

Panel 3: ATM technologies

EASA ICF/5: Hong Kong, 9-10 December 2015

Mr Luc Tytgat, Strategy and Safety Management Director, EASA

Mr Paul Riemens, Chair, CANSO

Mr Victor Andrade, ATS Coordinator, COCESNA

Mr Michael Mapanao, Acting Head of Air Traffic Service, CAA Philippines

Your safety is our mission.



EASA
European Aviation Safety Agency



Moderator



Panellist

Panel 3

Luc Tytgat

**Paul
Riemens**

**Victor
Andrade**

**Michael
Mapanao**

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EASA and ATM/ANS

Luc Tytgat
Strategy and Safety Management Director, EASA

Your safety is our mission.



Outline of themes

EASA & Single European Sky (SES)

EASA activities in ATM

Review of new ATM technologies

Oversight of trans-national services

Opportunity for collaboration



SES - Single European Sky

5 SES pillars

Performance

- Performance scheme
- Performance Review Body
- Functional Airspace Blocks
- Network Manager
- National Supervisory Authorities

Safety

**EASA - ATM
competence
&
Total system
approach**

Technology



- ATM Master plan
- SESAR Joint Undertaking
- Common projects
- Deployment governance
- Implementation projects

Airports

Airport observatory

Human factors

- Specific sectorial dialogue Committee
- Consultative expert group on social dimension of the SES



Objectives & Total system approach

- The Agency contributes directly to core activities and priorities of the European Union in particular:
 - Ensuring to all citizen a high level of aviation safety
 - Ensuring highest common level of environmental protection
 - Facilitate the internal aviation single market & create a level playing field
 - Support to European industry on the international scene
 - Enabling growth and the creation of jobs

Safety significantly affects all aviation domains:

Total System Approach

Airworthiness

Operations
& FCL

3rd Country
Operations

Aerodrom
es

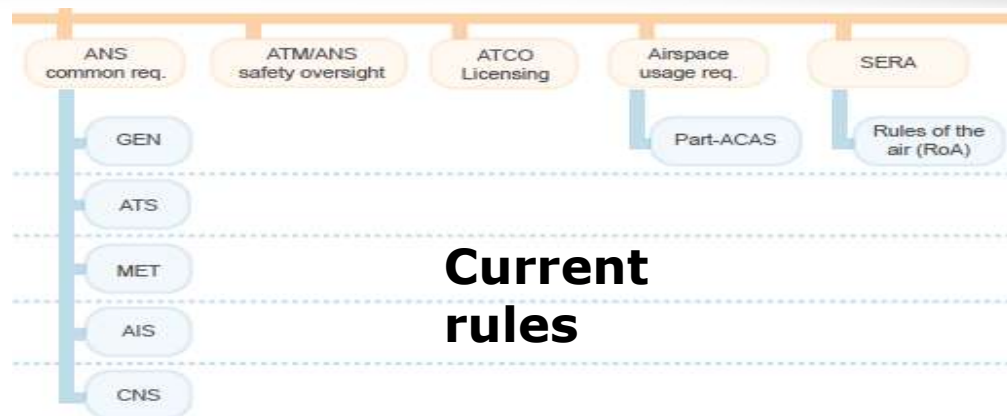
ATM/ANS



Regulatory measures

Rulemaking Programme

RM task -
RM.xxx



Implementing Rule

EASA Opinion
EC/comitology

AMC/CS's

EASA Decision
Means of
compliance

GM

EASA Decision
Guidance
material

Rules must
reflect
'state of the
art' and best
practices



Comply with
ICAO SARPS



Promote new
technologies
and practises



Use of industry
standards



EASA – for ATM/ANS & aerodromes

➤ Safe air-traffic



Regulation on Air Navigation Service provision;

- ~ 250 ANSPs in Europe
- Several services: ATC, AIS, MET, NAV, ...
- Rules of the Air
- Air Traffic Controller licensing
- New airspace concepts

➤ Safe landing/take-off



Regulation on Aerodromes;

- ~ 600 aerodromes (in BR scope)
- Aerodrome operator requirements & oversight
- Aerodrome operations
- Aerodrome design



Draft Rulemaking Programme 2016–2020

5.10. PCP/SESAR Deployment

(a) Issue/Rationale

Implement the regulatory needs of the SESAR Common Projects.

(b) What we want to achieve (Scope and Objective)

Enable implementation of new working methods and technologies developed by SESAR with focus on data management.

(c) How we want to achieve it: Rulemaking Actions

RM

PCP/SESAR deployment

Action
Number

Title
Objective

RMT.0524 Data Link Services

Development of requirements for extended Data link operations for safety critical message use, including D-TAIX, DCL, PM CPDLC, D-ATIS and CPDLC, ADS-C outside VHF data link coverage - This task is stemming from SES initiative and SESAR and will address PCP AF6 requirements as well as the existing issues related to the current DLS regulation.

Affected Stakeholders

ANSPs / Aerodrome operators / Aircraft Operators / Manufacturers

Domain	Start	Next Deliverable	End Deliverable	Owner	Pre-RIA
	2016	ToR/2016	Opinion/2018	EASA FS.4	-

RMT.0524 - Data Link Services

RMT.0624 - Technical requirements for Remote TWR Operations

RMT.0639 - Performance Based Navigation (PBN) implementation in the European Air Traffic Management Network (EATMN)

RMT.0679 - Revision of SPI (Surveillance Performance and Interoperability)

RMT.0680 - Ground Based Argumentation System (GBAS) CAT I/II/III

RMT.0682 - Implement the regulatory needs of the SESAR Common Projects



Key Performance Areas

- Cost efficiency
- Capacity
- Environment

➤ Safety KPIs

- a. Effectiveness of Safety Management
- b. Application of Severity Classification using the RAT methodology
- c. Just Culture



Deployment – R&D reviews, regulatory measures & industry standards

SESAR reviews:

- Document reviews
 - Very Large Demonstrations

Regulatory tasks:

- Rulemaking
- (Use of industry Standards)
- Oversight & certification



EASA review priorities in 2015-16

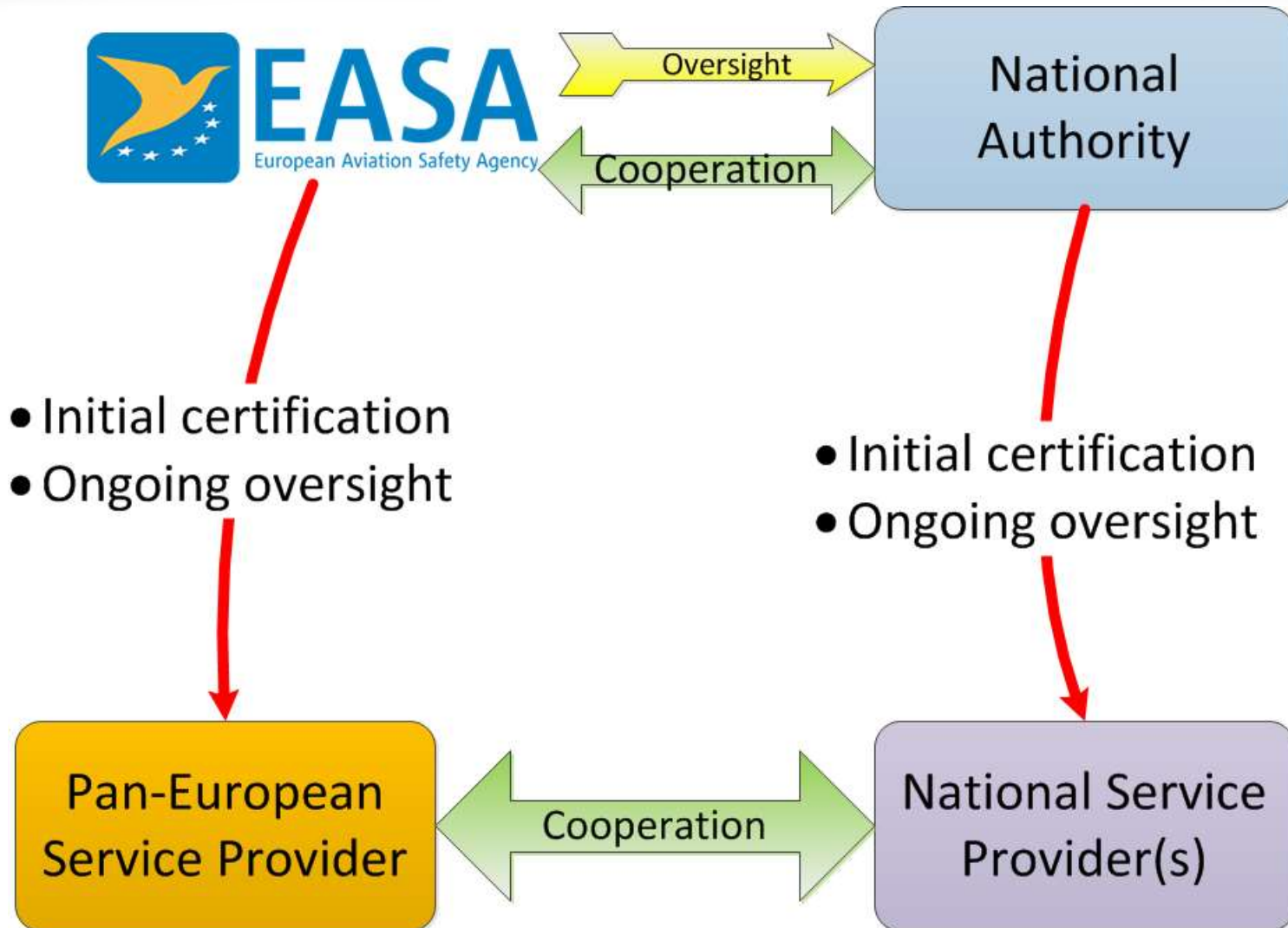
- Review of deliverables related and needed to implement Pilot Common Projects (PCP) ATM Functionalities (AF) and participate in related validation demonstrations (VLD)
- Follow Data Link, Cyber Security and GBAS studies
- Support to Large Scales Demos
- Activities related to RPAS, Remote TWR services
- Others (emerging priorities)



