



NextGen/SESAR

**A look at how ICAO is integrating these programmes
into the Global ATM System**

H.V. SUDARSHAN
International Civil Aviation Organization

**Workshop on the development of
National Performance Framework for
Air Navigation Systems
(Nairobi, 6-10 December 2010)**

Presentation Outline

- Introduction to the Presentation
- Standards Roundtable Meeting #1
- NextGen-SESAR Gap Analysis
- Results of Gap Analysis
- The Challenge Ahead
- Standards Roundtable Meeting #2
- Priorities for Standardisation
- New Method of Working
- Next Steps
- Conclusion

Act One:

→ NextGen-SESAR Gap Analysis

The ICAO NextGen-SESAR Gap Analysis was an important step taken by ICAO to determine the scope of the standardization task ahead and ensure that the advances of NextGen and SESAR are transferable to and compatible with the global civil aviation system.

Act One:

- In addition to the Gap Analysis, ICAO has been engaged in other activities to ensure that NextGen and SESAR are well integrated into the global ATM system.*
- The most significant being the Standards Roundtable Meetings held in Montreal.*

Lets go back a little

Assembly
Resolution
36-13

Informal
Standards
Roundtable
Meeting #1

#1

Standards
Roundtable
Meeting #2

Standards
Roundtable
Meeting #3

October 2008

June 2010

Forum on
NextGen-
SESAR
Harmonisation

ICAO
NextGen-
SESAR Gap
Analysis

October 2009

#2

Standards Roundtable #1

- Assembly Resolution 36-13, the driver.

Assembly Resolution A36-13 Appendix A, Item 4 resolves that:

“In the development of SARPs, procedures and guidance material, ICAO should utilize to the maximum extent appropriate and subject to the adequacy of a verification and validation process, the work of other recognized standards-making organizations.”

This was a response to the fact that, *“with the introduction of complex, digital aeronautical systems, increasing complexity has led to increasingly large Standards and Recommended Practices (SARPs)”*.

Standards Roundtable #1 (cont'd)

- ❑ An informal meeting, held after the ICAO “Forum on the Integration and Harmonization of NextGen and SESAR into the Global ATM Framework”.
 - ❑ Participating were;
 - *FAA, EUROCONTROL and a number of Industry Standards-making organizations.*
 - ❑ The Reason;
 - *To discuss ways to work more cooperatively in order to meet the challenges of NextGen and SESAR in the global ATM environment.*
 - ❑ Items Discussed:
 - *Document sharing – tentative agreement reached;*
 - *Coordination of standards activities – acknowledged need.*
- ⇒ *Now lets look at the NextGen-SESAR Gap Analysis.*

NextGen/SESAR Gap Analysis

Why?

- The NextGen and SESAR programmes are **HUGE** and have aggressive schedules.
- Both aim to be compliant with the Global Air Navigation Plan.

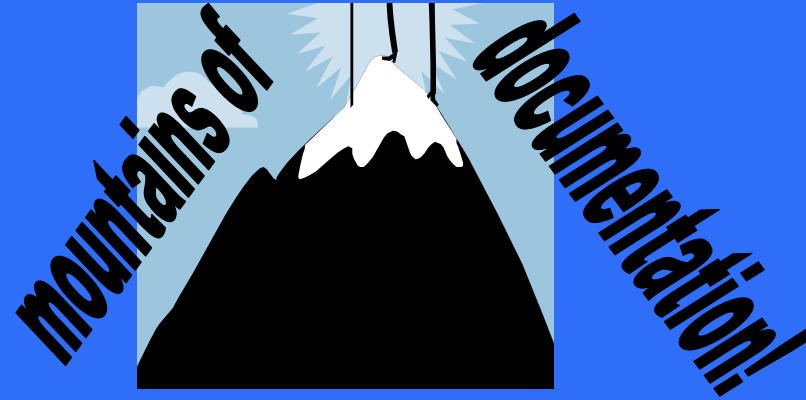
But will they be compatible with each other and the rest of the world??

ICAO's role is to ensure that they are.

