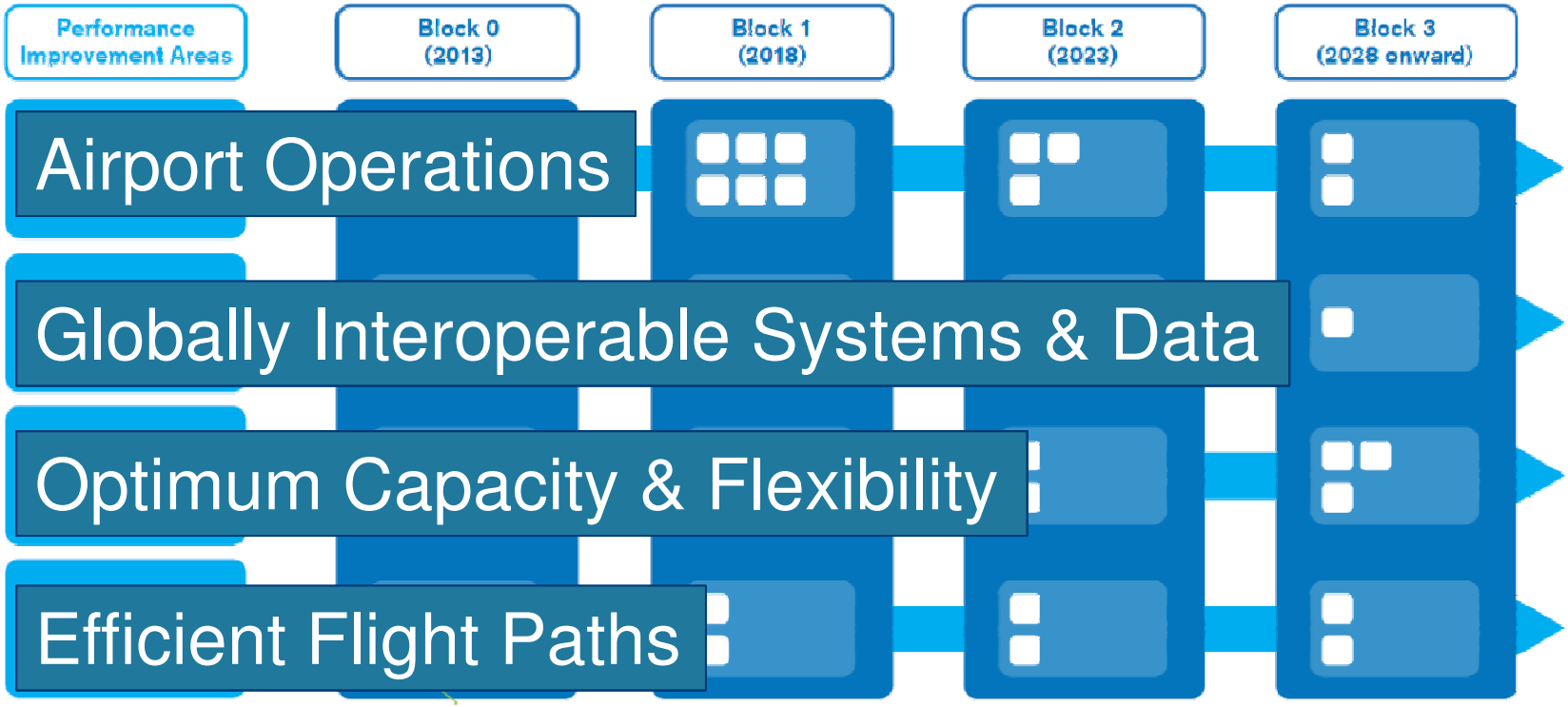
RTCA
THE GOLD STANDARD FOR AVIATION SINCE 1935

Source: ICAO Briefing

IATA

Global Air Navigation Plan (GANP)

Objectives and Priorities



PRIORITIES

- PERFORMANCE BASED NAVIGATION (PBN)
- CONTINUOUS DESCENT AND CLIMB OPERATIONS (CDO/CCO)
- COLLABORATIVE DECISION-MAKING (CDM & A-CDM) & ATFM

NextGen Mid-Term Implementation Task Force Output: *2009 through 2018*

- Prioritized List of Operational Capabilities
  - Defined Benefits
  - Identify All Challenges that Must be Resolved to Achieve Benefits
- Business Case Strategies
  - How to achieve return on investments
  - Operational or financial
- Coordinated Implementation Strategies
  - Institutional mechanism for collaborative planning, implementation and tracking

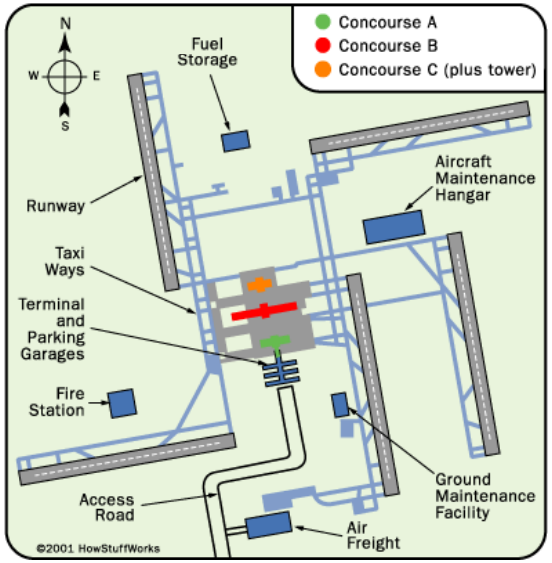
Deploy “Capabilities” not Technology

TECHNOLOGY	CAPABILITY/BENEFITS
DataComm Network	▲ Efficient weather reroutes ▲ Safety ▲ Efficiency ▲ Productivity
Published PBN routes	▲ Efficient routings
CPDLC in ATC Sys	▲ Safety, Efficiency, Productivity
RNP/PBN Routes	De-conflict traffic to/from Airports ▲ Efficiency, ▼ Environment Impact
ADS-B Infrastructure	▼ A/C separation, ▲ Capacity ▲ Efficient Merging & Spacing

Getting to NextGen:

Improve Operations Where Biggest Problems Exist

Improve Surface Operations



SURFACE

Getting to NextGen:

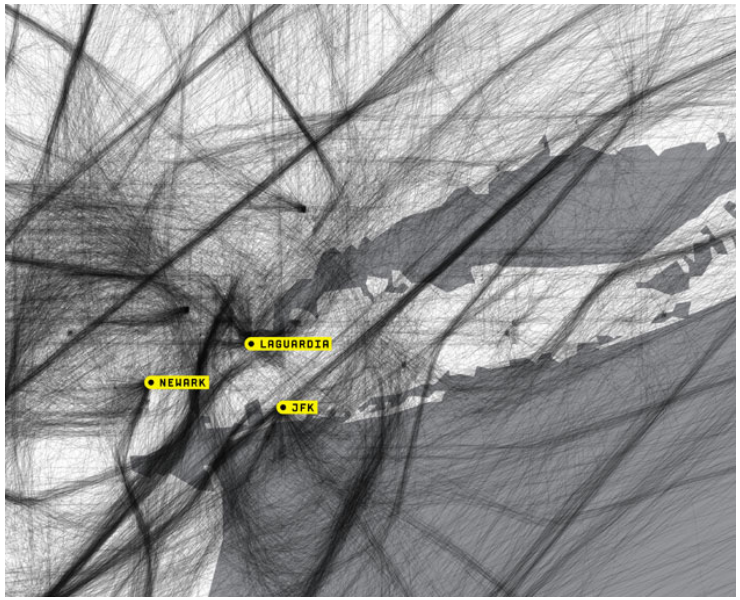
Improve Operations Where Biggest Problems Exist

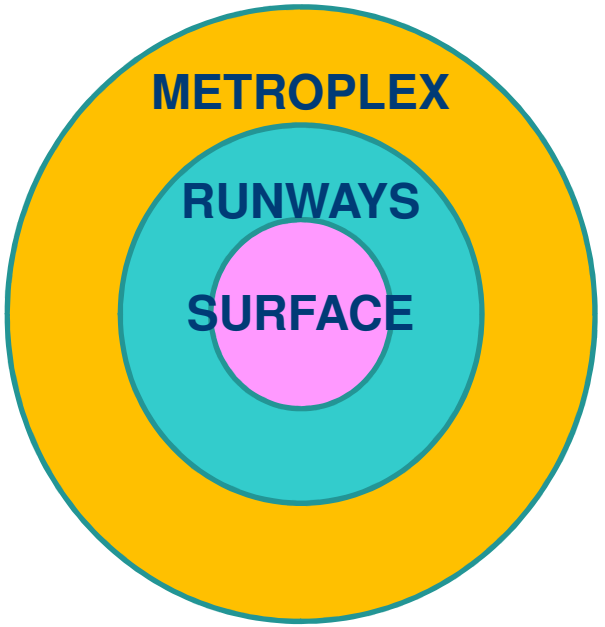
Increase Access to Closely-Spaced Runways

Getting to NextGen:

Improve Operations Where Biggest Problems Exist

De-conflict Operations at Metroplex Airports

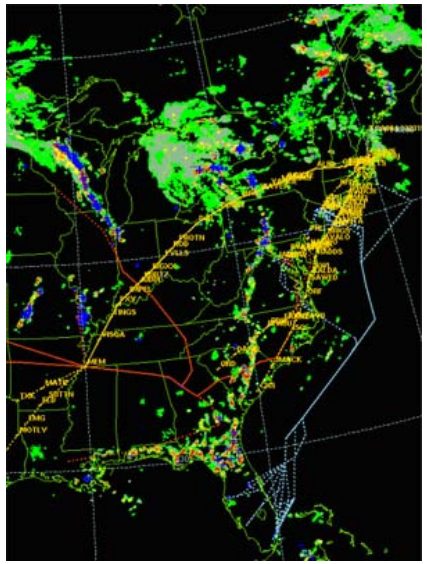


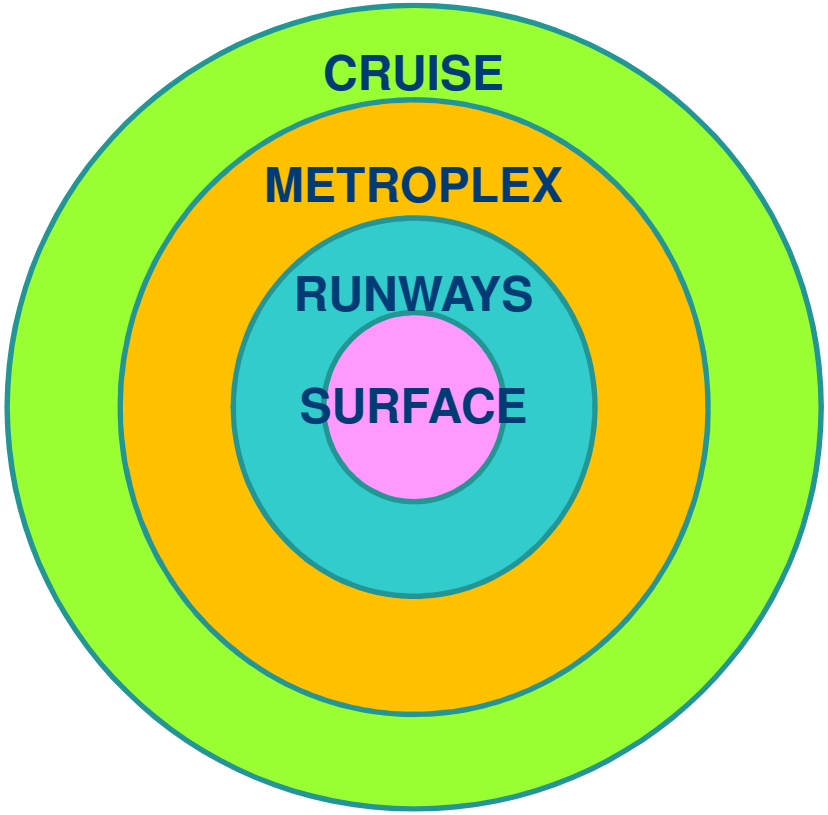


Getting to NextGen:

Improve Operations Where Biggest Problems Exist

Improve Cruise Efficiency

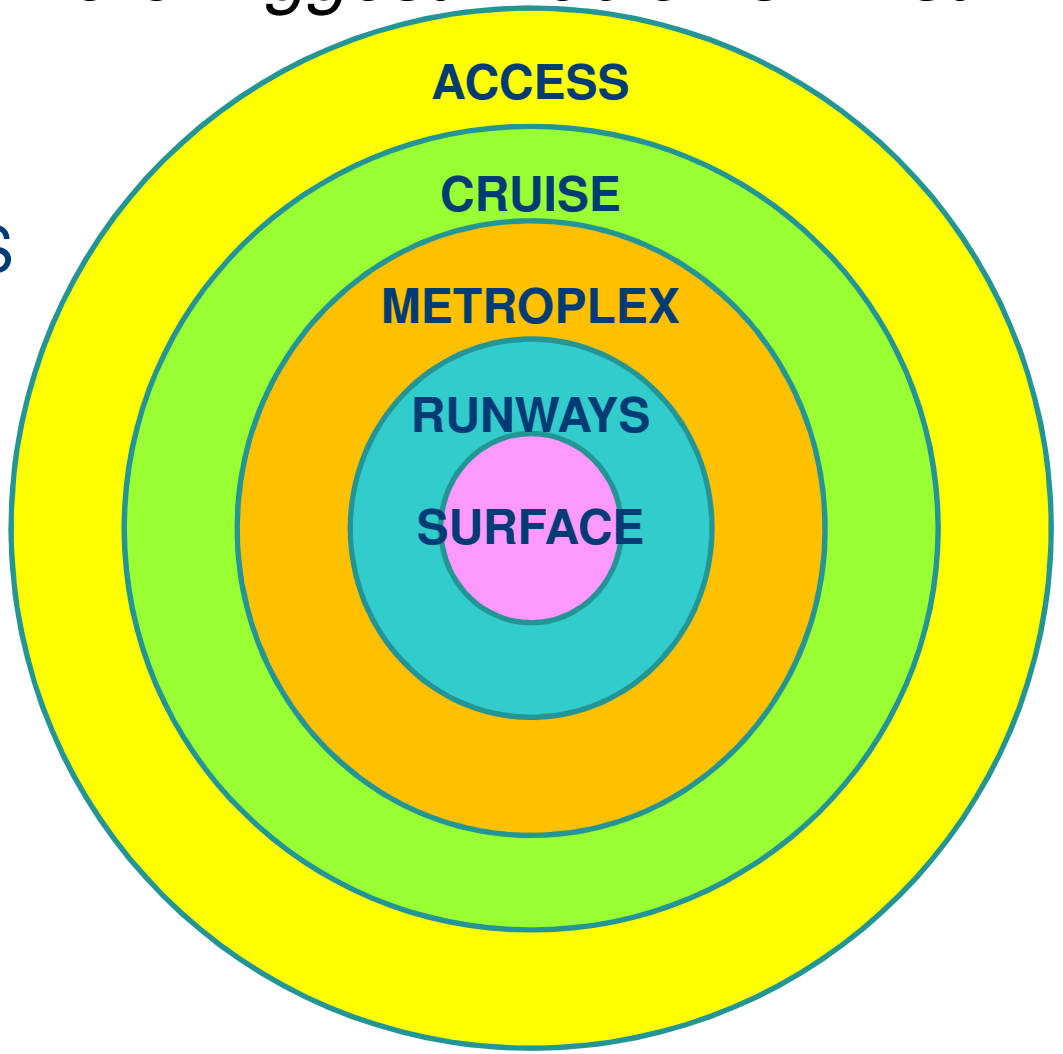




Getting to NextGen:

Improve Operations Where Biggest Problems Exist

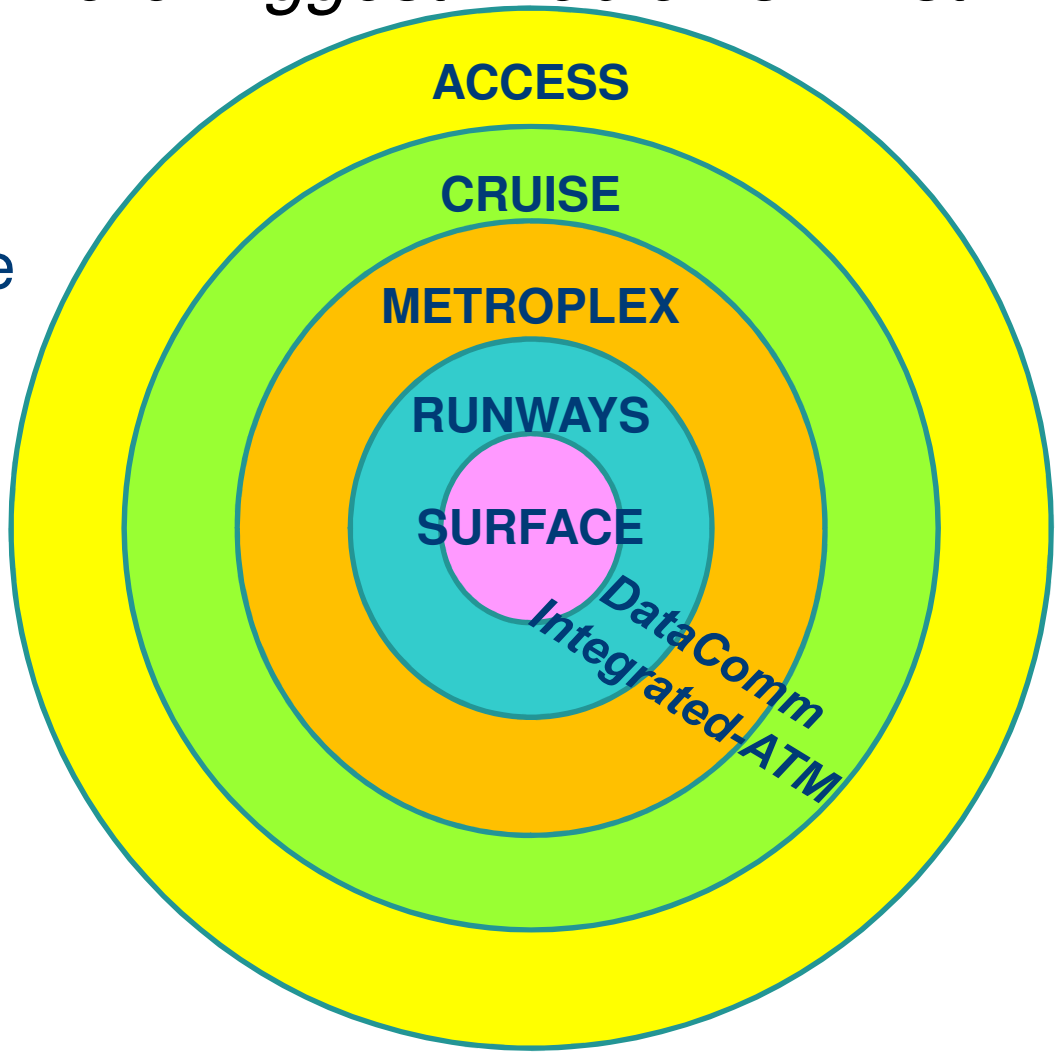
Enhance Access to the NAS



Getting to NextGen:

Improve Operations Where Biggest Problems Exist

- Leverage Current Equipage
- Close Business Case
- Document Commitments
- Plan, Execute & Track Collaboratively



How did 300 People Reach Consensus?

- Everyone's Voice was Heard
- Everyone Agreed on Evaluation Criteria
- Relative Value of All Candidate Capabilities Assessed Using Data-driven Dashboard "Tool"
- Expert Opinion Considered as Necessary
- Not Everyone Got Everything They Wanted

***350** people from **140** organizations identified over **120** possible capabilities, through a consensus process reduced that to a list of **28 capabilities** at specific locations and dates, and produced a report*

Beyond Single FIR

- Seamless Air Transportation
  - (CNS) Aircraft equipage applicable everywhere
  - Procedures
  - ATC, TFM, CDM automation & decision support tools
- Commonality Across Airports
  - e.g., PBN, OPDs
- Interoperable Flight Plans
  - SWIM

Prerequisites for Delivering Benefits

Must address the following elements of each capability:

- Change in roles
- Equipage
- Decision Support Tools
- Policies
- Airspace
- Training
- Automation
- Standards
- Ops Approval; Certification
- Political Risk
- Environmental Issues

For:

- Pilots
- Controllers
- ATC
- TFM
- AOC/FOC

Prerequisites for Delivering Benefits

Must address the following elements of each capability:

- Change in roles
- Equipage
- Decision Support Tools
- Policies
- Airsp
- Train
- Auto
- Stan
- Ops Approval; Certification
- Political Risk
- Environmental Issues

For:

llers

- AOC/FOC

The result becomes basis of integrated implementation plan

Perspectives Vary

Setting Your Priorities

GOALS FOR GANP CAPABILITIES
ACCESS / EQUITY
COST
FLEXIBILITY
PREDICTABILITY
INTEROPERABILITY
SAFETY
ENVIR0NMENT / NOISE
EFFICIENCY
CAPACITY
DELAY

Defining What is Most Important

Example

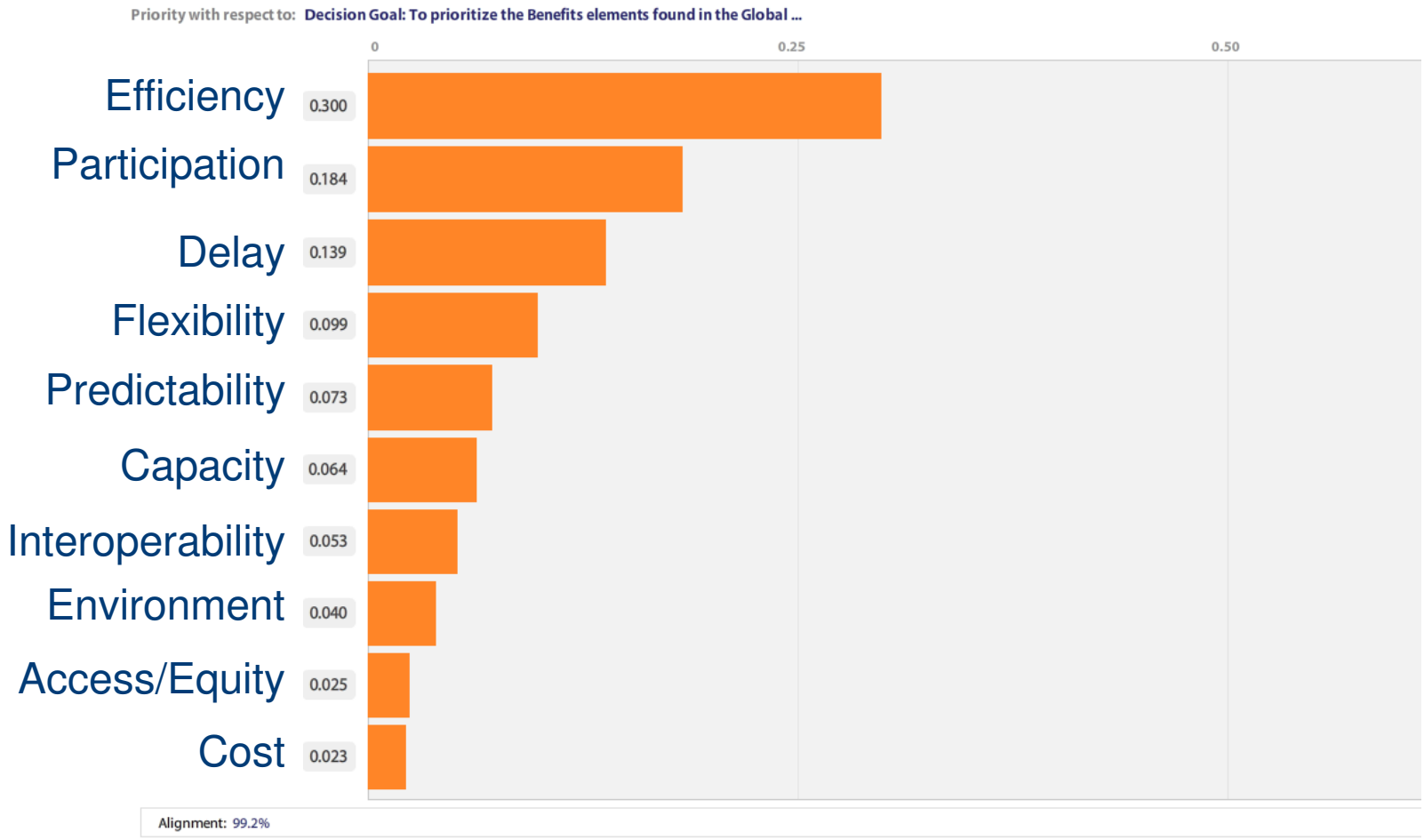
With respect to ASBU module implementation, which is more important?