In deploying ATM technologies (SESAR)

- R&D Programmes are large and further developing
 - More focus on maturity of new concepts and their validation
- Active role by the RSOO needed to enable/facilitate deployment
 - Safety reviews (planning on the basis of available resources)
 - Regulatory tasks ('normal' planning)
 - Important priority areas are defined
- RSOO works with Deployment manager in order to review the Deployment Plans (regulatory and standardisation aspects)
- Important for RSOO to work very closely together with National Authorities to ensure safe implementation!

ATM/ANS Certification and Oversight





Sharing and collaborating in ATM



**Collaborati
on
subjects
(poss.)**

Regulatory convergence - ATM service provision, safety oversight, ATCO licensing, etc.

Airspace concepts - Surveillance, PBN implementation, etc.

Themes - RPAS framework, Cyber security, remote TWR, etc.

Training, sharing of expertise

RSOO model – (e.g.) cross-border services



Promoting cross-border services

Potential for closer cooperation:

- Regulation is about requirements and privileges, regulatory objectives include (e.g.) level playing field
- ANSPs need to contribute on common rules
- Cross-border or common services – rule harmonisation is needed
- Centralised services – formal interface with ANSPs, no monopoly, oversight by the RSOO
- Certification of specific ATM system would be a potential asset
- Common safety processes – common element safety-assessed once -> ‘credit’ for local safety assessment



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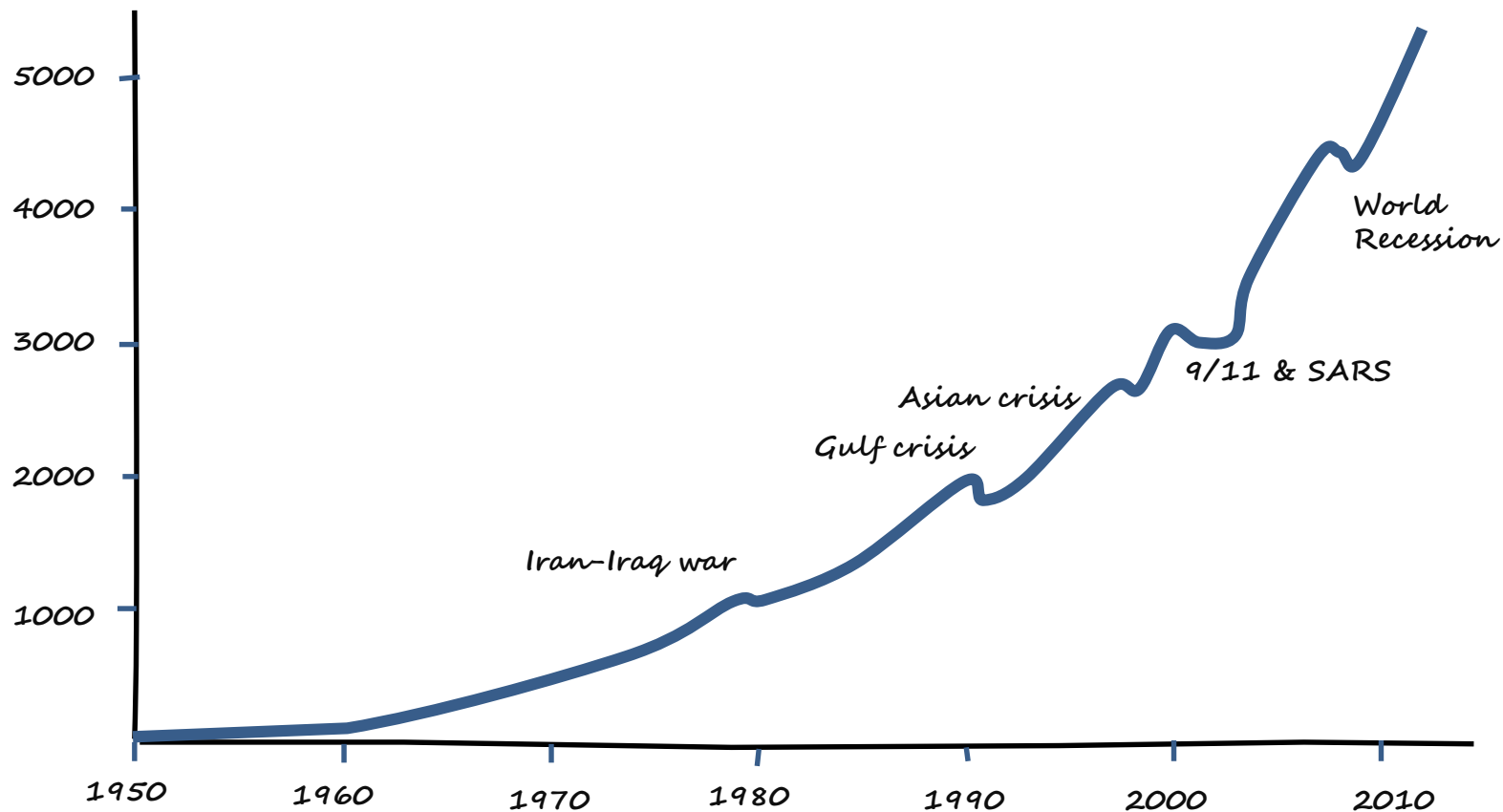
THE NEXT LEVEL OF REGULATION



