



Aspiring to a  
**SINGLE SAR SKY**  
over Africa

[brianday@brianday.aero](mailto:brianday@brianday.aero)

# Family of Air Navigation Services

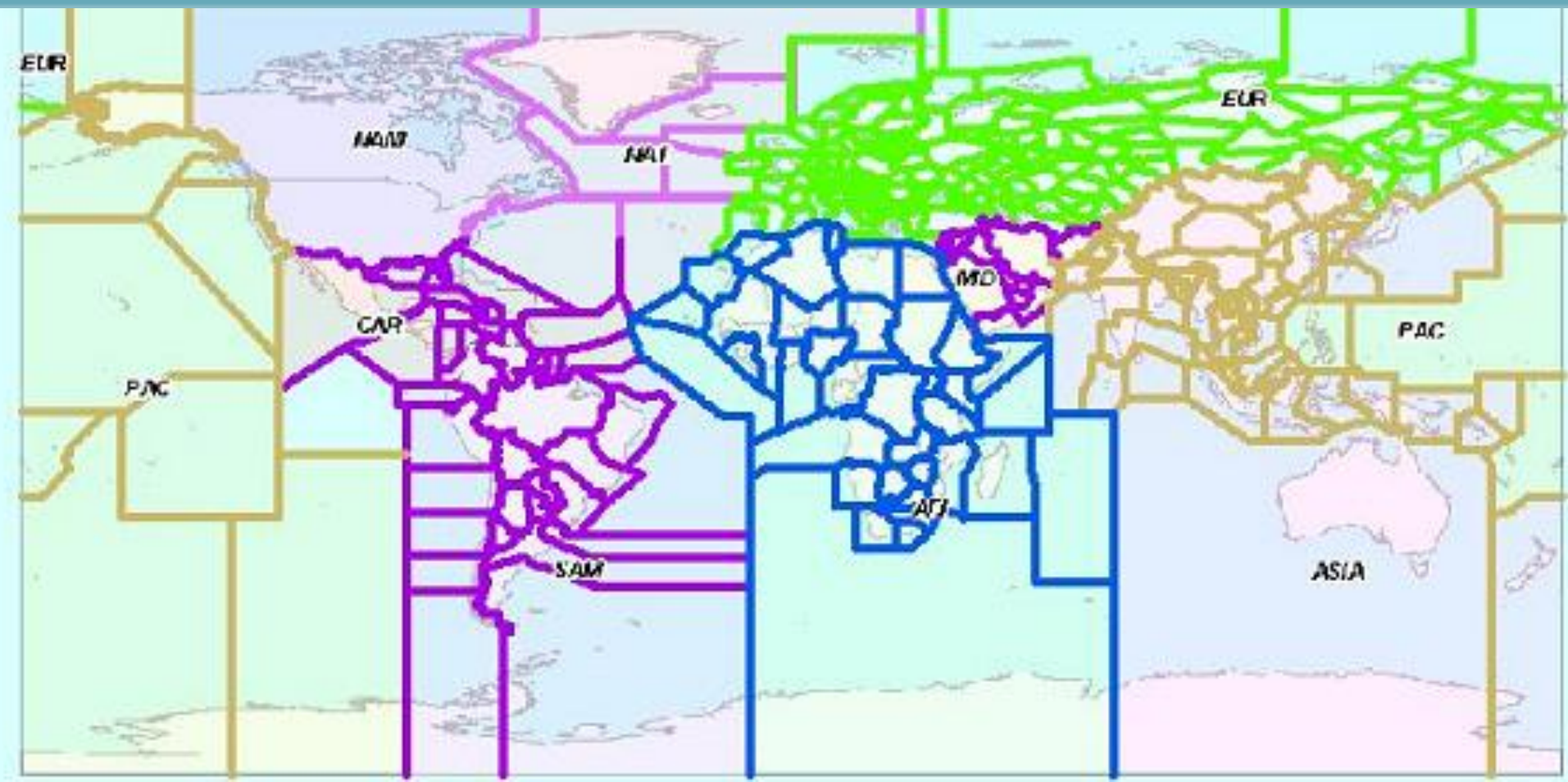


AIR CRASH  
INVESTIGATION

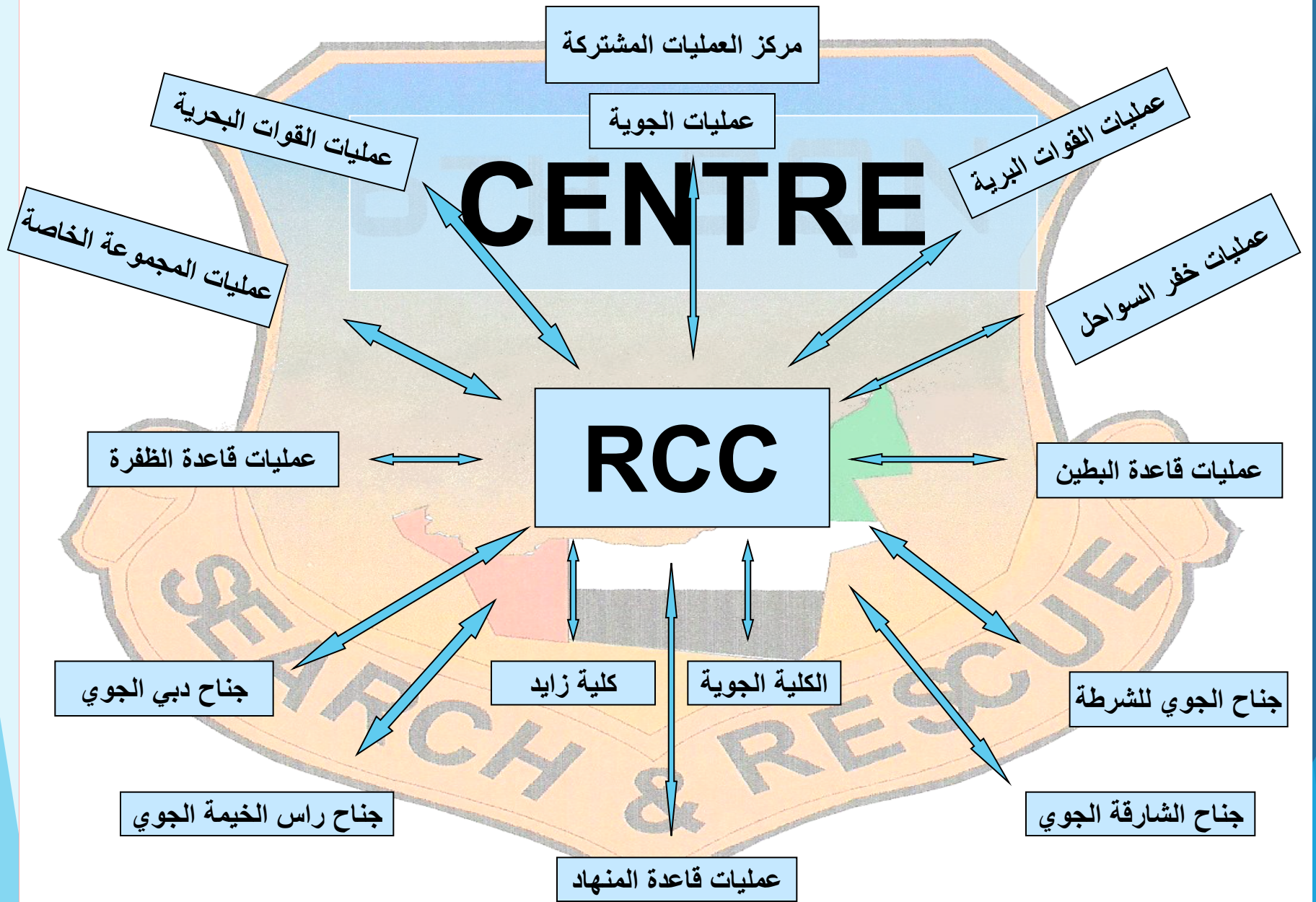


# SAAR

## Search and Rescue Regions (SRRs)



# اللية التنسيق مع الوحدات المساندة

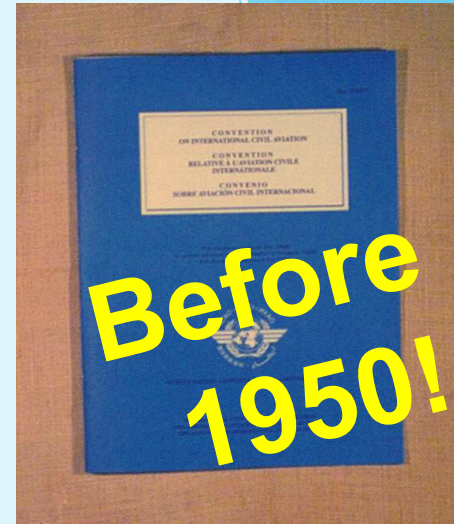


# Search and Rescue Regions





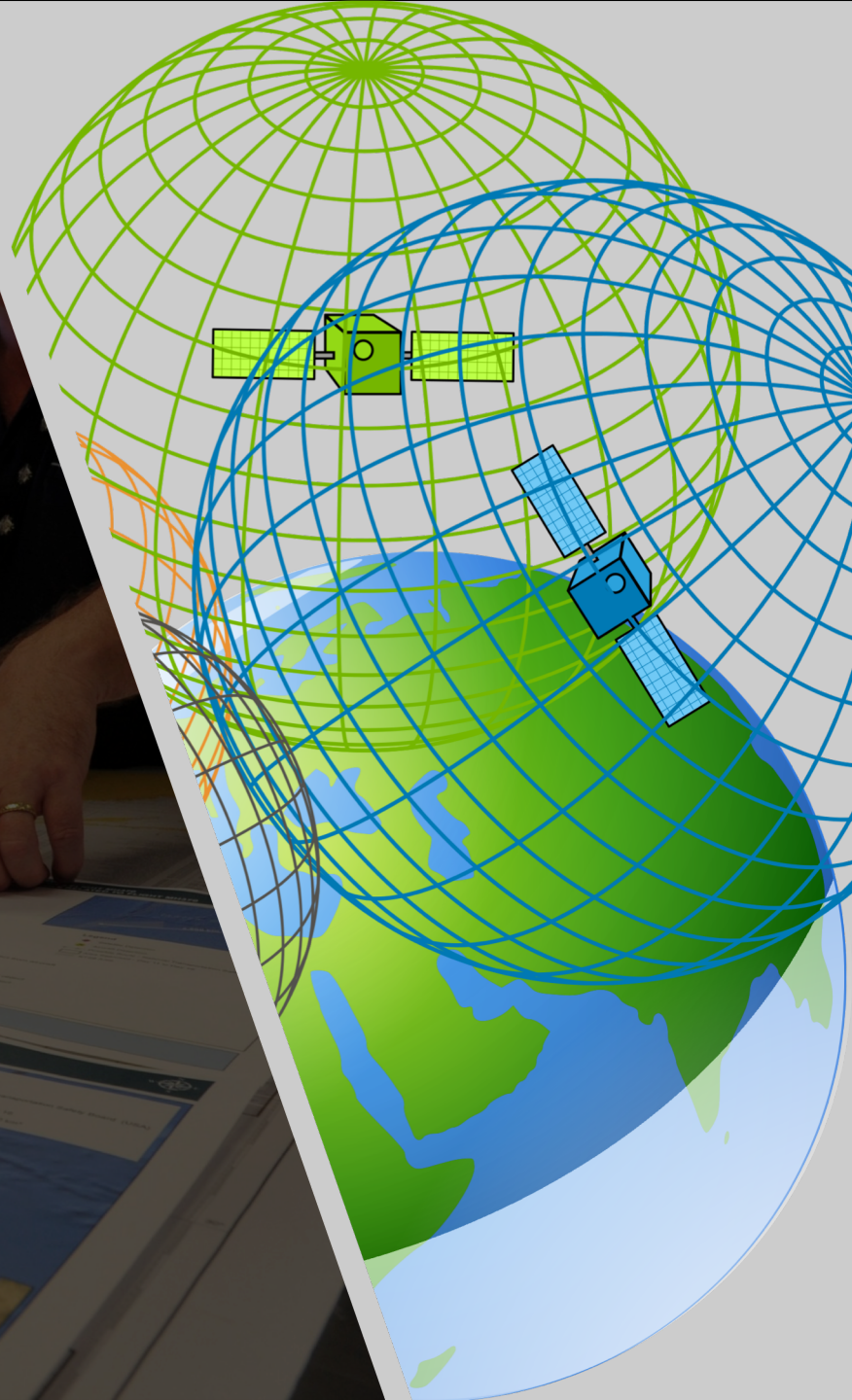
**ICAO Headquarters**



**Before  
1950!**



# Global SATNAV and SATCOMS





.....“crises  
confronting us  
are widely  
accepted as  
being beyond  
any individual  
State’s capacity  
to resolve.”



24	Angel Carte	0,9	1,1	1,0	1,1	1,0	1,5	1,5	1,5	1,5	1,5	629	702	614	732	631
25	GCLUB	0.5	0.7	0.7	0.7	0.9	0.4	0.4	0.8	0.8	1.2	1412	1485	8	1	770
26	Syndicate													2	4	205
27	IN.SP													5	2057	1832
28	YF													0	2487	3045
29	LAWN													8	110	402
30	MEAN.													6	1854	2423
31	FL													8	138	755
32	HO													6	1085	13584
33	BLA													7	889	916995
34	GAKL													1	1493	1535
35	TSOE															2527
36	PYCB															
37	APOC															
38	CO2															
39	IRC															
40	AFK															
41	ALTS															
42	VO															
43	Thukker T															
44	Serpentis															
45	-7-															
46	.EXE															
47	SOUND															
48	ORE															

Track spacing?

Medical support?

Observers?

Probability of detection?