Access and Equity	OR	Cost

	Extreme		Very Strong		Moderate		Equal		Moderate		Very Strong		Extreme	
Average	8	7	6	5	4	3	**2**	1	2	3	4	5	6	7
Person A	8	7	6	5	**4**	3	2	1	2	3	4	5	6	7
Person B	8	7	6	5	4	3	**2**	1	2	3	4	5	6	7
Person C	8	7	6	5	4	3	**2**	1	2	3	4	5	6	7
Person D	8	7	6	5	4	3	2	1	**2**	**3**	4	5	6	7
~~	8	7	6	5	4	3	2	1	**2**	3	4	5	6	7
Person X	8	7	6	5	4	3	**2**	**1**	2	3	4	5	6	7

Pair-wise comparisons of decision criteria

Results of Sample Criteria Priorities



Task Force Approach ♦Tailored Solutions

- Your Input Needed to Tailor Solution to Local Needs
- Tools & Information Intended to Aid Experts
- Dashboard & Tools Capture and Display
- Enable Sensitivity Analysis
- Dashboard & Tools do not Provide Answers
- RTCA Known for Signature Consensus Process!
- Starting Point to Help You Prioritize and Make Sound Investments to Meet Your Goals

Mapping ICAO ASBU BO/B1 to Benefits, Elements

Global Air Navigation Plan Dashboard - for Block 0

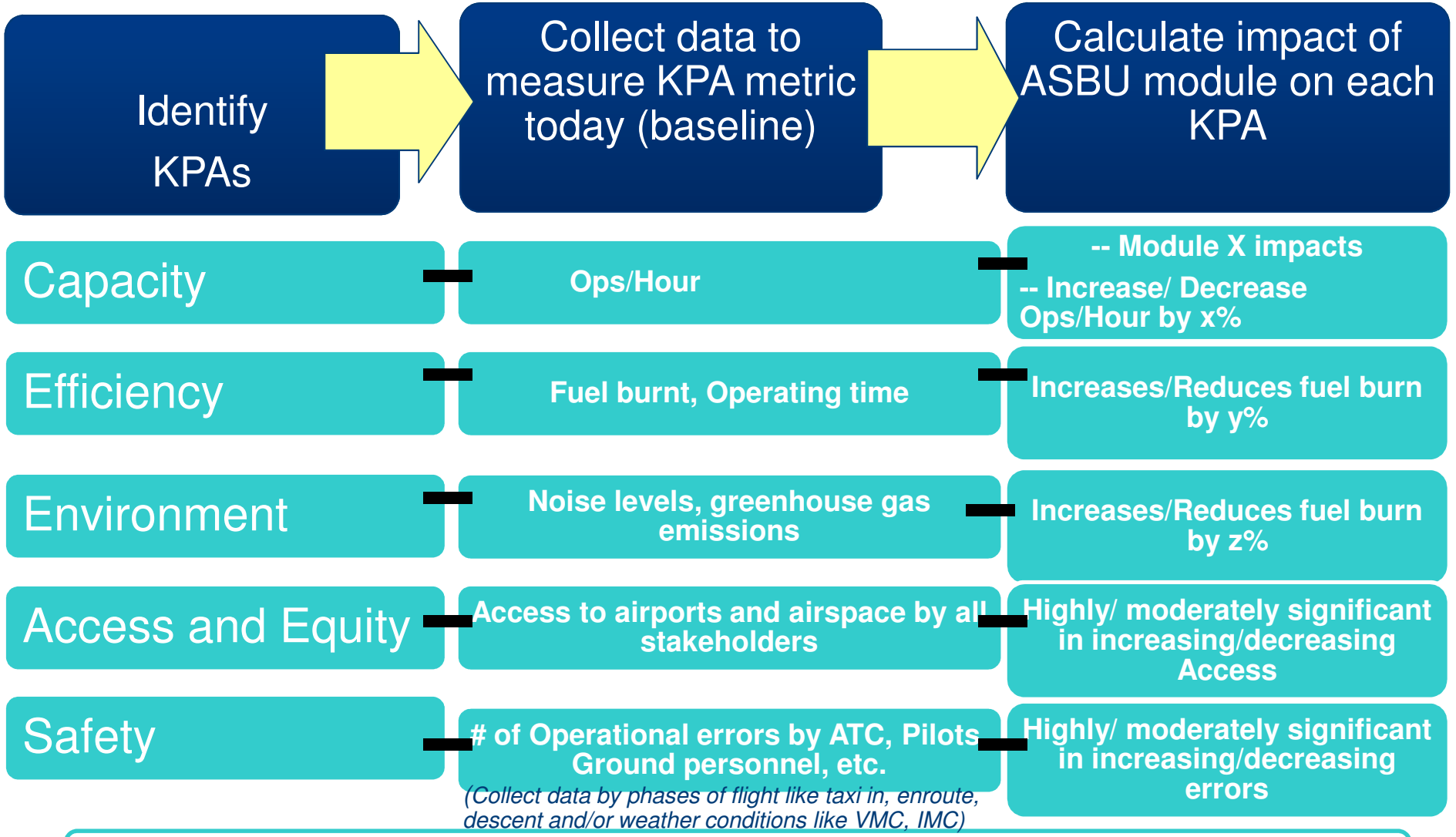
For Legend See "Parameters" Sheet

Module Names (click for Description)	Capacity	Efficiency	Environment	Safety	Interoperability	Predictability	Participation	Flexibility	Acess and Equity	Cost	Assessment Confidence
B0-CDO											
29_OPD	~^	M.	H?	M.	~.	L?		~.	H?	?	
B0-TBO											
16a_DC reroutes (FANS)	H.	H.	L?	H^	H^	M?		M?	M?	?	
16b_DC reroutes (LINK)	H.	H.	L?	H^	H^	M?		M?	M?	?	
17a_Enroute Data Comm (FANS)	H^	H^	~.	H^	H^	M^		M^	M?	?	
17b_Enroute Data Comm (LINK)	H^	H^	~.	H^	H^	M^		M^	M?	?	
BO-CCO											
04_Adjacent Airports	H.	M.	M?	M.	~.	M.		H?	?	?	
29_OPD	~^	M.	H?	M.	~.	L?		~.	H?	?	
32a_RNAV RNP SID & STAR (RNAV only)	H?	M?	L?	~.	~.	L?		L?	~.	?	
32b_RNAV RNP SID & STAR (RNAV & RNP)	H?	M?	L?	~.	~.	L?		L?	~.	?	