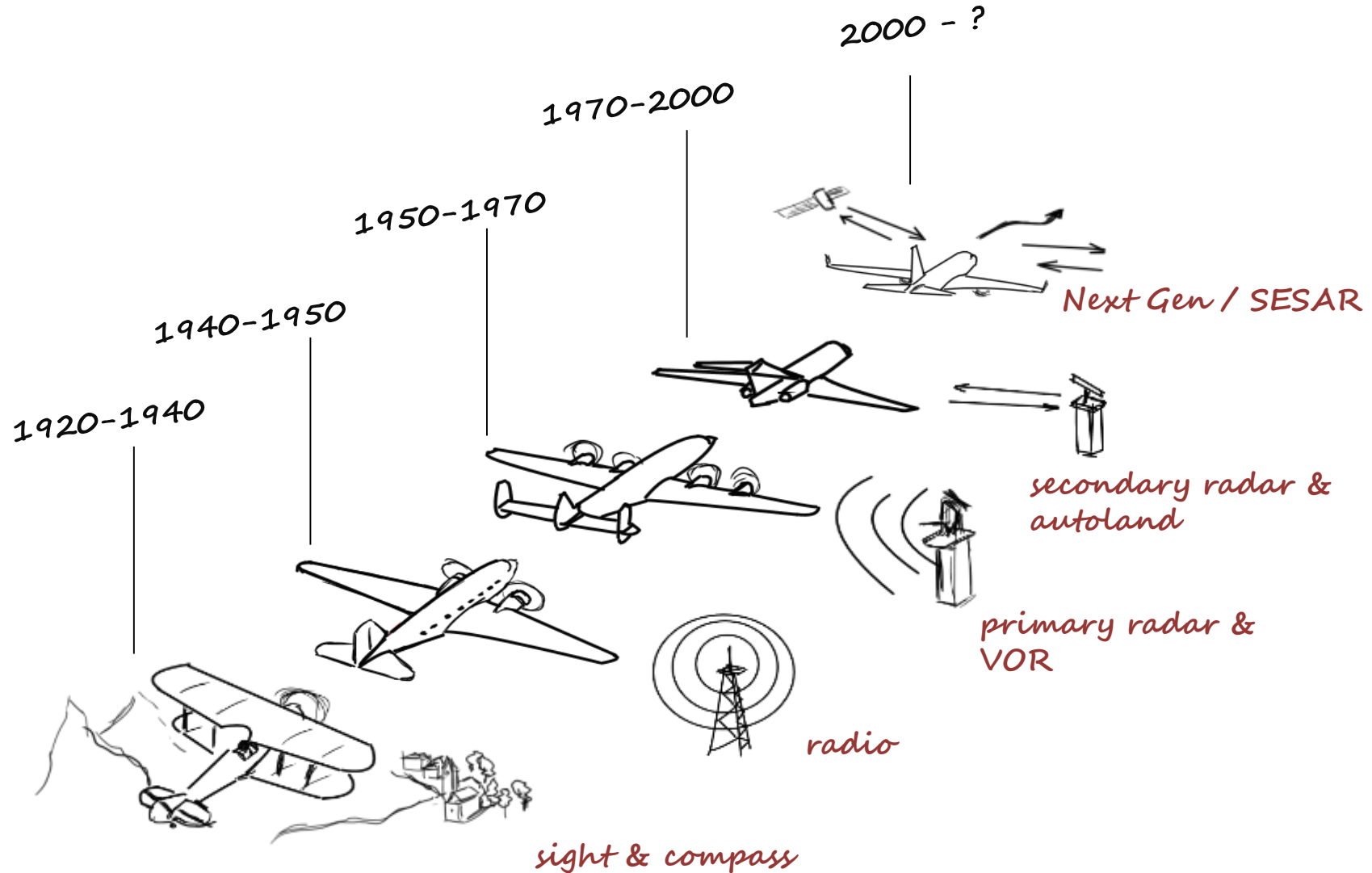
Paul Riemens, 5th EASA Int
Cooperation Forum
9th December 2015, Hong Kong

GROWTH OF CIVIL AVIATION

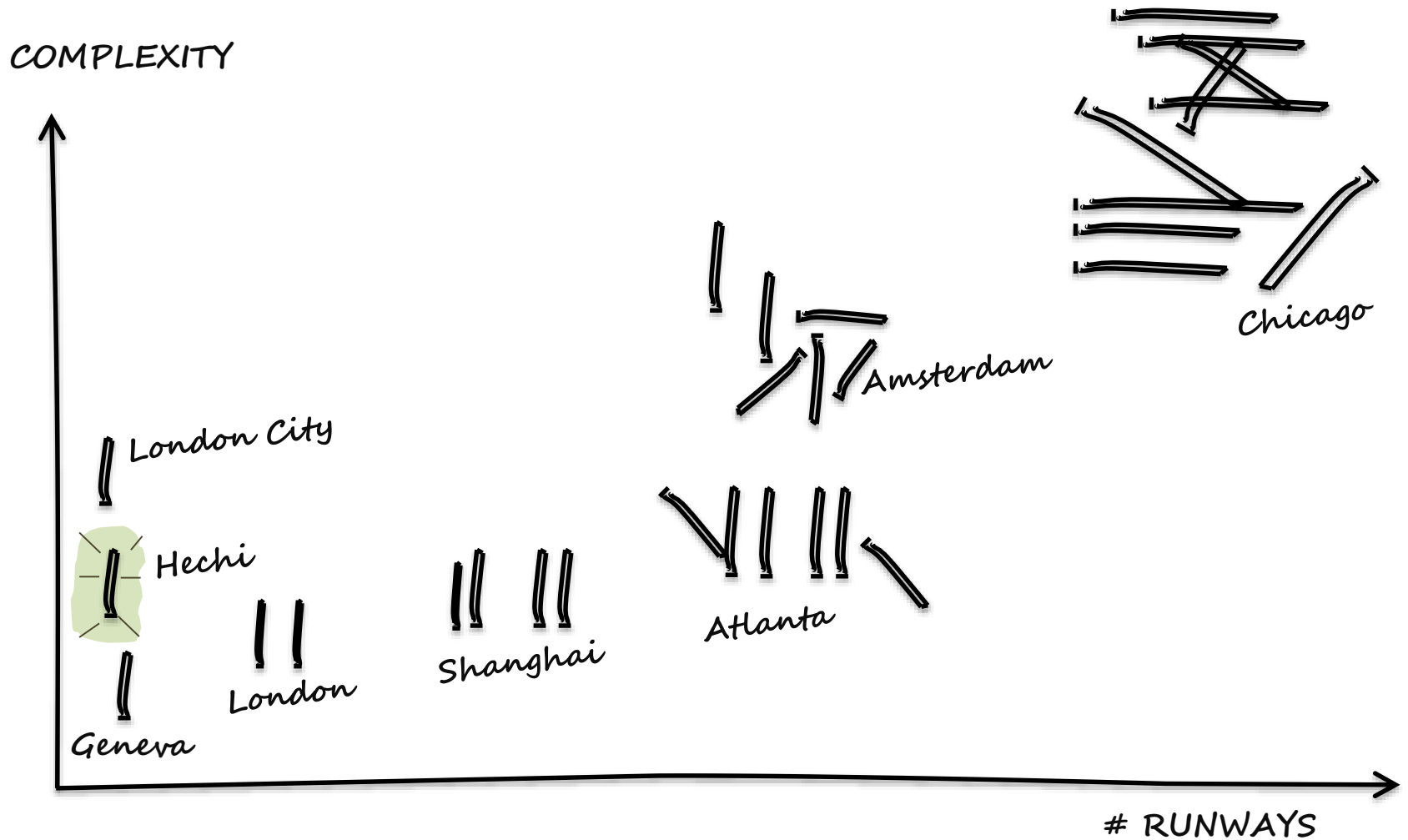
REVENUE PASS-KILOMETRES
(BILLION)