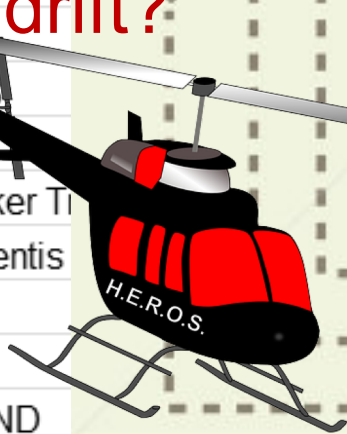
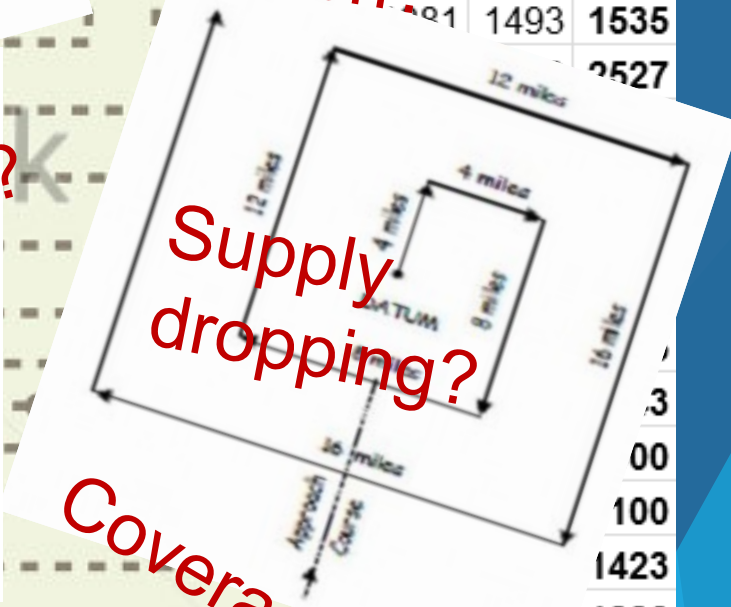
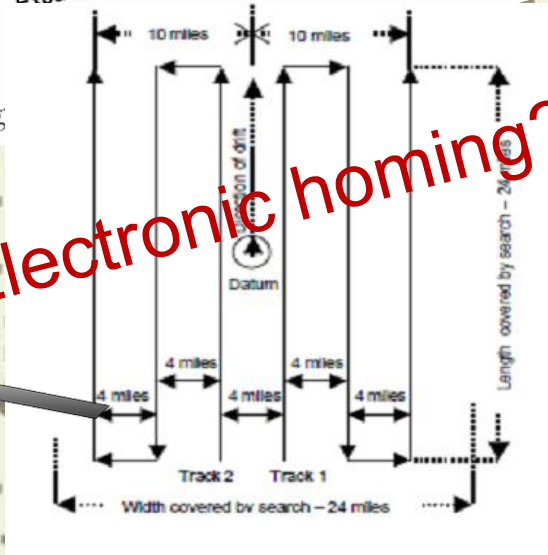
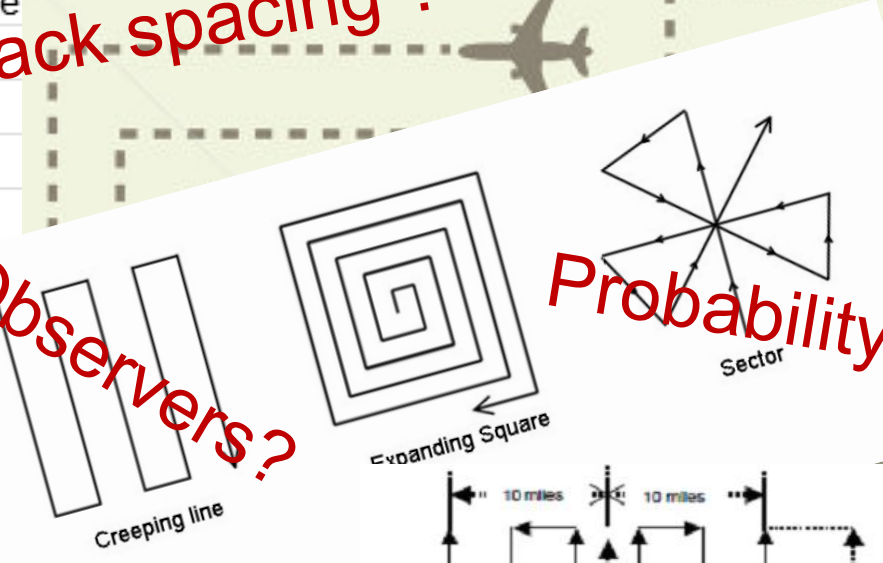
Target drift?

Electronic homing?

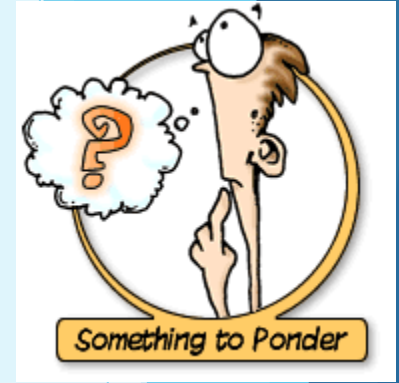
Supply dropping?

Coverage factor?

Search altitude?

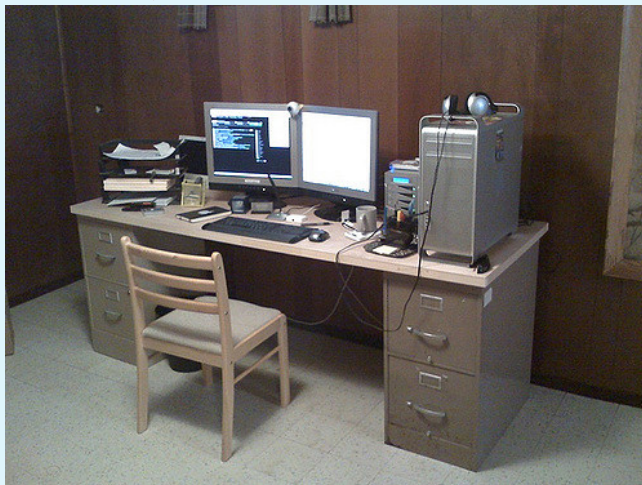


# State Search and Rescue Regions' RESCUE COORDINATION CENTRES



**SOME**

**A FEW**



**MANY**



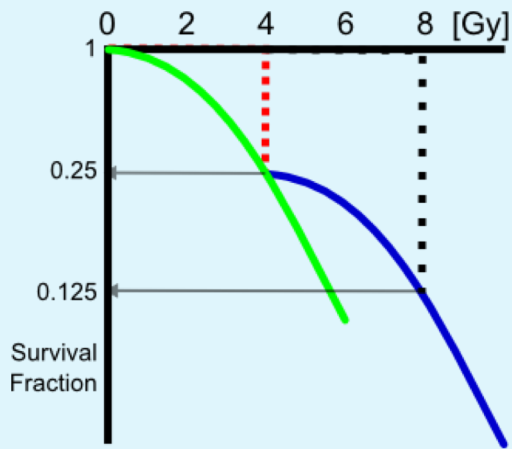
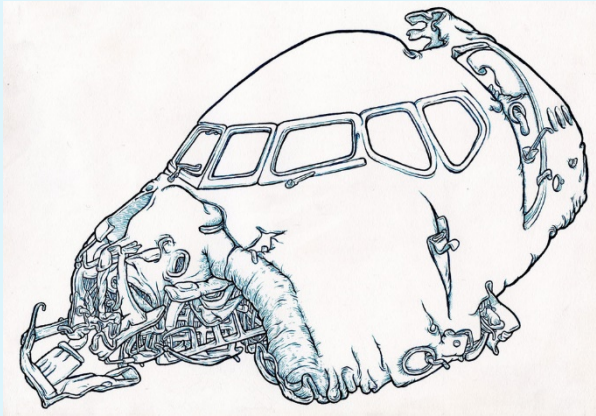


This Photo by Unknown Author is licensed under CC BY-SA

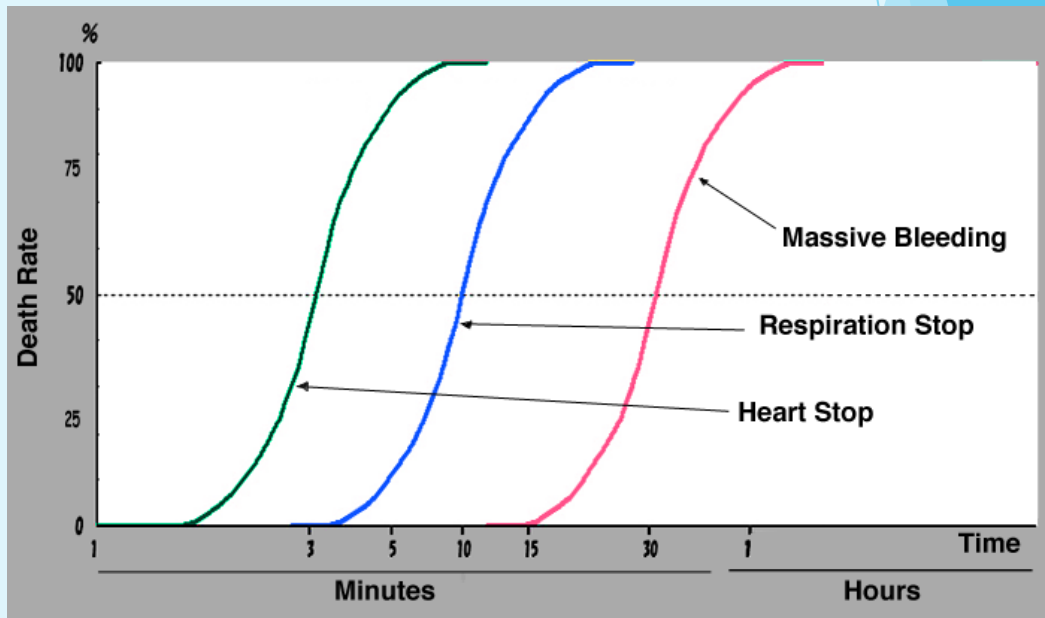
# 8 WORKSHEETS

# “THE GOLDEN HOUR”

northumbrian : light



immediate repeat of 4Gy fractions [NO repair at all]