Steps

- ✓ Review SAM PBIP
- ✓ Identify biggest challenges for Region
- ✓ Framework of Final Product
- ✓ Update Mapping of ASBU B0/B1 Modules to benefits & “elements” necessary to deliver benefits
- ✓ Agreement on stakeholders to participate in TF
- ✓ Solicit TF participation
- ✓ Identify data needs; Commitment to supply
- ✓ Schedule and Resources

Identify and collect data



Other basic data includes:

Fleet types and counts; Current aircraft equipage: CNS; Airports/runways configuration; Traffic: aircraft and passenger, airports & key city pair flows

TF Steps

Nov 2014

- Kickoff
- Review inputs and assumptions
- Report framework
- Stakeholders on TF
- Data needs, commitments to supply
- Agree on target date for harmonized systems (2020?)

- List of participants
- Data to RTCA
- RTCA analysis

Report Framework and Outline

Mar 2015

- Kickoff with industry
- Validate SAM PBIP; update as necessary
- Data needs from industry
- Agree on performance metrics

- Industry data to RTCA
- Continued analysis

Jun 2015

- Identify challenges, elements
- Identify locations and capabilities

- …

Oct 2015

- Continue filling in elements

- …

SA M&H TF Report

DRAFT

Dec 2015

- Review draft report

- Review and comment on draft report

Early 2016

- Review all comments and suggested resolutions

- Produce final report

SA M&H TF Report

Stakeholders

Stakeholder Groups	
Academic	Dispatchers
Airframers	General Aviation
Airlines	ICAO
Airports	Military
ANSPs	Other
Associations	Pilots
Aviation Information	Regional Aviation
Business Aviation	Regulatory Organizations
Comm Providers	Standards
Consultants	Training
Controllers	Weather

RTCA

THE GOLD STANDARD FOR AVIATION SINCE 1935

Join the Consensus

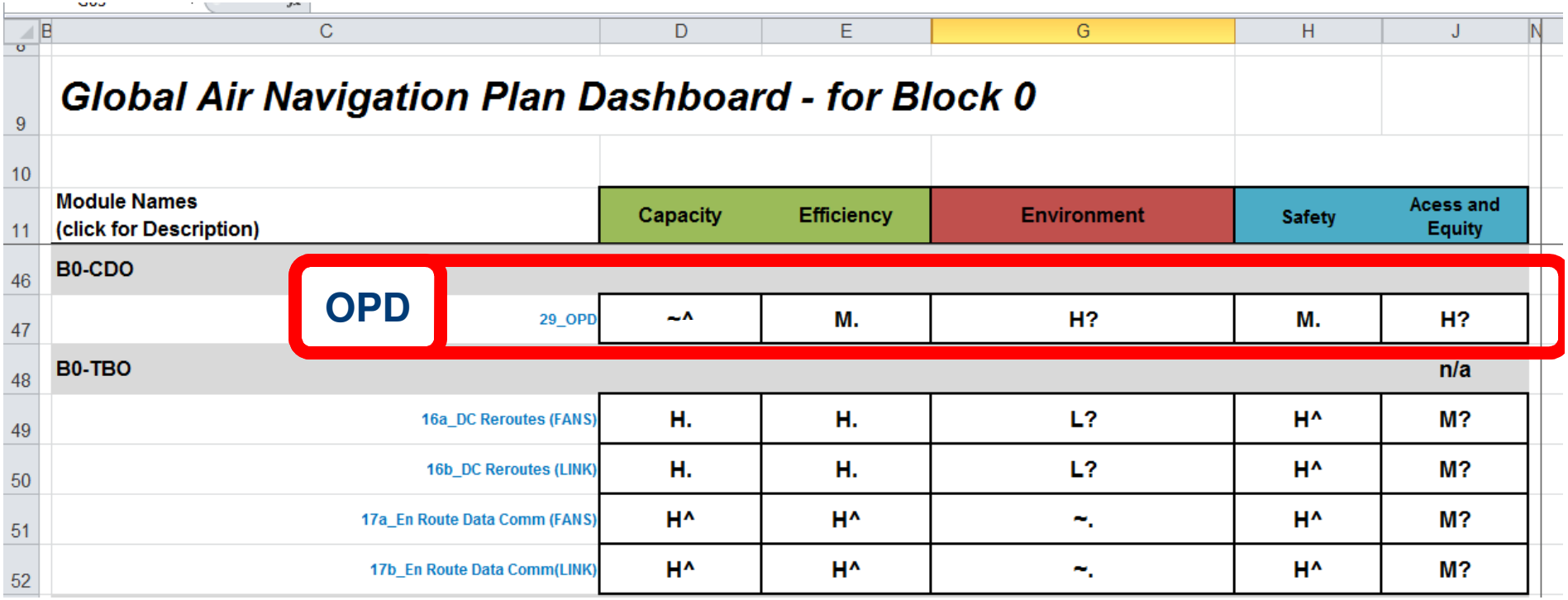
IATA

www.rtca.org

www.iata.org

BACKUP

Sample Dashboard



Global Air Navigation Plan Dashboard - for Block 0

Module Names (click for Description)	Capacity	Efficiency	Environment	Safety	Acess and Equity
B0-CDO					
29_OPD	~^	M.	H?	M.	H?
B0-TBO					n/a
16a_DC Reroutes (FANS)	H.	H.	L?	H^	M?
16b_DC Reroutes (LINK)	H.	H.	L?	H^	M?
17a_En Route Data Comm (FANS)	H^	H^	~.	H^	M?
17b_En Route Data Comm(LINK)	H^	H^	~.	H^	M?