The Challenge

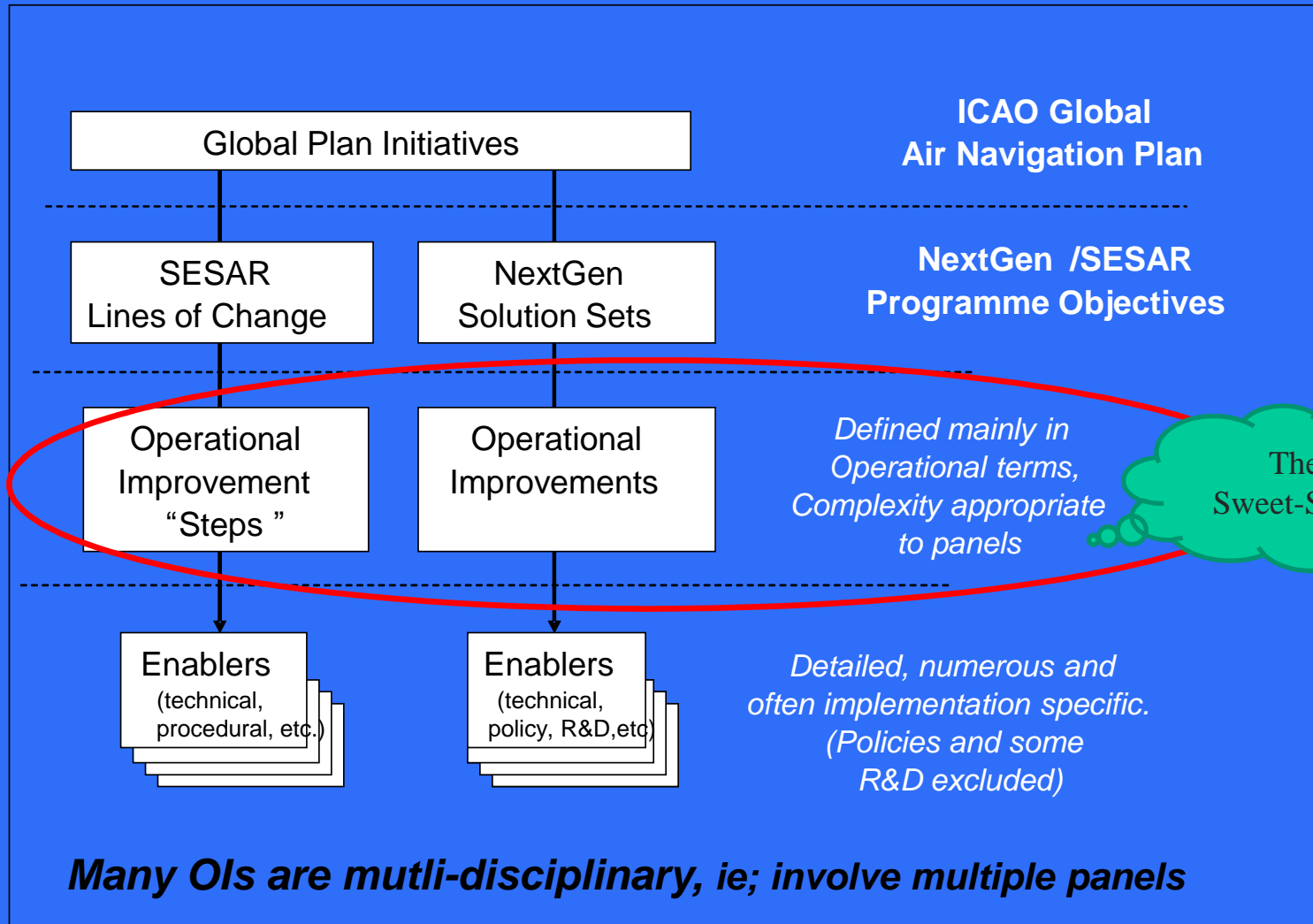
- ICAO is faced with a massive standardization task.
 - *Complicated by the need for global harmonization.*
- The solution:
 - *To plan ahead and anticipate upcoming work;*
 - *Identify key focus areas; and*
 - *Plan resource requirements now.*
- The first step:
 - *NextGen-SESAR Gap Analysis*

What did we know about NextGen and SESAR?



- We have
- SESAR – Master Plan + 6 volumes
 - » Supported by dozens of documents.
- NextGen – Seven Volumes
- Each Program:
 - 100+ Operational Improvements
 - Hundreds of enablers: policy, technology, procedures.
 - Document outlining requirements for Standards Development.

How did we make sense of it??



The Approach Taken

Team surveyed relevant ICAO entities for an evaluation of the work required by ICAO on each and every SESAR/NextGen Operational Improvement.