# FLYING OPERATIONS

Airport  
RFFS

Rules  
of the  
Air

## AIR TRAFFIC CONTROL

AIS

MET

In- Flight  
Emergency  
response



SAR  
Alerting



*If you don't pull the trigger,  
the gun don't fire!*

# SEQUENTIAL ATC/SAR PROCESS

**ATC**

traffic  
separation

**ATC/IFER**

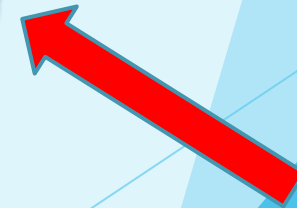
In-Flight  
Emergency  
Response:  
Advise &  
Assist

**ATC/SAR  
Alerting**

SAR Phase:  
Uncertainty,  
Alert, or  
Distress;  
Notify RCC

**SAR/RCC**

Evaluate,  
Gather  
intelligence;  
Activate SAR  
procedures





## ICAO Accident/Incident Data Reporting system (ADREP)

“The single most often recurring causal factor in the incidence of civil aviation accidents and incidents is in the mis-transfer of information.”

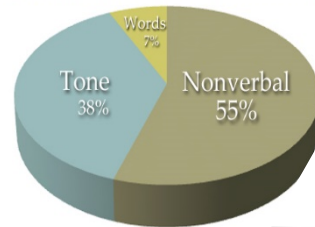


# Communication between 200 RCCs and supporting agencies

....across divides of policies, procedures, cultures, proficiencies and languages....

... is just not viable!

Communication Breakdown



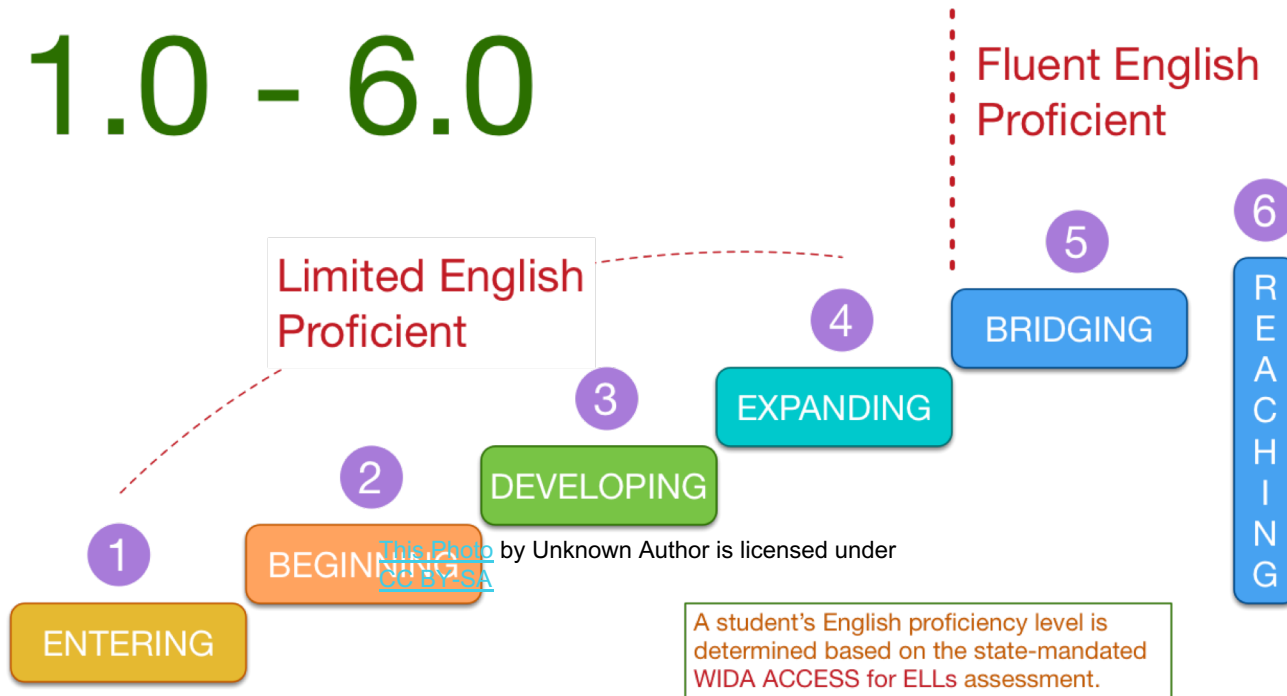




# English Language Proficiency Levels



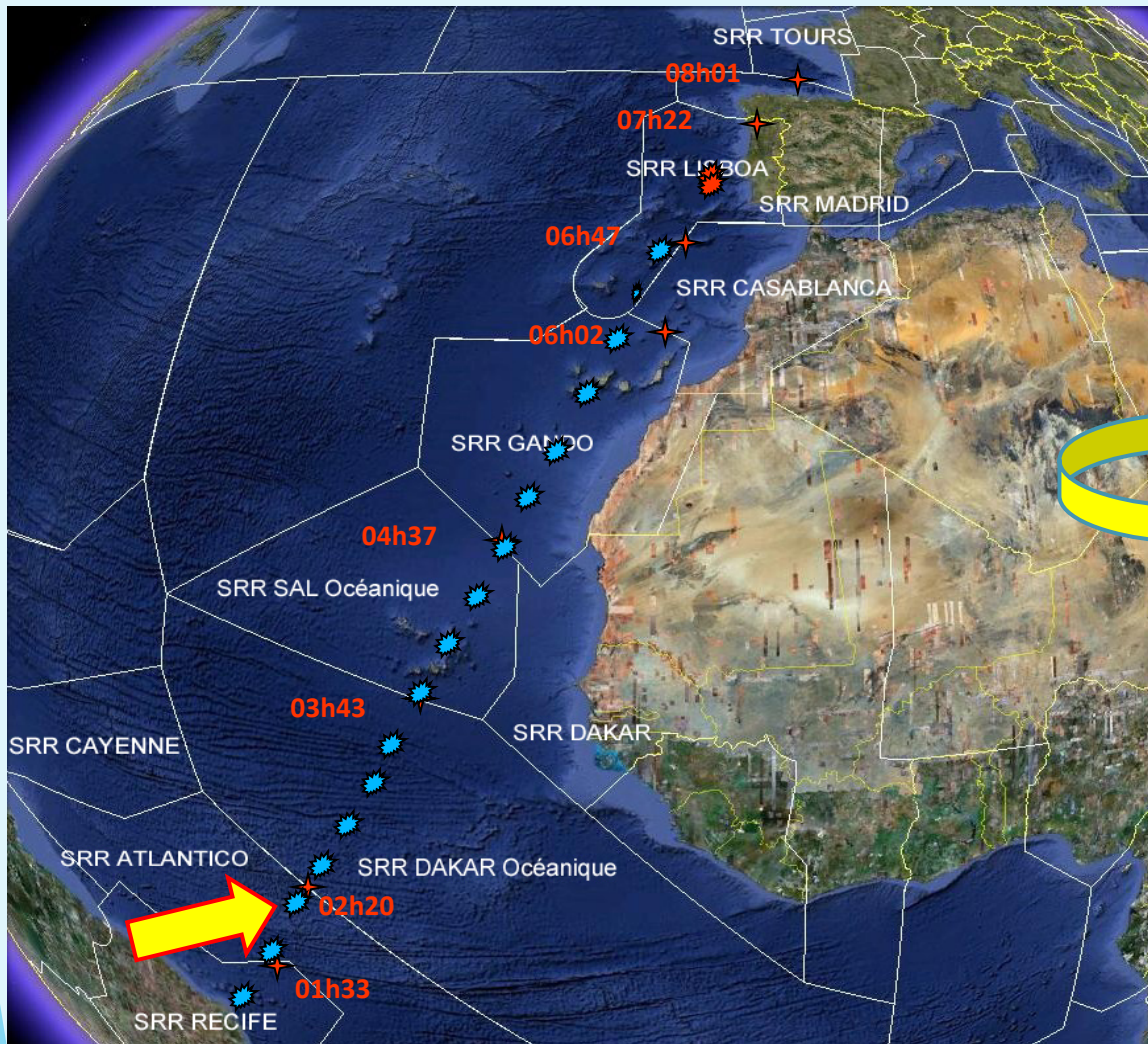
# 1.0 - 6.0



\* The labels used for the six proficiency levels were created by the WIDA.