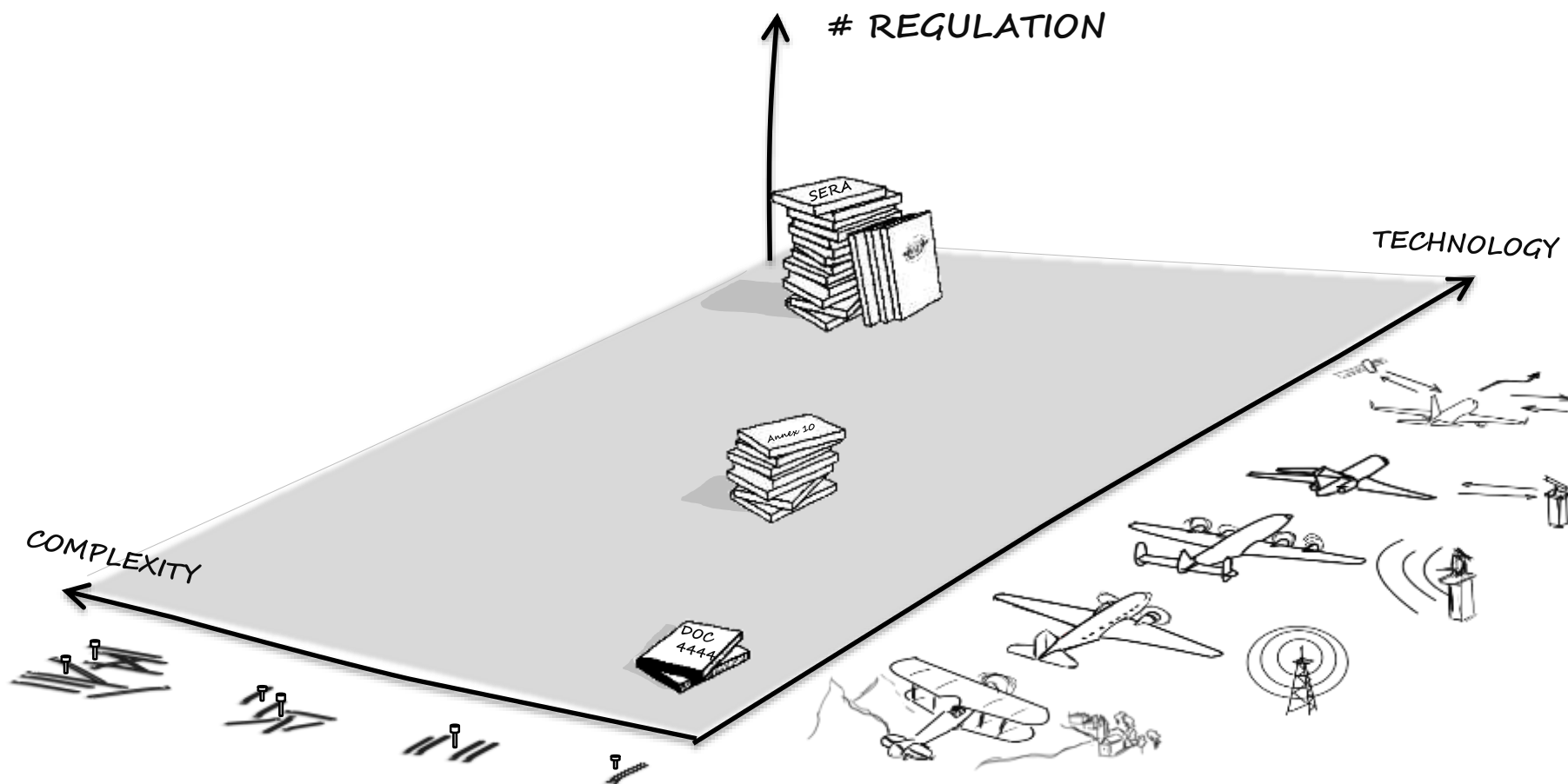
GROWTH WAS ENABLED BY TECHNOLOGY



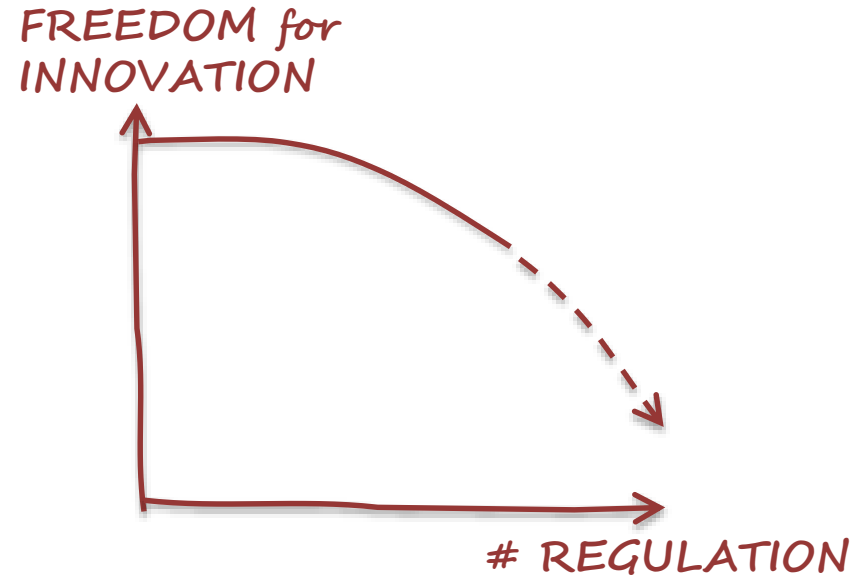
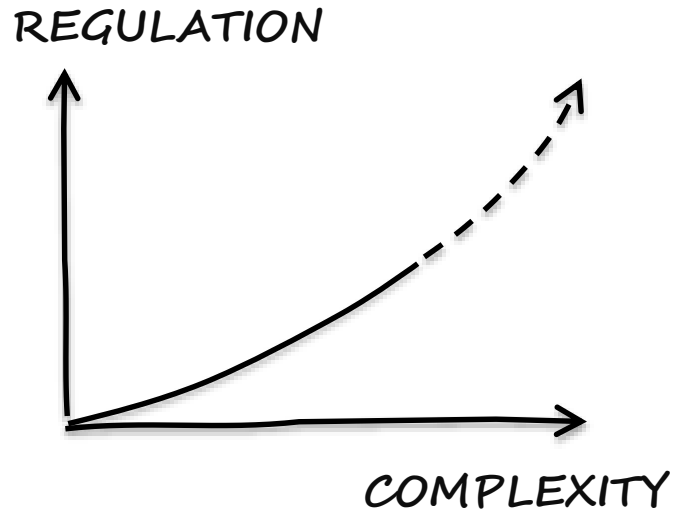
GROWTH RESULTED IN INCREASED COMPLEXITY