- Using a database to distribute information and collect responses;
and*
- face-to-face Q/A sessions.*

Sample Survey Entry Form

Microsoft Access - [Annex 10 NextGen OI's]

Type a question for help

File Edit View Insert Format Records Tools Window Help

Operational Improvement: OI-0316

Title: Enhanced Visual Separation for Successive Approaches

Initial Operational Capability: 2012

Full Operational Capability:

Description

This Operational Improvement (OI) increases runway throughput in low ceiling and visibility conditions by allowing an aircraft to augment out-the-window visual separation information with onboard traffic display information on a visual approach. After establishing initial visual contact, the aircraft can continue a visual approach while traversing a light cloud layer, using the onboard traffic display briefly to augment situational awareness until visual contact is reestablished. The flight crew is responsible for safe wake separation during augmented visual approaches. This OI enables Visual Meteorological Condition (VMC) runway capacity levels to be achieved in marginal VMC for single, parallel and converging runways.

Actions to Annex: New Technology, New Procedures, Affects Aircraft from Other States

Reasons for Actions: New Technology, New Procedures, Affects Aircraft from Other States

Other Documents: PANS-OPS

Other Issues: Cockpit Displays of Traffic Information (CDTI's) currently not sufficiently covered by ICAO SARP's or GM's

Already Covered by ICAO Activity:

Comments/Analyses

Comment by: VM **Date:** **Data Identifier:** OI-0316 **Reference Annex #:** 10

Comment

Technology to support the traffic display level 2, is already available (i.e TCAS, ADS-B) however the cockpit traffic display device itself does not seem to be covered by any ICAO documents thus far. This does not belong in Annex 10 but would need to be covered by another annex.

Additional Information:

Annexes impacted by

OI-0316	1	<input type="checkbox"/>	7	<input type="checkbox"/>	13	<input type="checkbox"/>
	2	<input checked="" type="checkbox"/>	8	<input checked="" type="checkbox"/>	14	<input type="checkbox"/>
	3	<input type="checkbox"/>	9	<input type="checkbox"/>	15	<input type="checkbox"/>
	4	<input type="checkbox"/>	10	<input checked="" type="checkbox"/>	16	<input type="checkbox"/>
	5	<input type="checkbox"/>	11	<input checked="" type="checkbox"/>	17	<input type="checkbox"/>
	6	<input checked="" type="checkbox"/>	12	<input type="checkbox"/>	18	<input type="checkbox"/>

OI Enablers

Enabler 1: <http://ie.ipdo.gov/ee/request/elementForm?id=456305>

Enabler 2: <http://ie.ipdo.gov/ee/request/elementForm?id=456306>

Enabler 3: <http://ie.ipdo.gov/ee/request/elementForm?id=455887>

Enabler 4:

Enabler 5:

Enabler 6:

Enabler 7:

Enabler 8:

Enabler 9:

Enabler 10:

Enabler 11:

Enabler 12:

Enabler 13:

Enabler 14:

Enabler 15:

Record: 1 of 1

Record: 1 of 46

Form View

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Gap Analysis - Results

Over 1500 entries considered and analysed.

- Two categories of result:
 - Clearly defined work:
 - *Affected panels, study groups, documents and schedule clearly defined.*
 - *150+ of these.*
 - Items for Further Evaluation:
 - *Of too complex for simple review*
 - *Concepts behind improvement needed further development*
 - *120+ of these.*

Results Dashboard

NextGen-SESAR Dashboard

Operational Improvement View																																			
Year	CI-0304	CI-0310	CI-0316	CI-0320	CI-0344	CI-0352	CI-0400	CI-2010	CI-2020	AO-0202	AO-0203	AO-0204	AO-0206	AO-0301	AO-0502	AO-0503	ADM-0101	ADM-0203	ADM-0301	ADM-0504	ADM-0602	ADM-0801	AJO-0304	CM-0101	CM-0102	CM-0803	DCB-0102	DCB-0201	DCB-0203	DCB-0204	DCB-0205				
2010																																		31	
2011																																		10	
2012																																		17	
2013																																		5	
2014																																		14	
2015																																		12	
2016																																		2	
2017																																		11	
2018																																		1	
2019																																		5	
2020																																		4	
2021																																		2	
2022																																		6	
2023																																			120

NextGen OI-0322: Low Visibility Surface Operations Documents
 Doc 9849 and others TBD. R-ANPs
Panels/Groups
 ASP; ANP; ATMRPP, OPLINKP, PIRGS
Notes:
 A-SMGCS is already in place, ATMRPP to evaluate other tools. OPLINK also involved. ASP already has this underway for completion by 2013. ANP also working on this. Determination on work to be done by 2014 with commencement at that time.