OPD

Example Dashboard Navigation: Optimal Profile Descents

NextGen Dashboard - for Mid-Term Implementation (9/8/09)						For Legend See "Parameters" Sheet
Capability Name (click for Description)	**Timeframe**	**Benefit**	**Readiness**	**Implementation Risk Resolution**	**Other Consideration Resolution**	**Assessment Confidence**
27_Non-radar GOMEX	2012-2020	H^	M^	M.	M.	Medium
28_Non-radar Low Altitude	2010-2018	H^	L^	L^	M.	High
29_OPD	2010-2012	M.	M^	M.	M^	Medium
30_Q&T Routes	2012-2013	H^	M^	H^	M^	High
32a_RNAV RNP SID & STAR (RNAV only)	2010-2012	H?	M^	M^	M^	Low

Dashboard Navigation: Capability Description and Link to Unique Capabilities

Elements Analysis:																	
	Change in Roles	Technology/Equipage Required	Technology/Equipage Available?	Decision Support Tools Required	Need Policy	Need Procedures	Implementation Bandwidth	Need Airspace Changes	Standards Required?	Ops Approval Required	Cert Required	Political Risk	Links to Planning Documents	Training	Other Challenges	Environmental	Safety
Pilot/Operator	No role changes.	None	Yes	None	Designed for public use. LOAs should be addressed if OPD benefits are sought.	Yes	Yes	Yes depending on the profile developed and current airspace.	Yes with AC 90-100A	No	No	Environmental. SMS	NGIP	No			
ATC	STAR: No. LOAs would need to be addressed to facilitate. TA: Yes. ATC will need to transmit via datalink. Training in the software would be needed as well.	None. Enhanced TMA operations would assist in spacing/merging prior to TOD	Yes	ATC training on OPD operations to assist understanding of these types of operations in a daily environment to assist in design.	LOAs should be addressed if OPD benefits are sought.	Yes	Yes	Yes depending on the profile developed and current airspace. LOAs should be addressed if OPD benefits are sought.	Yes with AC 90-100A	No	No	Environmental. SMS. LOAs should be addressed if OPD benefits are sought.	NGIP	No		LOAs should be addressed if OPD benefits are sought.	

Example Dashboard Navigation: Optimal Profile Descents

NextGen Dashboard - for Mid-Term Implementation (9/8/09)						For Legend See "Parameters" Sheet
Capability Name (click for Description)	Timeframe	Benefit	Readiness	Implementation Risk Resolution	Other Consideration Resolution	Assessment Confidence
27_Non-radar GOMEX	2012-2020	H^	M^	M.	M.	Medium
28_Non-radar Low Altitude	2010-2018	H^	L^	L^	M.	High
29_OPD	2010-2012	M.	M^	M.	M^	Medium
30_Q&T Routes	2012-2013	H^	M^	H^	M^	High
32a_RNAV RNP SID & STAR (RNAV only)	2010-2012	H?	M^	M^	M^	Low

OPD Example: Overall Benefit Scores

<== Return to Top <==

Capability Name (click for Description)	Benefit		Operator					System/Society				General (Nor		
				Capacity	Efficiency	Predictability	Operator Productivity		ANSP Productivity	Less Enviro Impact	Less Pax Delay		Access	Resource Utilization
18_En route Parallel Offsets	M.		M.	M.	M?	M?	?	L?	~^	~^	L?	M?	~^	L?
19_GBAS TAP	L?		L?	L?	L?	L?	?	L?	~^	L?	~.	L?	L?	~^
20a_GLS	H.		H.	H.	M.	M.	?	M.	L?	~.	M.	M.	M.	?
20ab_GLS	H.		H.	H.	M.	M.	?	M.	L?	~.	M.	M.	M.	?
20b_GLS	H.		H.	H.	M.	M.	?	M.	L?	~.	M.	M.	M.	?
20c_GLS	H.		H.	H.	M.	M.	?	M.	L?	~.	M.	M.	M.	?
21_Integrated Arrival/Departure Airspace (aka Big Airspace)	H^		H^	H^	H^	M?	?	H^	H^	M?	H^	H?	~^	H?
22_LPV	H^		H^	H^	M?	M?	?	M?	~^	M?	?	H^	H^	~^
23_MMS FDMS, Interval Management	H^		L.	L.	L?	L?	?	H^	~.	H^	L?	L^	~.	L?
24_MMS NT TMA RPI	~^		?	~^	~^	~^	?	~^	~^	~^	?	~^	~^	~^
25_Metering, Merging, Spacing Utilizing Required Time of Arrival (RTA)	H^		H^	L.	L?	H^	?	L.	L.	L?	L?	M.	~.	M.
26_MVMC_IMC_CAS	M.		M.	M.	L?	H?	?	M.	~^	M.	?	H?	~^	~^
27_Non-radar GOMEX	H^		H^	H^	H.	H^	?	M?	M?	~^	?	M.	M.	~^
28_Non-radar Low Altitude	H^		H^	H^	H?	M.	?	L?	L?	~^	?	H?	M?	~
29_OPD	M.		M.	~^	M.	L?	?	H?	L?	H?	M?	M.	H?	~.

OPD: Detailed Assessment Comments

3.1.2	Efficiency		
3.1.2.1	Fuel Use	M.	(-1%-3%):
Different aircraft types vary in fuel savings from 300 – 500lbs per flight. Reference: NWA trials; MITRE analysis for PHX has also analyzed benefits			
3.1.2.2	Block Time Length	L?	(-<.5%):
3.1.2.3	Flight Operating Time	M.	(-4%-7%): Current programs show reduction in flight time of ~2 ½ minutes per flight
3.1.2.4	Taxi Operating Time		

Performance Data - Capacity

- Sub-factor 1: Changes to Airport Visual Operations Throughput - Ops / Hour
- Sub-factor 2: Changes to the Capacity of General Airspace Categories - Ops / Hour
- Sub-factor 3: Changes to the Capacity of Congested Airspace - Ops / Hour
- Sub-factor 4: Changes in Airspace Capacity during Adverse Weather Meteorological Conditions - Ops / Hour
- Sub-factor 5: Changes to Airport Capacity During Adverse Meteorological Conditions - Ops / Hour

H	High Benefit	The increase in throughput is 7 to 10 percent.
M	Medium Benefit	The increase in throughput is 4 to 7 percent.
L	Low Benefit	The increase in throughput is 2 to 4 percent.
~	Negligible Benefit or Not Applicable	The change in throughput is within 2 percent (i.e., (+) or (-)) 2 percent.
N	Minor negative benefit	The reduction in throughput is 2 to 4 percent...
!	Significant negative benefit	The reduction in throughput exceeds 4 percent.