WIDE SPECTRUM OF COMPLEXITY AND TECHNOLOGY... ... COVERED WITH GROWING LEVEL OF REGULATION

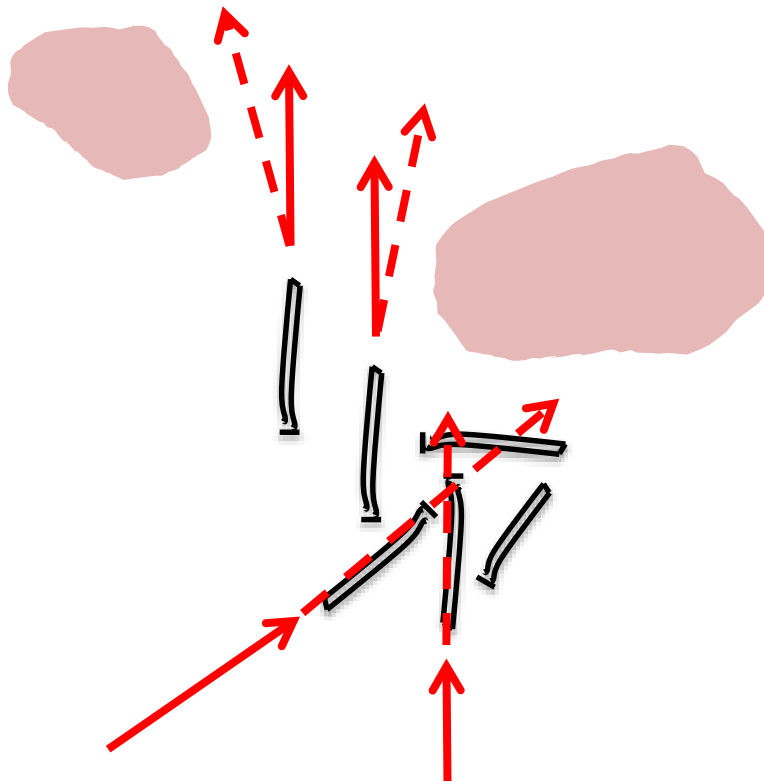


REGULATION CAN THREATEN INNOVATION IN A COMPLEX ENVIRONMENT

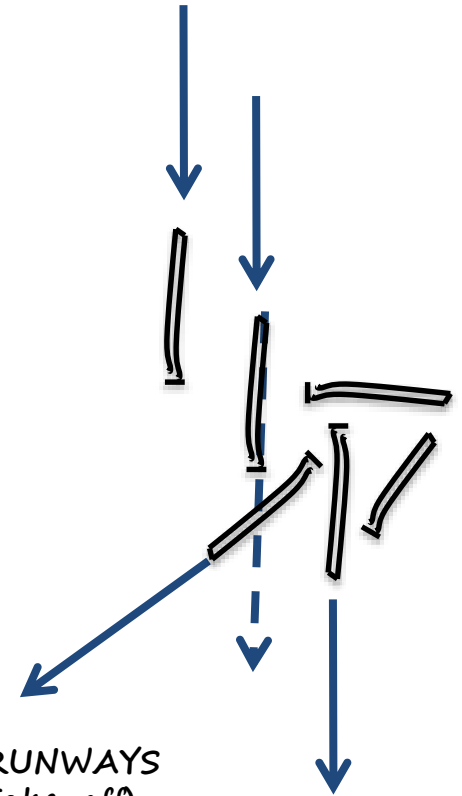


SAFETY REGULATION, TECHNOLOGY AND INNOVATION IN A COMPLEX ENVIRONMENT

PARALLEL DEPARTURE TRACKS



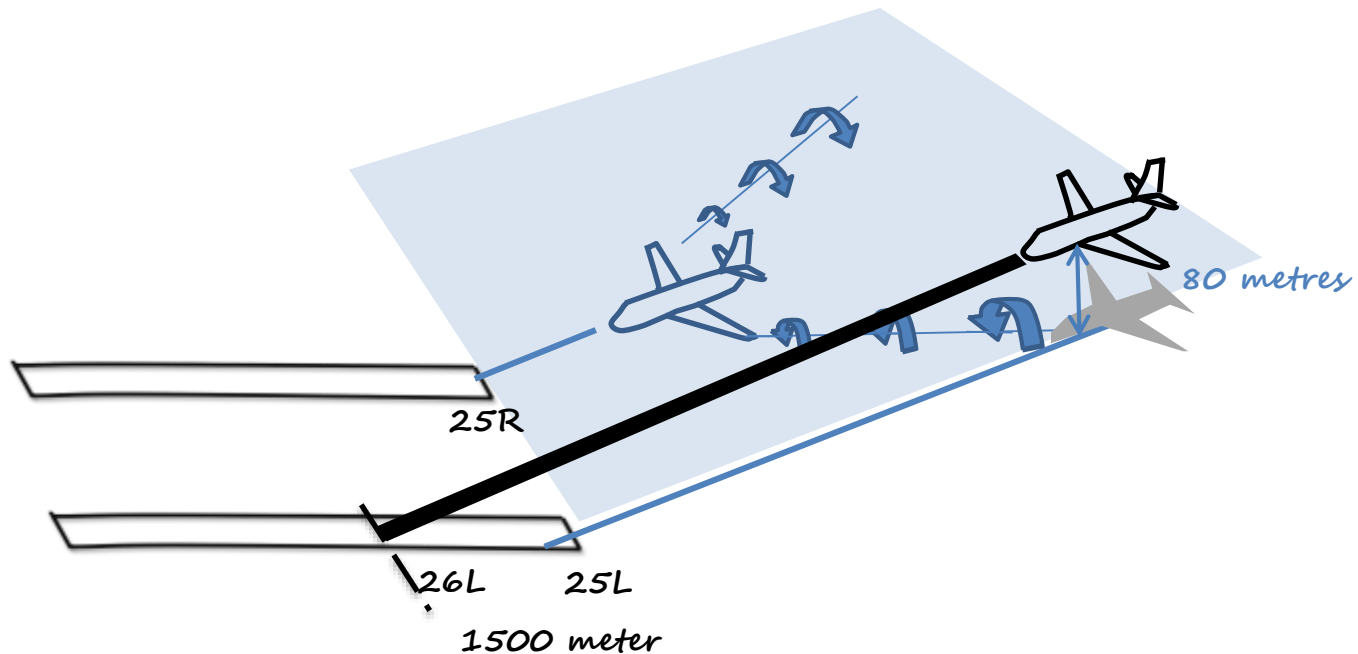
CONVERGING RUNWAYS
(Landing / Landing)



CONVERGING RUNWAYS
(Go-around / Take-off)

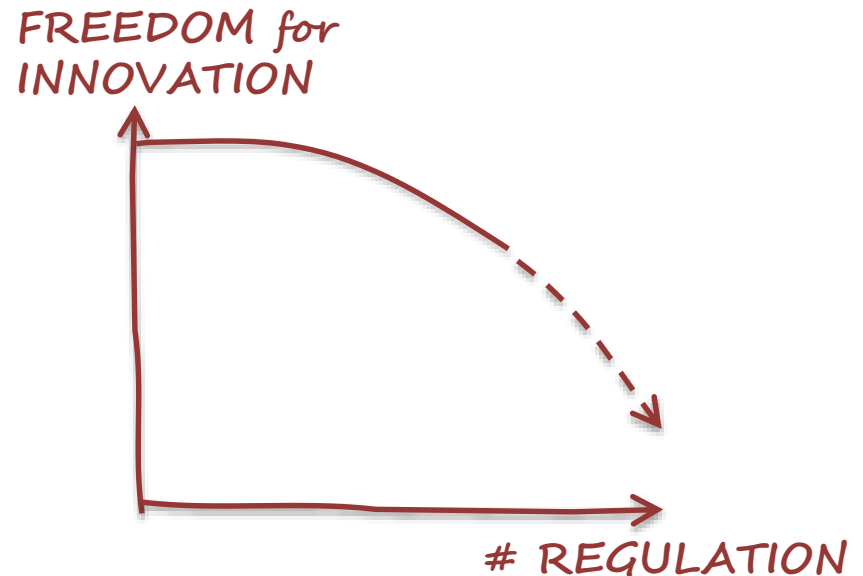
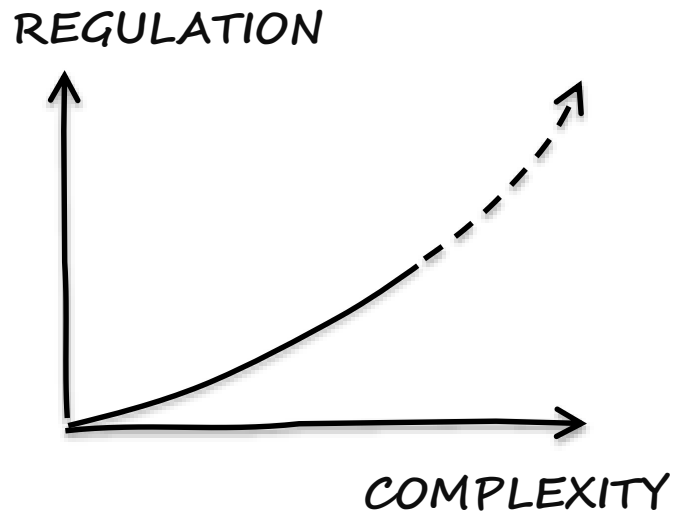
SAFETY REGULATION, TECHNOLOGY AND INNOVATION IN A COMPLEX ENVIRONMENT

DUAL THRESHOLD OPERATIONS / HIGH APPROACH LANDING SYSTEM
(Frankfurt)