\*\* An overall composite proficiency level score of 5.0 or higher on ACCESS for ELLs is required to be considered as Fluent English Proficient in Indiana.

# AF447, A330, Rio to Paris, 1 June 2009



**0135** Last radio contact @ INTOL est TASOL (FIR boundary) at 0220.  
**0220** failed to report

Mind the gap!!

**0741** Dakar RCC notified

Mind the gap!!

**0815**  
Uncertainty/Alert Phase declared

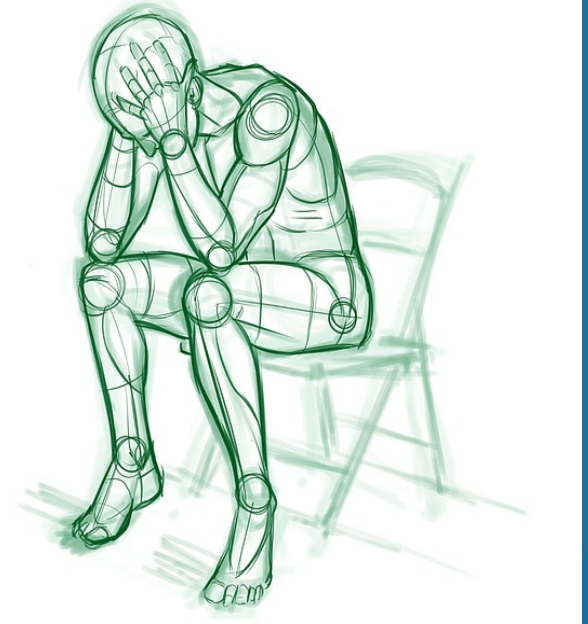
**0834** Distress Phase declared



# PUBLIC COMMENTARY: IS THIS ACCEPTABLE SAFETY?

“Had there been any survivors, they would never have had a chance.”

“I can’t believe that a big jet was missing for 4 or 5 hours and the controllers were saying ‘Maybe it will show up.’ ‘Are you sure it’s coming?’ ‘You sure about the plane?’ This went on for hours.”



John Cledes, representing an association of families of the 228 crash victims and brother of one of them, after numerous meetings with Air France and BEA.

# Facts, indications, concerns



At around **0940** the search was no longer in the hands of authorized RCCs;

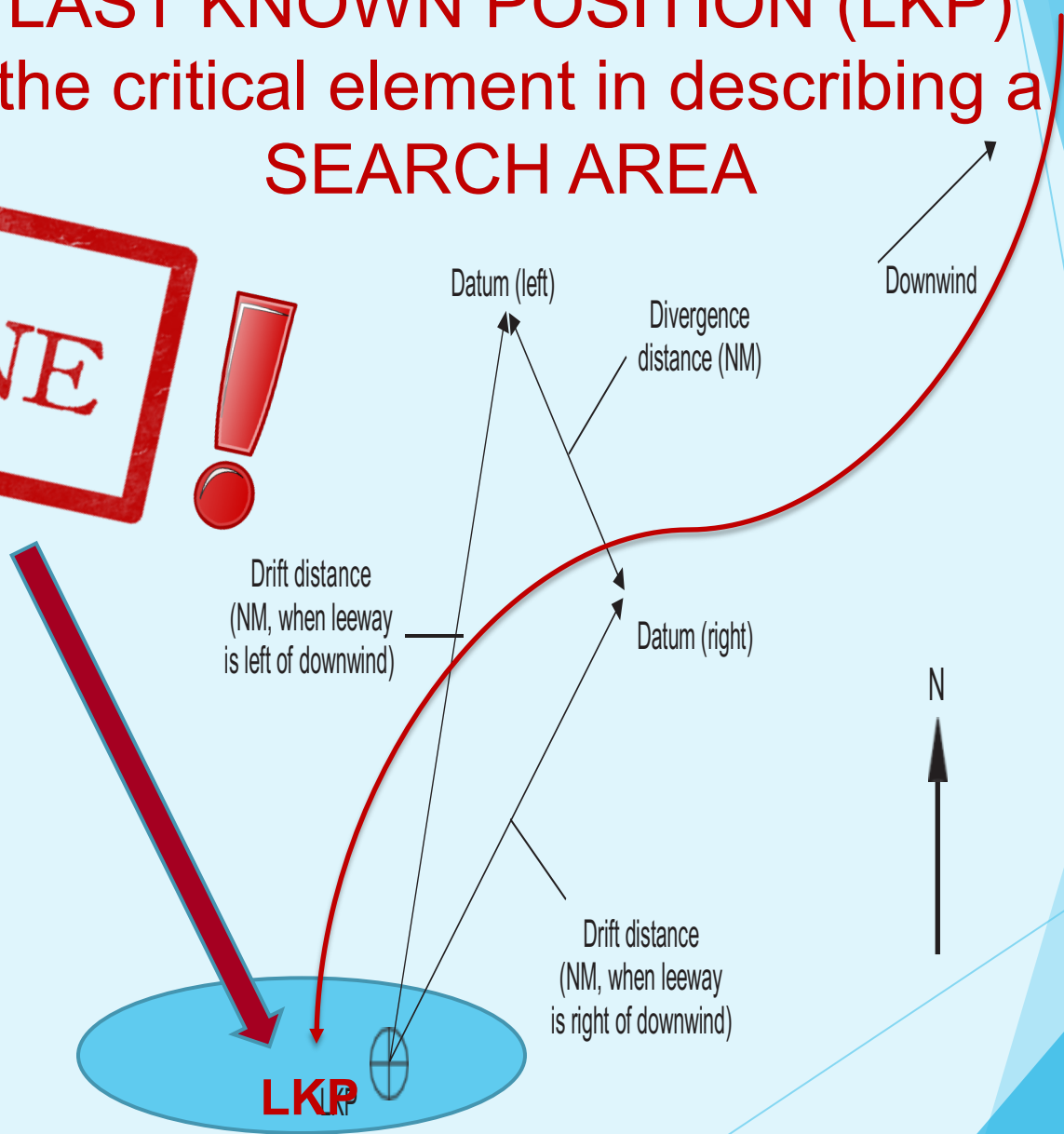
- ▶ the search was being planned by unqualified government bureaucrats.
- ▶ At **1214** - **about 10 hours after the first missed position report** - the first search aircraft departed Dakar for Cape Verde then TASIL.
- ▶ (ICAO specifies that RCC action should commence within **five minutes** of an SAR alert.)

Search aircraft were allocated

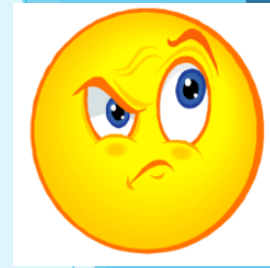
- to quite different search areas,
- in separate jurisdictions,
- by separate authorities,
- in uncoordinated searches,
- with no common radio frequency, and
- with no on-scene aircraft coordinating search operations.