Performance Data - Efficiency

- Sub-factor 1: Fuel Use - Kilograms by phase of flight
- Sub-factor 2: Scheduled Block Time Length – Time by phase of flight (Predictability metric)
- Sub-factor 3: Flight Operating Time – Time by phase of flight
- Sub-factor 4: Taxi Operating Time – Time by phase of flight

		Fuel Use	**Time**
H	High Benefit	The reduction in fuel used is 3 to 10 percent.	The reduction in operating time is 7 to 10 percent.
M	Medium Benefit	The reduction in fuel used is 1 to 3 percent.	The reduction in operating time is 4 to 7 percent.
L	Low Benefit	The reduction in fuel used is 0.3 to 1 percent.	The reduction in operating time is 2 to 4 percent.
~	Negligible Benefit or Not Applicable	The change in fuel used is within (i.e., (+) or (-)) 0.3 percent.	The change in operating time is within (i.e., (+) or (-)) 2 percent.
N	Minor negative benefit	The increase in fuel used is 0.3 to 1 percent.	The increase in operating time is 2 to 4 percent.
!	Significant negative benefit	The increase in fuel used exceeds 1 percent.	The increase in operating time exceeds 4 percent.

Performance Data - Environment

- Sub-factor 1: Noise - Population/Land exposed to over 65 DNL, Number of flights under 10000 ft
- Sub-factor 2: Greenhouse Gas Emissions - Co/Co2 ton emission/phase of flight (over and under tropopause) / Operation
- Sub-factor 3: Local Criteria-Pollutant Emissions - Particulate ton/year

		Noise	Greenhouse gas Emissions	Pollutant Emissions
H	High Benefit	3-10% reduction to 65 DNL contour areas or to persons impacted	Reduction in greenhouse gas emissions from 3-10%.	A reduction in particulates from +10-30%
M	Medium Benefit	1-3% reduction to 65 DNL contour area or to persons impacted	Reduction in greenhouse gas emissions from 1 to 3%.	A reduction in particulates from +3-10%
L	Low Benefit			
~	Negligible Benefit or Not Applicable	+/- 0.3 % change to 65 DNL contour area or to persons impacted	No (or negligible) change to greenhouse gas emissions	Neutral: negligible change: +1-3%
N	Minor negative benefit	>0.3% increase to 65 DNL contour area or to persons impacted	An increase in greenhouse gas emissions from 0.3-1%	An increase in particulates
!	Significant negative benefit		An increase in gas emissions over 1%	

Performance Data – Access and Equity

- Sub-factor 1: General Access to airspace or airports
- Sub-factor 2: VFR Access to Services and Airspace
- Sub-factor 3: IFR Access to Services and Airspace
- Sub-factor 4: IFR Access in Low Visibility and Ceiling Conditions
- Sub-factor 5: Equitable Allocation of Limited Service Provider Resources

H	High Benefit	*Significantly* increases access for stakeholder without requiring any new airport infrastructure or aircraft equipage investment.
M	Medium Benefit	*Moderately* increases access from current level for stakeholder with additional airport infrastructure or aircraft equipage investment. Aircraft equipage retrofits and airport infrastructure changes are technically, politically, and financially feasible and scaled to the level of anticipated benefits.
L	Low Benefit	Increases access from current level for stakeholder with additional airport infrastructure or feasible and retrofitable aircraft equipage investment. Aircraft equipage retrofits and airport infrastructure changes are technically, politically, and financially feasible.
~	Negligible Benefit or Not Applicable	Does not reduce access from current level for stakeholder or require any new airport infrastructure or aircraft equipage investment to maintain current access.
N	Minor negative benefit	Requires additional aircraft equipage or additional airport infrastructure to maintain current access. Aircraft equipage retrofits and airport infrastructure changes are technically, politically, and financially feasible stakeholder receives no benefits from this equipage or infrastructure other than maintaining current access.
!	Significant negative benefit	Reduces access from current levels for stakeholder regardless of equipage. Includes cases where mitigating aircraft equipage may be available but not retrofitable or mitigating airport infrastructure changes may not be technically, politically, or financially feasible. Reduction in number of airports with the infrastructure to mitigate the proposed access constraints is a major negative.

Performance Data – Safety

- Sub-factor 1: Reduction in Operational errors (OEs) by Ground Personnel
- Sub-factor 2: Reduction in Pilot Deviations
- Sub-factor 3: Reduction in Flight Crew–Controller Communication Errors
- Sub-factor 4: Reduction in Controller Workload
- Sub-factor 5: Reduction in Flight Crew Workload

		Errors	**Workload**
H	High Benefit	Operational capability decreases the number and severity of controller operational errors by more than 4%.	Operational capability reduces the flight crew workload by more than 20%.
M	Medium Benefit	Operational capability decreases the number and severity of controller operational errors by 3%-4%.	Operational capability reduces the flight crew workload by 10% - 20%.
L	Low Benefit	Operational capability decreases the number and severity of controller operational errors by 2% - 3%.	Operational capability reduces the flight crew workload by 3% - 10%.
~	Negligible Benefit or Not Applicable	Operational capability does not improve the number or reduce the severity of controller operational errors by more than 1%.	Operational capability does not reduce the flight crew workload by more than 3%.

Basic Data – Other

- Fleet types and counts
- Current Aircraft equipage
  - Communications, Navigation, Surveillance
- Airports/runways configuration
- Traffic – aircraft and passenger
  - Airports
  - Key City Pair flows

NextGen TF: Delivering Operational Capabilities

What, Where, Who, When, Why, How (W5H)