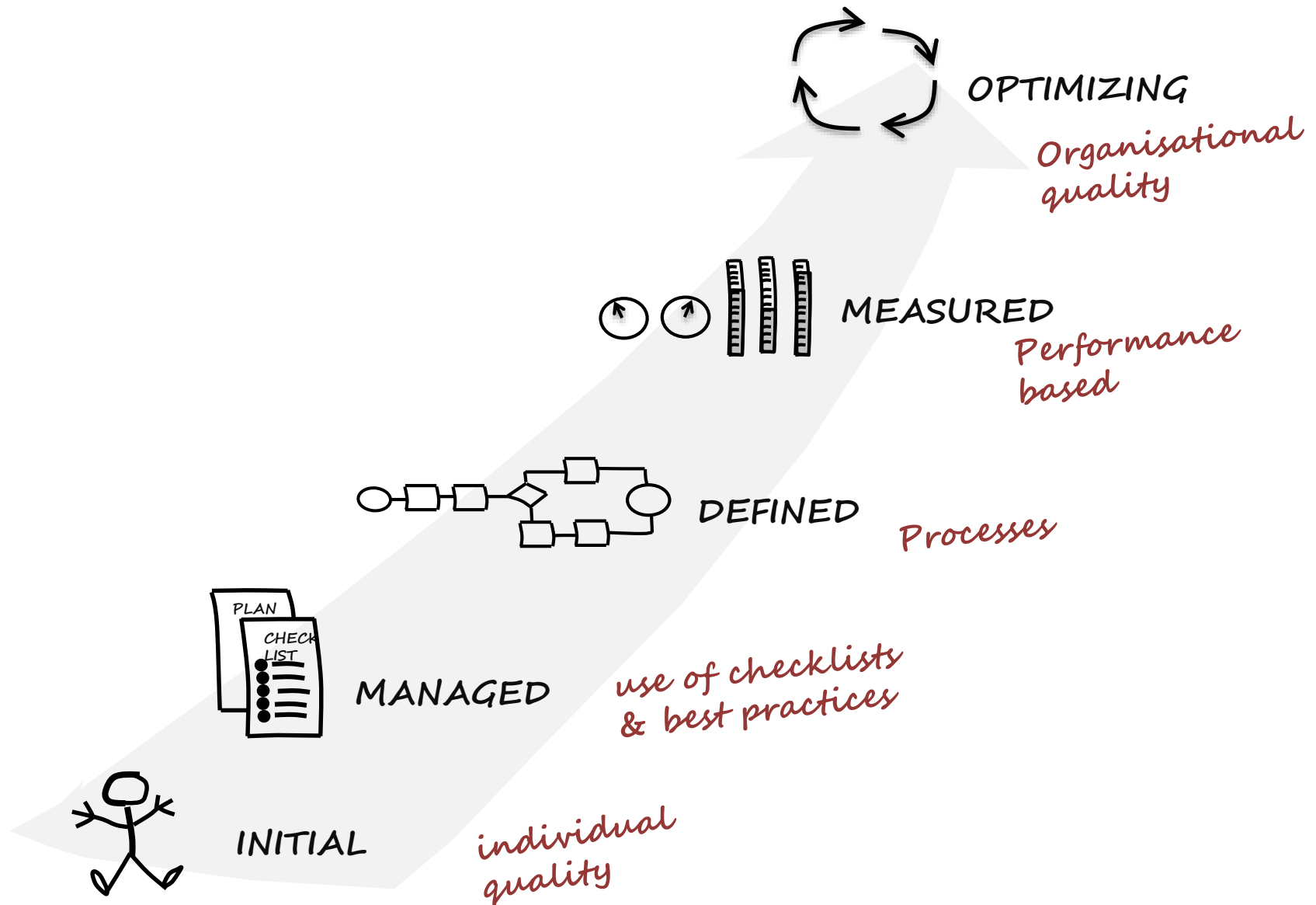


(trial between 1999 and 2004, now stopped)

HOW CAN WE AVOID THAT REGULATION THREATENS INNOVATION IN A COMPLEX ENVIRONMENT?

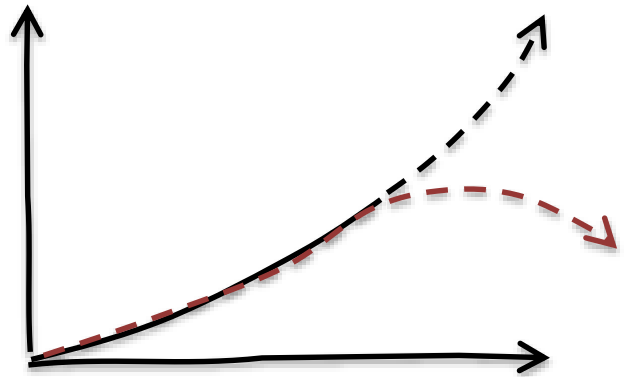


ORGANIZATION PHASES OF MATURITY



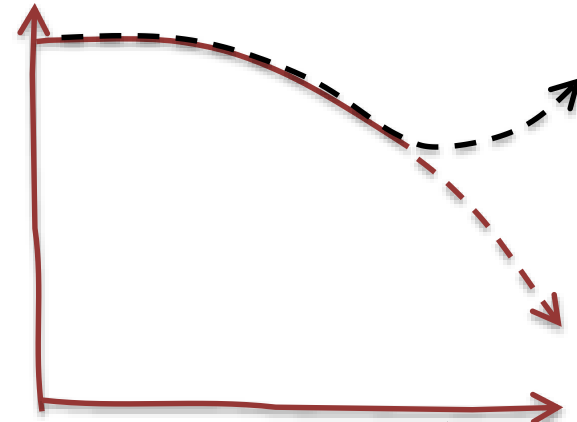
AN ALTERNATIVE APPROACH TO REGULATION IN A COMPLEX ENVIRONMENT

NUMBER OF
REGULATION

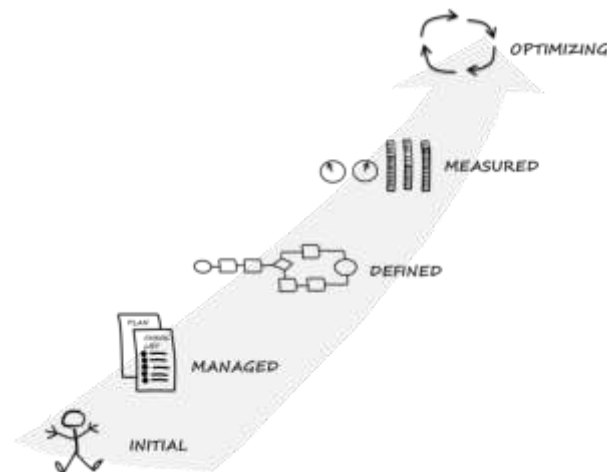


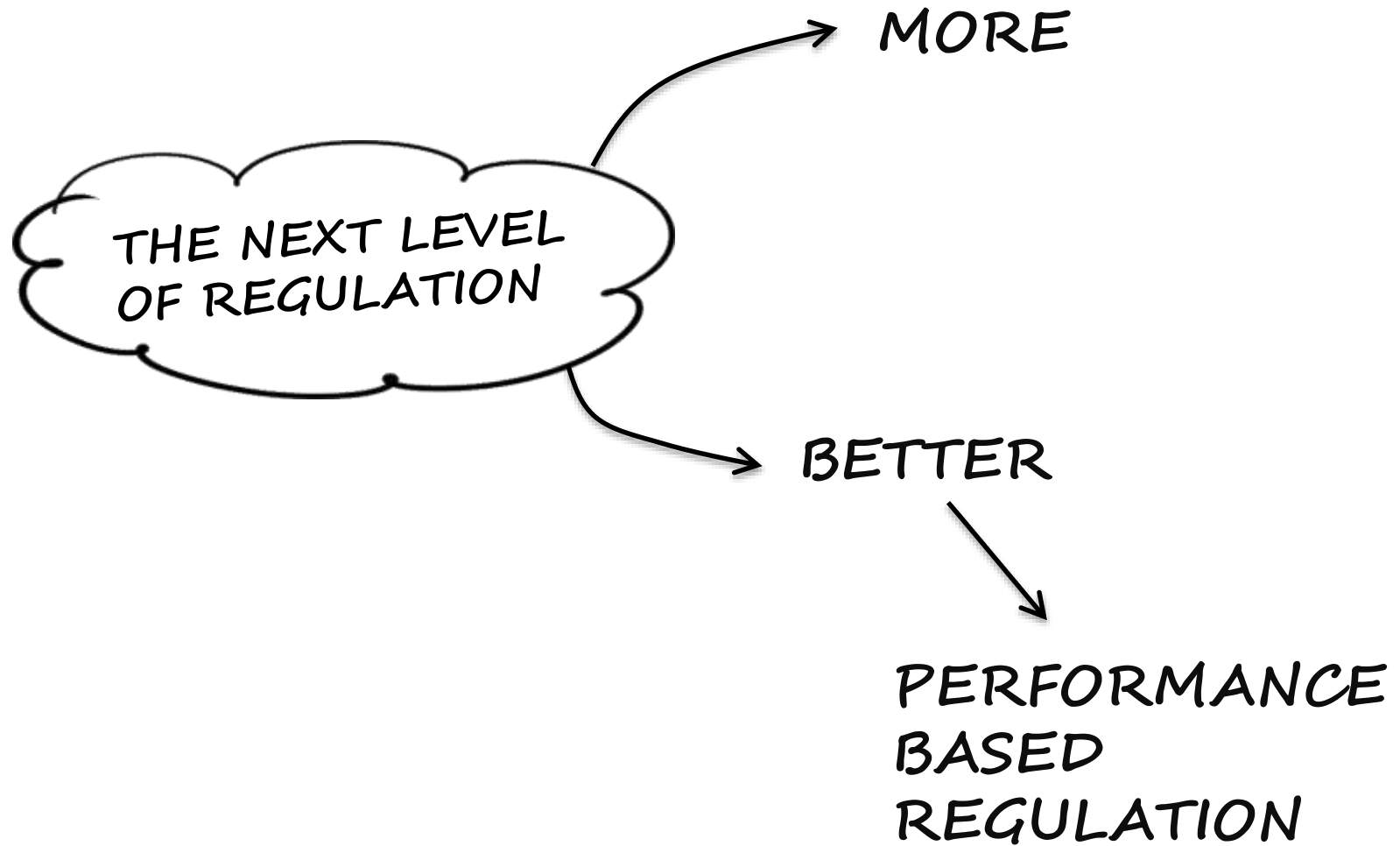
COMPLEXITY

FREEDOM for
INNOVATION



~~REGULATION~~
LEVEL OF







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Air Traffic Management Technologies