NextGen-SESAR Dashboard (Actuals)

Operational Improvement View																																											
Year	CI-0309	CI-0311	CI-0316	CI-0320	CI-0344	CI-0350	CI-4101	CI-4106	CI-4014	CI-4017	AO-0104	AO-0301	AO-0302	AO-0303	AO-0402	AO-0403	AO-0501	AO-0502	AO-0503	AO-0504	AO-0505	ADM-0101	ADM-0203	ADM-0301	ADM-0504	ADM-0602	ADM-0801	AJO-0304	CM-0101	CM-0102	CM-0801	CM-0803	DCB-0102	DCB-0201	DCB-0203	DCB-0204	DCB-0205	DCB-0302					
2010																																											40
2011																																											29
2012																																											10
2013																																											16
2014																																											17
2015																																										5	
2016																																										3	
2017																																										1	
2018																																										2	
2019																																										2	
2020																																										2	
2021																																										2	
2022																																										150	

NEXTGEN OI-0316: Enhanced Visual Separation for Successive Approaches Documents:
 Annex 10; Annex 2; PANS-ATM; Regional SUPPS, R-ANPs
Panels/Groups
 ASP, others TBD, PIRGS, OPSP
Notes:
 Work Needed: Work is in progress with ASP however prioritization needs to be given to the group; Changes to VMC visibility and cloud minima for Annex 2; procedures for arriving aircraft in PANS-ATM, regional procedures in Doc 7030. Update to all weather Operations Doc 9906-1. Also R-ANPs to cover equipment. Who will do work on Annex 2 and Doc 9906. Needs to commence now.

Clearly Identified Document Changes

319 Identified changes

Unspecified Guidance Material	17	Doc 7030	9	Annex 1	2
PANS-ATM	100	Doc 8126	23	Annex 2	1
PANS-OPS	28	Doc 8168	2	Annex 3	1
PANS-AERO	1	Doc 8967	4	Annex 4	10
PANS-TRG	5	Doc 9184	3	Annex 6	13
R-ANP	57	Doc 9284	2	Annex 9	2
Circular 303 Replacement	19	Doc 9305	2	Annex 10	26
AIM Service Manual	9	Doc 9625	3	Annex 11	15
ACAS Manual	6	Doc 9829	2	Annex 14	5
New CAEP	19	Doc 9830	2	Annex 15	3
New ATFM Manual	1	Doc 9849	1	Annex 18	3
New CDO Manual	8	Doc 9880	1		
Civ/Mil Coord Manual	1				
Arpt Air Qual Guidance	1			Others	2

Further Evaluation Needed??

- 120+ Operational Improvements need further evaluation
 - *mainly because concepts need further development.*
- Clustered into six key areas:
 - *Trajectory management (4D-trad)*
 - *ATFM*
 - *Integrated Operations (Arrival, Departure, Surface)*
 - *Improved Surface Ops, especially low visibility ops.*
 - *New Separation Techniques*
 - *System Wide Information Management (SWIM)*

Outcome of Gap Analysis

- The Gap Analysis has enabled ICAO to evaluate the full scope and impact of the NextGen and SESAR Programmes
 - Affected panels, SGs and ANB Sections identified.
 - Affected documents known.
 - Areas for future work requiring collaboration with NextGen and SESAR programme offices and (industry) Standards-Making bodies also identified.
- *The last point represents the greatest challenge.*

The Task is Daunting

- Many OIs are related and hence could be rolled into one standardisation activity.

However:

- Almost half of the OIs require concept development in new/novel areas, adding to lead times.
- Most OIs are multi-disciplinary in nature, affecting multiple Panels, WGs, SGs, etc.
- Most OIs require action on the part of industry standards bodies.
- Therefore we still face a challenge as these are *multi-disciplinary, multi-layered and multi-organisational*.

A new way of working is required which brings us to the Standards Roundtable Meeting #2

Act Two: Standards Roundtable #2

A meeting held in late October 2009 between ICAO, FAA, EUROCONTROL, SESAR JU and the International Standards-Making bodies.