# LAST KNOWN POSITION (LKP) the critical element in describing a SEARCH AREA

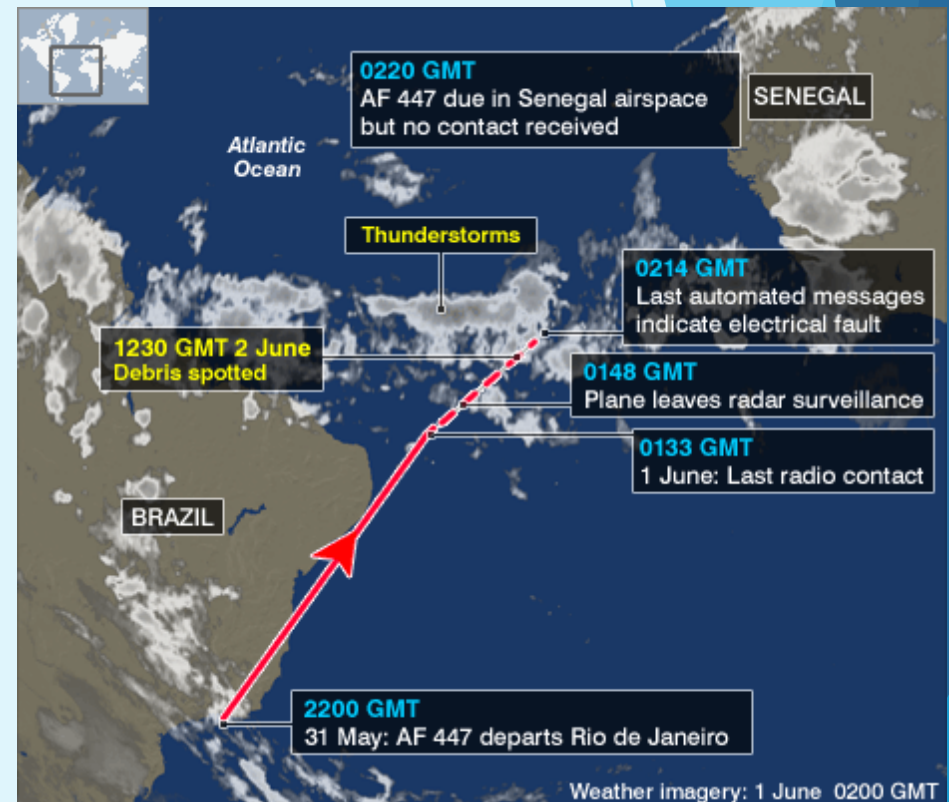
**GONE**



# Facts, indications, concerns



- ▶ No Regional SAR Plan was enacted.
- ▶ There was none.
- ▶ There is a need, too, for current and complete databases of resources and the terms of their availability.
- ▶ There were none.
- ▶ The wrecked aircraft was ultimately found underwater after 671 days at a cost of \$145m.



# AF447: BEA Safety Recommendations

- ▶ ICAO should ensure that all States develop **Regional SAR Plans** covering all maritime and remote areas.
- ▶ ICAO should ensure that all States have a **National SAR Point of Contact**.
- ▶ ICAO should encourage States to consider the establishment of **Joint Av/Mar RCCs**.
- ▶ ICAO should define a **framework for the training of SAR operators**.



# UPS - B747 - Arabian Gulf - 2010



© Mike Snyder, via Werner Fischdick

aviation-safety.net

Twenty-two minutes after departing Dubai, UPS 6, a B747-400, reported a fire on board.

The aircraft was positioned near the mid-point of the Arabian Gulf, close to the 3-way confluence of the Bahrain, Emirates and Tehran SRRs.

The crew opted to return to Dubai and transmitted a MAYDAY message.



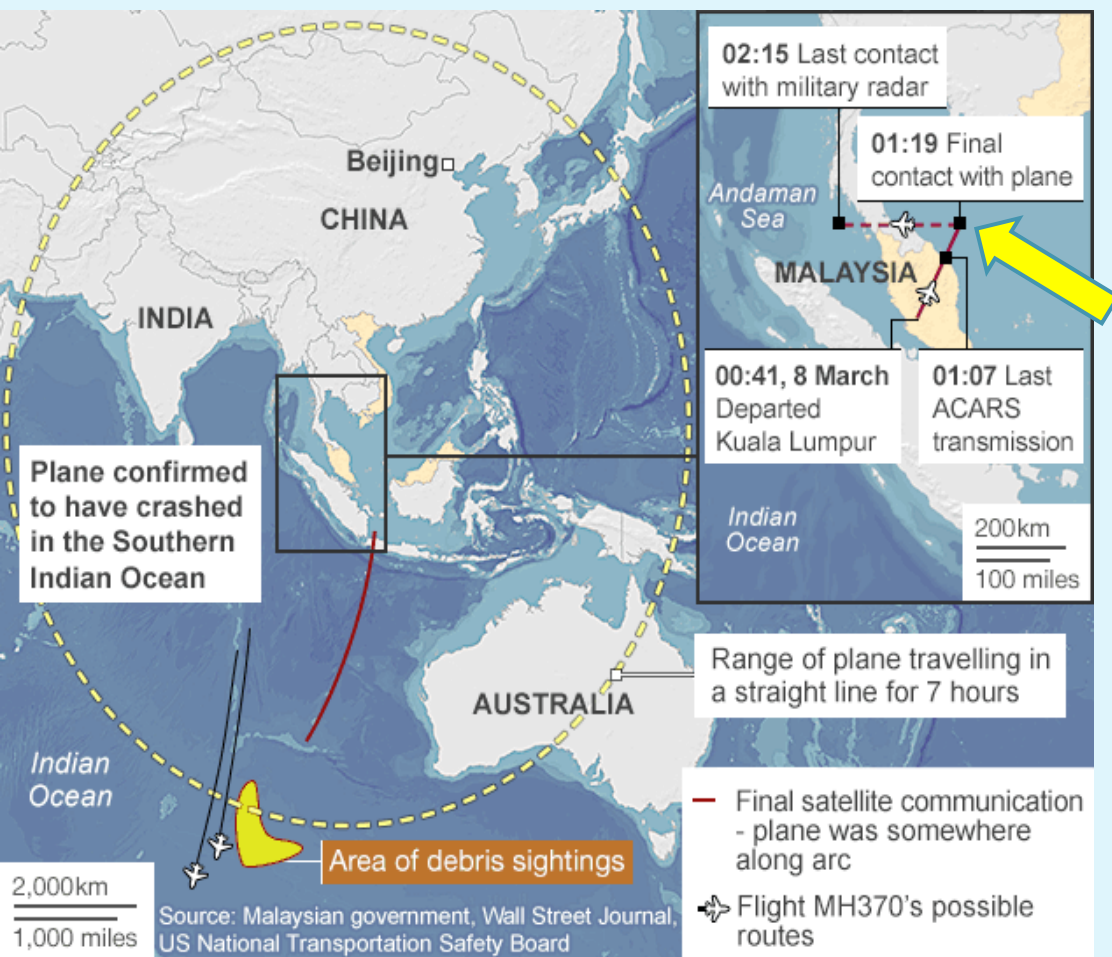
# UPS - B747 - Arabian Gulf - 2011

- ▶ No SAR phase was declared by ATC.
- ▶ No RCC was notified.
- ▶ No RCC was activated.
- ▶ The aircraft crashed on land close to Dubai; there was, then, no searching to be done.
- ▶ There being no survivors, neither was there need for any rescue.





# MH370, B777-200, KL to Beijing, 8 March, 2014



- **1722 UTC:** failed to report at IGARI on the Malaysian/Vietnamese FIR boundary
- **1739:** Vietnamese ATC informed KL ATC that radio and radar contact had been lost.
- **1800:** Vietnamese ATC declared Uncertainty Phase and notified its RCC.
- **1815:** Malaysia Airlines erroneously advised that aircraft was flying in Cambodian airspace.
- **2130:** (IGARI plus 4 hours, 8 minutes) KL RCC activated. Subsequently, HCM was advised of its responsibility for provision of SAR.
- **0043:** (IGARI plus 7 hours 21 minutes) HCM ATC declared a Distress Phase.
- **0630:** (IGARI plus 21 hours, 8 minutes) KL RCC was advised by RMAF that military radar painted aircraft, possibly MH370, west of Malaysian Peninsular.