COCESNA

COCESNA

In the Central American Region a seamless sky has been implemented by COCESNA since 1960. COCESNA has been delegated the Air Navigation Services of all aircrafts above 20,000 feet by the six Central American States:

1. Belize
2. Guatemala
3. El Salvador
4. Honduras
5. Nicaragua
6. Costa Rica



INTRODUCTION

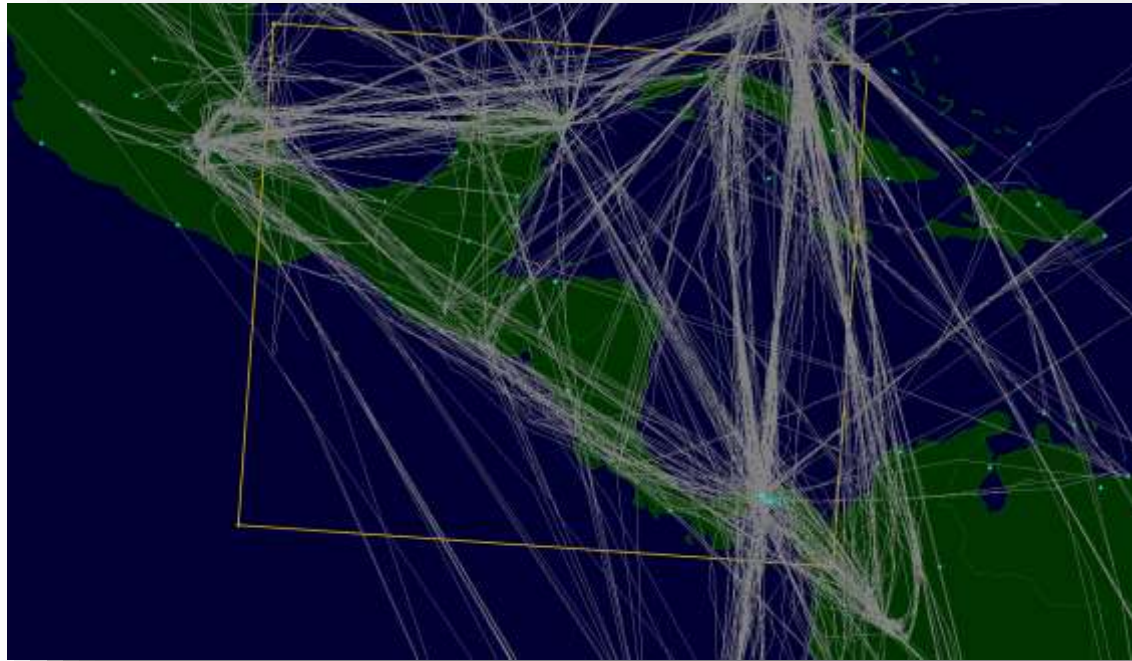
On October 20, 2009 the Latin American Air Transport Association (ALTA) reported that the airline industry will grow 6.6% in the region until 2027.

This growth is reflected in the monthly and annual average increase of operations in CENAMER.

COCESNA should apply every effort to provide sufficient capacity that accommodates normal and maximum traffic levels; however, in implementing any measures to increase capacity, it must ensure, in accordance with specified procedures, they do not jeopardize safety levels.

	1.65%	6.23%	9.72%	5.30%	5.72%
	2.11%	12.87%	3.98%	5.44%	6.10%
	2.18%	9.03%	7.16%	8.15%	6.63%
	5.42%	15.49%	-2.13%	6.79%	6.39%
	7.69%	9.11%	2.44%	7.70%	6.74%
	3.90%	13.69%	1.20%	7.79%	6.64%
	2.85%	10.98%	0.16%	7.10%	5.27%
	2.32%	9.28%	1.89%	13.49%	6.75%
	5.30%	0.51%	9.28%	7.60%	5.67%
	4.66%	11.31%	0.16%	7.65%	5.94%
	5.59%	8.14%	6.13%	4.90%	6.19%
	9.67%	5.69%	6.53%	6.84%	7.18%
	4.40%	9.35%	3.78%	7.40%	6.23%

COCESNAS ATC FLOW MOVEMENT



BUILDING CAPACITY

Increasing ATC capacity is usually achieved by allocating more airspace control resources.

COCESNA has implemented an investment plan that includes:

1. Monitoring system Renewals (AIRCON2100R).
2. Renewals for radio systems AMS, who have the remote management capability.
3. The renewal of the communication system.

These renewals facilitate the employment of new systems, such as:

1. AIDC, whose main objective is to reduce the workload of air traffic controllers and likewise mitigate the error in the coordination by automating all arrangements within the control centers in Central America and control centers adjacent to the CENAMER FIR.
2. ADSC / CPDLC, whose main objective is to increase situational awareness of air traffic controllers, increase safety and optimize the use of airspace of the FIR taking advantage of the avionics on board aircraft in airspace OCEANICO.

BUILDING CAPACITY

At the same time, work is being done to redesign the Central American airspace including the creation of new control sectors.

For this reason, Cocesna, through de ATFM implementation has developed a system for the management of air traffic services that meets the ATS demand.

This system consists on a application that predicts the ATS demand and provides information in regards to a flexible airspace sectorization.

By this means, the renewal of our CNS and the ATFM implementation allows us to plan and adjust the number of sectors and configuration control thereof (the dimensions) in order to ensure safety by balancing workloads by sector and increase the efficiency of ATC resources.

ATS CAPACITY

AIRSPACE DESIGN CENAMER ACC



CALCULATION OF OPTIMUM CAPACITY

According to the ICAO, the Sector Capacity is calculated in 15 minute intervals.

The capacity per sector CENAMER is:

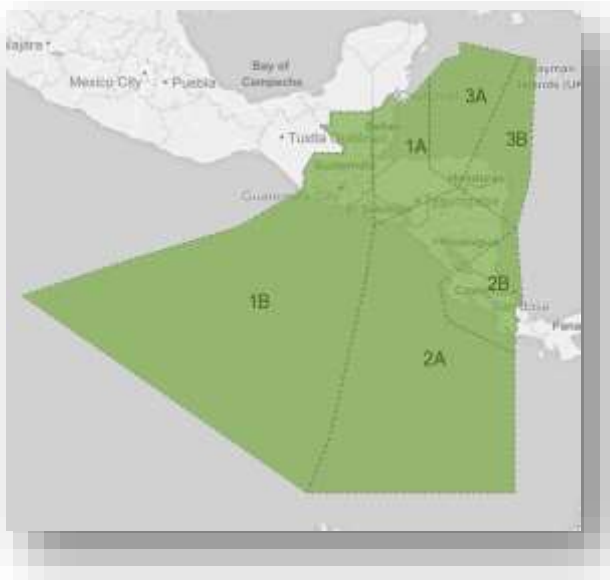
- Sector 1, 15 aircraft
- Sector 2, 17 aircraft
- Sector 3, 18 aircraft

CENAMER ACC, 50 aircraft

Significantly, this capability allows an adjustment of ± 3 aircraft, according to prevailing conditions

BUILDING CAPACITY

AIRSPACE DESIGN CENAMER ACC



BUILDING CAPACITY

CENAMER building capacity, detailed :

- Sector 1A, 13 aircraft, 133.5 Mhz
- Sector 1B, 14 aircraft, 123.9 Mhz
- Sector 2A, 15 aircraft, 135.5 Mhz
- 2B Sector 12 aircraft, 124.1 Mhz
- Sector 3A, 15 aircraft, 124.3 Mhz
- Sector 3B, 17 aircraft, 134.5 Mhz

CENAMER ACC, 86 aircraft

Creating new control sectors results in a increment capacity of 72%.

Thank you...