Purpose:

- ❖ *identify the core standardisation aspects of NEXTGEN and SESAR requiring international harmonization*
- ❖ *identify what international SARPS will be needed over the next 5 years*
- ❖ *identify the required timelines*
- ❖ *Develop a collaboration process between the organizations including respective roles and deliverables.*
- ❖ *identify what the different parties can offer to and need from each other to succeed*

.....*To develop a new way of working.*

Act Two: Standards Roundtable #2

(cont'd)

- At this meeting, ICAO presented the results of the Gap Analysis and outlined the challenges ahead.
- Possible solutions to the time and resource constraints, were discussed:
 - *The use of multi-disciplinary or even multi-organisational groups or task forces as needed.*
 - *The need to coordinate meeting times to minimise the amount of travel.*
 - *The meeting acknowledged the need for all of these.*

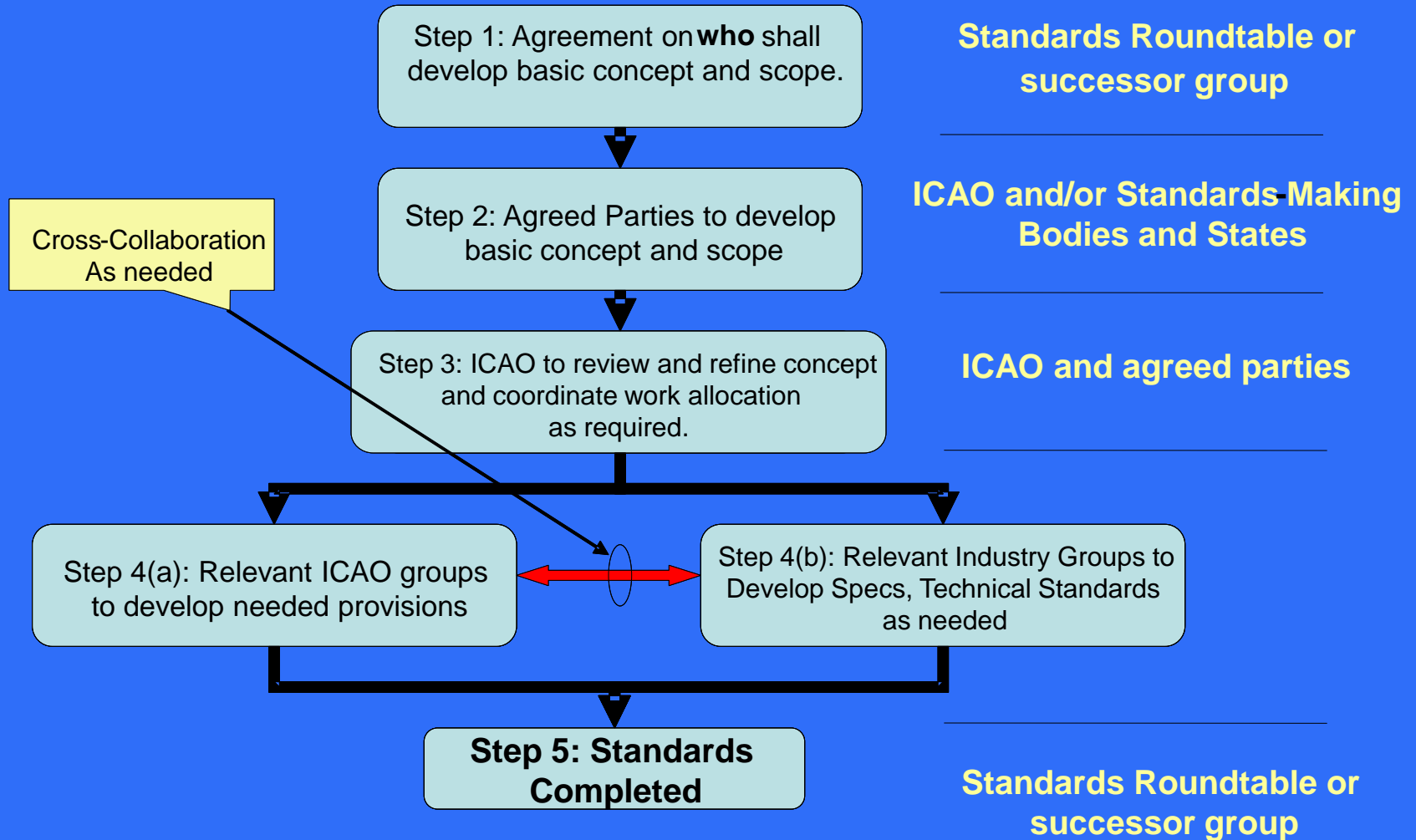
Priorities for Standardisation

- The meeting then identified 12 primary focus areas for standardisation over the next five years.
 - *Many of these corresponded to ICAO's own analysis.*
- A table of Short-Term Standardisation Needs was developed.
 - *A rolling 5-year plan*
 - *To serve as the guiding document for the standardisation activities of ICAO and the Standards-Making bodies.*

New Method of Working

- *The meeting agreed that a collaborative approach to standards development was needed.*
- *The meeting adopted the approach given overleaf.*

Concept for New Method of Working



Benefits of New Approach

- **Applicable to all key focus areas and standardisation activities.**
- **Well-suited to areas requiring concept development.**
- **Allows parties (ICAO, States and Standards-making bodies) to work in coordinated fashion.**
- **Allocation of responsibilities and deliverables clearly identified.**

Information Sharing

➤ ICAO also concluded Memoranda of Understanding allowing for the mutual sharing of documents between ICAO and the following standards-making bodies:

- RTCA Inc.
- EUROCAE
- SAE International.



Act Three: Standards Roundtable #3

- Roundtable #3 was held in June 2010 with the following outcomes:
 - Lines of communication established.
 - Short-term standards requirements completely revised.
 - Standards to be “Bundled” to maximise benefits to stakeholders.

Act Three: Standards Roundtable #3

➤ Outcomes (cont'd):

- **Other ATM Modernisation programmes to also be considered.**
 - Japanese CARATS programme to be the first.
- **Assembly paper has been prepared asking all States/Regions to submit their ATM modernisation plans to ICAO for a gap analysis.**