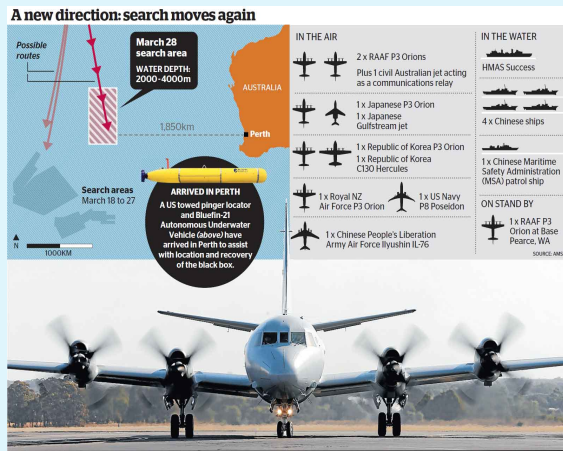
# MH370, B777-200, KL to Beijing, 8 March, 2014



- ▶ Time delay of > 16 minutes after the aircraft's ETA at the KL / HCM border before loss of coms was reported by ATC;
- ▶ Time delay of > 38 minutes before an Uncertainty Phase was declared;
- ▶ Time delay of 7:21 before an Alert or Distress Phase was declared;
- ▶ Military radar data that showed an aircraft tracking west was never passed to the RCC during initial SAR response and not publically released until a week later;
- ▶ Radar data from two civil installations in Thailand and Malaysia were not passed to the RCC during initial SAR response.

# MH370, B777-200, KL to Beijing - a few (of many) facts of concern!

- ▶ The operational decision-making prerogative of the RCC was again interrupted by politicians.
- ▶ **Cross-border search operations and use of military aircraft was severely hampered by a lack of Regional SAR Plans;**
- ▶ Allocation of search aircraft was mis-managed because of confusion about overlapping aviation and maritime SRRs in the South China Sea - another critical point of interface.
- ▶ Uncoordinated searches were, once again, conducted by separate State authorities in different localities.
- ▶ **Early offers of assistance from foreign States were declined.**





- ▶ “The conspiracy theories are smokescreens for **systemic failures**”, said the Prime Minister.
- ▶ “The **basic issue** is that two independent Malaysian agencies, air traffic control and the air force, failed that night.
- ▶ “If you include MAS, then that’s three.
- ▶ “How do you explain this?”
- ▶ “Where is the inquiry into this?”

# SAR: A TATTERED SERVICE



# Degree of LEI in provision of SAR services - worldwide \*

- ▶ Legal framework, nominated authority, organized resources. ▶ 43%
- ▶ Sufficient workforce skilled in SAR coordination and operational functions. ▶ 46%
- ▶ Agreements that provides for civil/military cooperation; ▶ 40%
- ▶ Arrangements for coordination between aeronautical and maritime authorities. ▶ 36%





# Degree of LEI in provision of SAR services - worldwide

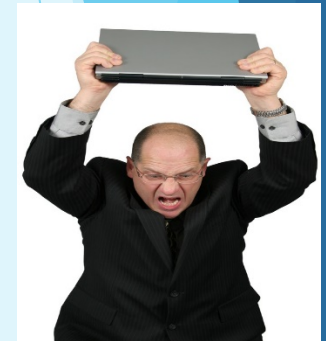
▶ SAR staff training, exercised and certified as proficient? ▶ 70%

▶ Permission for entry of SAR units into foreign territory to search for lost aircraft ▶ 35%

▶ SAR staff proficient in the use of the English language. ▶ 72%

▶ Designated SAR Point of Contact for the receipt of distress alert data? ▶ 34%

Remember the BEA  
Safety  
Recommendation?



Remember the BEA  
Safety  
Recommendation?

Remember the BEA  
Safety  
Recommendation?

# ICAO AUDIT FINDINGS

Approximate  
Global rate of  
LEI of SAR  
Protocol  
Questions:

**a lousy 50%**



# Recent ICAO Provisions

- ▶ A requirement for aircraft operators to track their aircraft at least every 15 minutes over oceanic areas.
- ▶ A requirement for an aeroplane in distress to autonomously\* transmit information from which a position can be determined at least once every minute.



\*without the need for flight crew action



GLOBAL AVIATION STRATEGIC PLANNING  
CONFERENCE

**IT'S TIME!**



State-of-the-art SAR solution computerware

Dedicated SAR staff - properly trained, certified and exercised

Consolidated RCCs with regionalised major SAR responsibilities

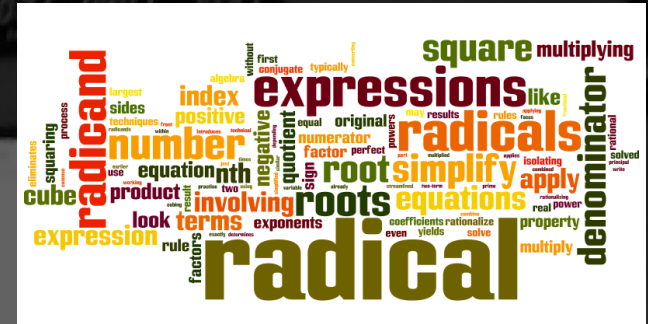
Proper authorisation



plans, agreements and databases

Integrated communication networks  
Much-reduced points of interface

# TO REGIONALISE IS NOT RADICAL!



“In many areas of the world, the fastest, most effective and practical way to achieve a global SAR service is to develop regional systems.” (IAMSAR Manual)

To nominate Regional RCCs is to follow these organizational models:

- ▶ Regional Safety Oversight Organizations,
- ▶ Upper Airspace ATC,
- ▶ Accident Investigation,
- ▶ Flight Operations Inspection....



# 5 Regional Maritime RCCs



Morocco, Monrovia, Lagos,  
CapeTown, Mombasa

“... to work cooperatively to provide effective SAR coverage in an area previously identified as suffering from a lack of SAR and safety infrastructure.” (IMO)

# INCIDENT MANAGEMENT SYSTEM FOR AERONAUTICAL AND MARITIME SEARCH AND RESCUE OPERATIONS

## SAR Incident Response and Management Platform

- Connects
- Accesses
- Monitors
- Detects
- Alerts
- Plans
- Manages
- Reports
- Records



At the Core of  
Mission Critical  
Applications



[www.mcmurdogroup.com](http://www.mcmurdogroup.com)  
[www.orolia.com](http://www.orolia.com)  
[sales@mcmurdogroup.com](mailto:sales@mcmurdogroup.com)





## Shared SAR Hardware and Solutions McMurdo Group

- Multi-point communication, calculation and coordination tool across the region/ globe connecting governments, operators, aviation, military, maritime, police, medical, disaster relief, press etc;
- Regional asset database - aircraft, sea craft, land vehicles, ground parties, coms;
- Cospas-Sarsat alerts;
- Regional SAR Plans;
- SAR splash-point and search area protocols;
- Flight planning;
- Operational control;
- SITREPs
- Maps and charts;
- Geographic and weather data;
- SPOC details;
- Letters of Agreement;
- SAR Tutorial material inc English standardised phraseology
- Exercises;
- Regular reports, news, developments;

# INTERNATIONAL SAR FUND

- ✓ to finance Regional MRCCs,
- ✓ to establish a global system for distress alerts,
- ✓ to build databases,
- ✓ to train RCC staff, and
- ✓ to provide technical equipment.