- **China, Australia, Russia and Canada are future candidates.**

Act Three: Standards Roundtable #3

➤ Outcomes (cont'd):

- Issue to extend the benefits of advanced ATM Modernization programmes to other states regions.
- PIRGs the preferred conduit.
 - Secretariat to prepare papers to inform PIRGs of developments in other States/Regions.
 - PIRG's response will determine whether implementation is feasible or necessary.
 - Successful response will lead to workshops, seminars, etc.

Act Three: Standards Roundtable #3

➤ Outcomes (cont'd):

- First objective – a “bundle” of Standards for ATFM/CDM.
 - Has global applicability – China, South Africa and others have imminent plans to develop and implement.
 - Will serve as the first trial of the new collaborative working methods.
 - If successful mature standards can be brought for approval to the 12th Air Navigation Conference.

Where to Now?

- **Act on the outcomes of Standards Roundtable #2:**
 - Test the new approach in developing - a “bundle” of Standards for ATFM/CDM.
 - If successful apply the new approach to future standards development.

Where to Now? (2)

- **Act on the outcomes of Standards Roundtable #2:**
 - **Apply the “Gap Analysis” approach to all future ATM modernization programmes.**
 - **To allow timely review and integration into the global ATM System.**

Where to Now? (3)

➤ Act on the outcomes of Standards Roundtable #2:

- Use the PIRGS as a conduit to extend the benefits of advanced ATM Modernisation programmes to other states regions.
- Secretariat to prepare papers to inform PIRGs of developments in other States/Regions.
- PIRG's response will determine whether implementation is feasible or necessary. Successful response will lead to workshops, seminars, etc.

Where to Now? (4)

- **Establish a practical, long-term working arrangement:**
 - **Standards Roundtable to meet again to determine progress.**
 - **Most likely outcome will be regular coordination on Work Programmes with meetings as needed.**
 - **A routine function of each organization**

Conclusion

- Short term requirements for international standardization have been reviewed and updated
- Methods of working to achieve this identified.
 - To be refined in the future
 - First trial will be global standards for ATFM/CDM
- Closer relationships with standards-making bodies achieved.
 - Including document sharing.
- Approach to be used to support other ATM Modernization Programmes
- ICAO to take benefits of all programmes to the world.

Conclusion

By assuming a leadership role, ICAO has positioned itself well to deal to deal with the significant standardization requirements of NextGen and SESAR, while meeting its commitment to the global civil aviation community.