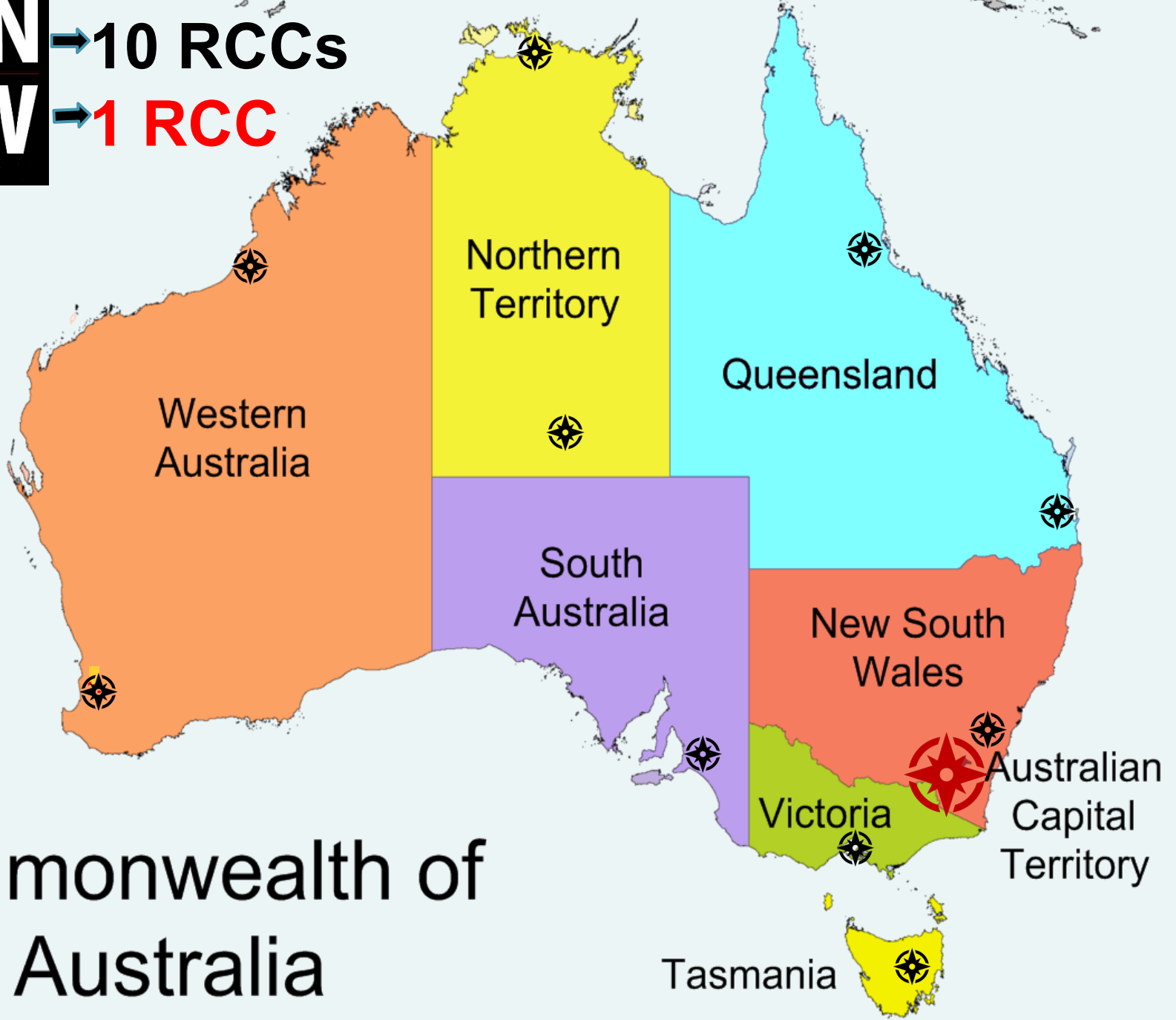
**ICAO  
Doc.9161  
Manual of ANS  
Economics**

“SAR costs  
may be taken  
into account  
in arriving at  
the level of  
States’ air  
navigation  
charges ...”



CHIPMUNK  
**THEN**  
AND  
**NOW**

→ 10 RCCs  
→ 1 RCC

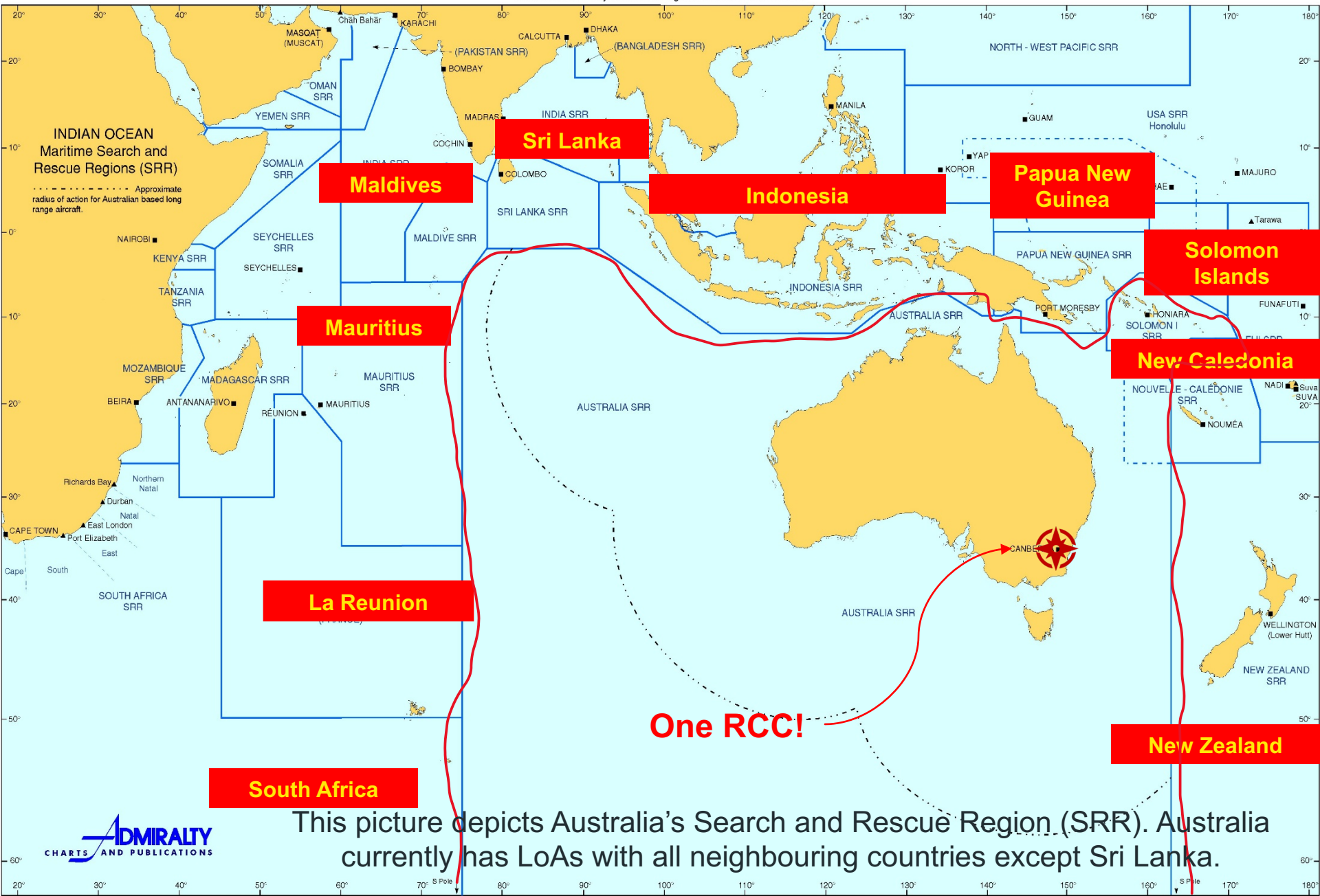


Commonwealth of  
Australia

Tasmania

# Australia's Search and Rescue Region (SRR)

Extract from Admiralty List of Radio Signals Volume 5 Edition 1998/99



This picture depicts Australia's Search and Rescue Region (SRR). Australia currently has LoAs with all neighbouring countries except Sri Lanka.



What's Next?



Morocco,  
Monrovia,  
Lagos,  
Cape Town,  
Mombasa

SAR

Answer  
the  
Call .