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MANILA ATM SYSTEM:

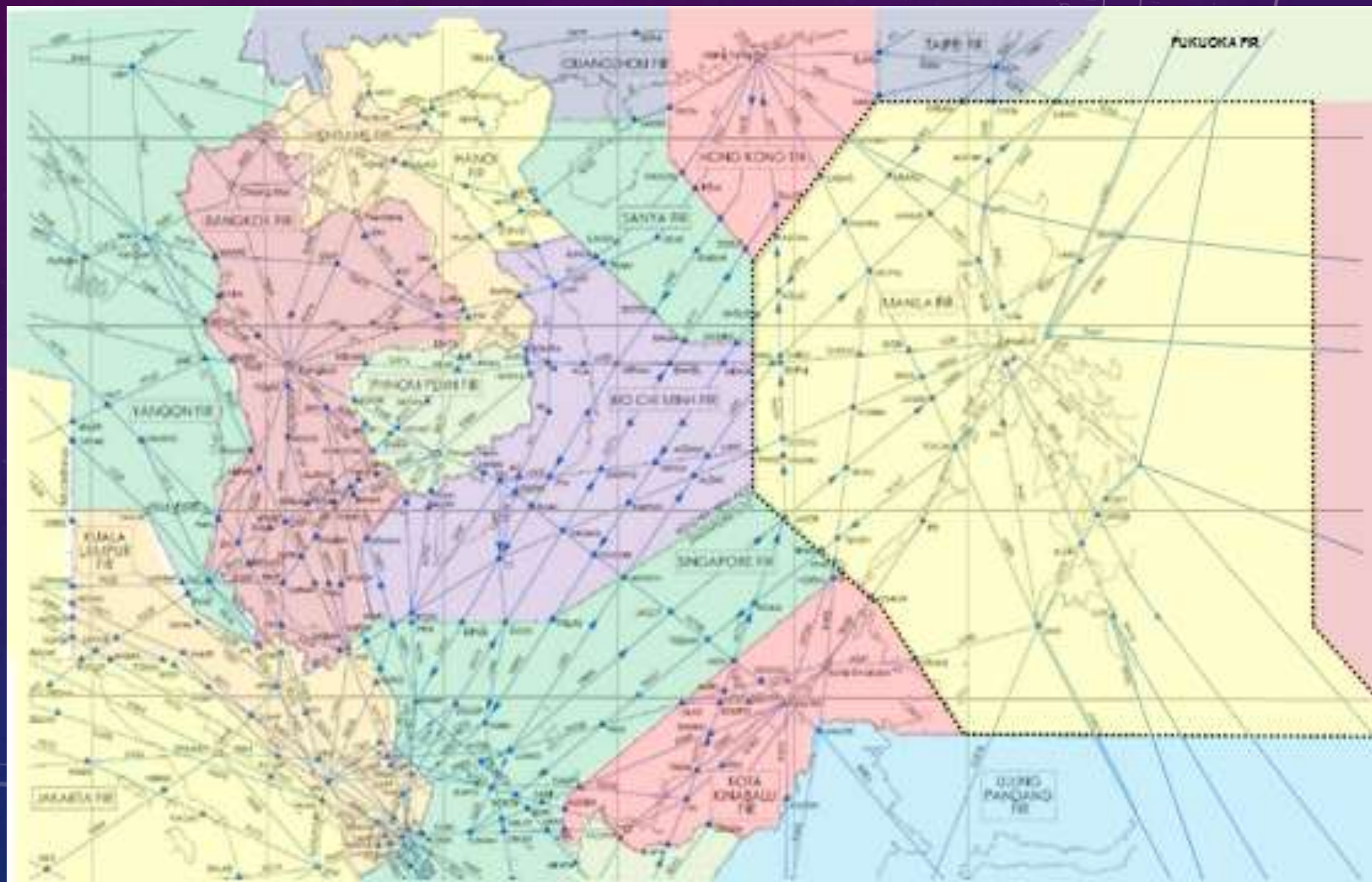


CURRENT AND *FUTURE*

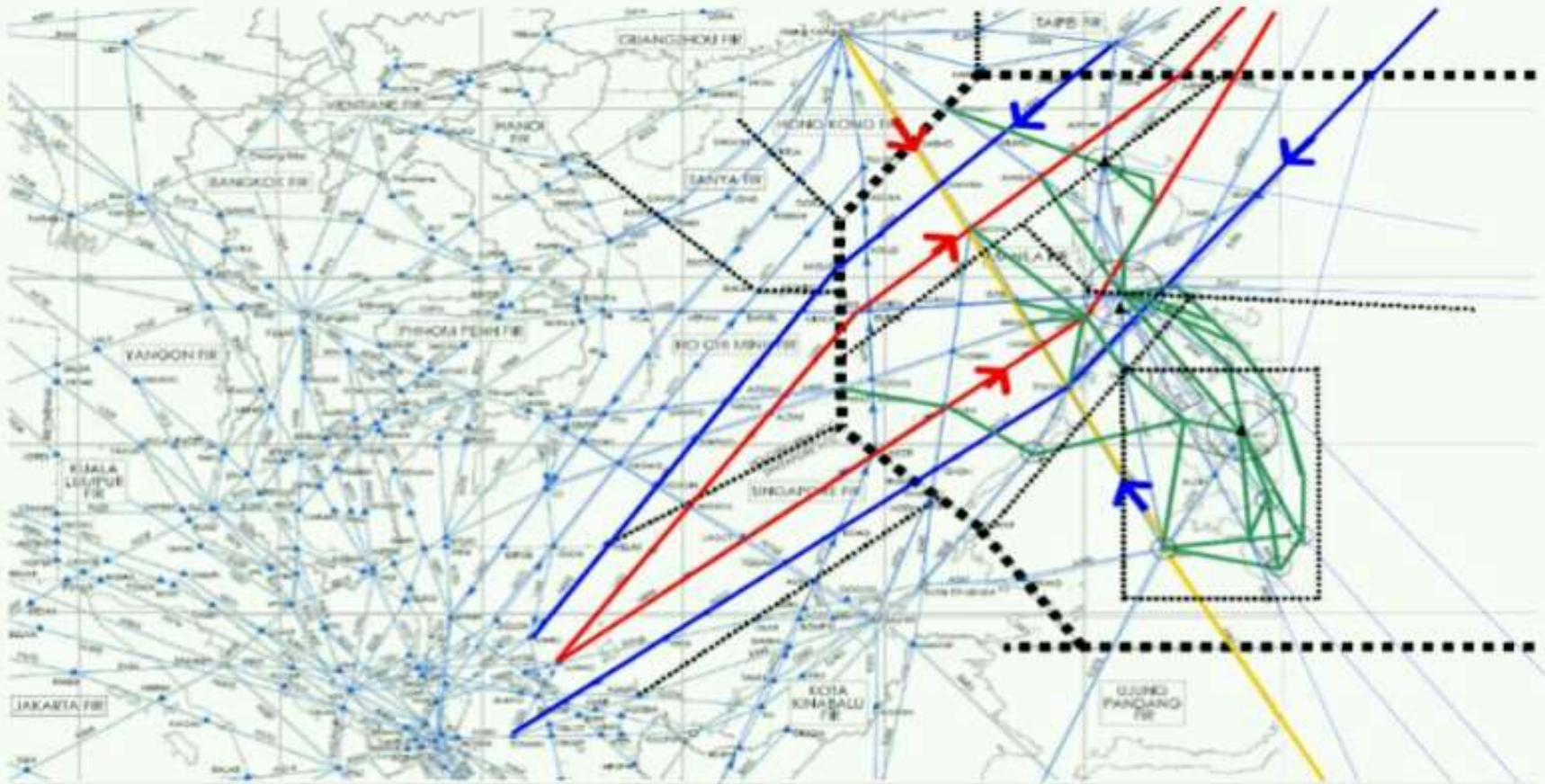
TABLE OF CONTENTS:

- ✓ The Manila FIR Strategic Location
- ✓ Major Traffic Flows
- ✓ Traffic Statistics
- ✓ Current ATM
- ✓ Future ATM

MANILA FIR



MAJOR TRAFFIC FLOWS



TRAFFIC STATISTICS 2014

- **Monthly Average:**

International Flights = 22,921

Airline = 22,263 (97%)

General Aviation = 353 (1.6%)

Military = 305 (1.3%)

Domestic Flights = 13,685

Airline = 13,106 (96%)

General Aviation = (2.7%)

Military = (1.3%)

TRAFFIC STATISTICS 2014

- **Monthly Average:**

- International (Airline)*

- Departure = 4809 (22%)

- Arrival = 4756 (21%)

- Overflight = 12,698 (57%)

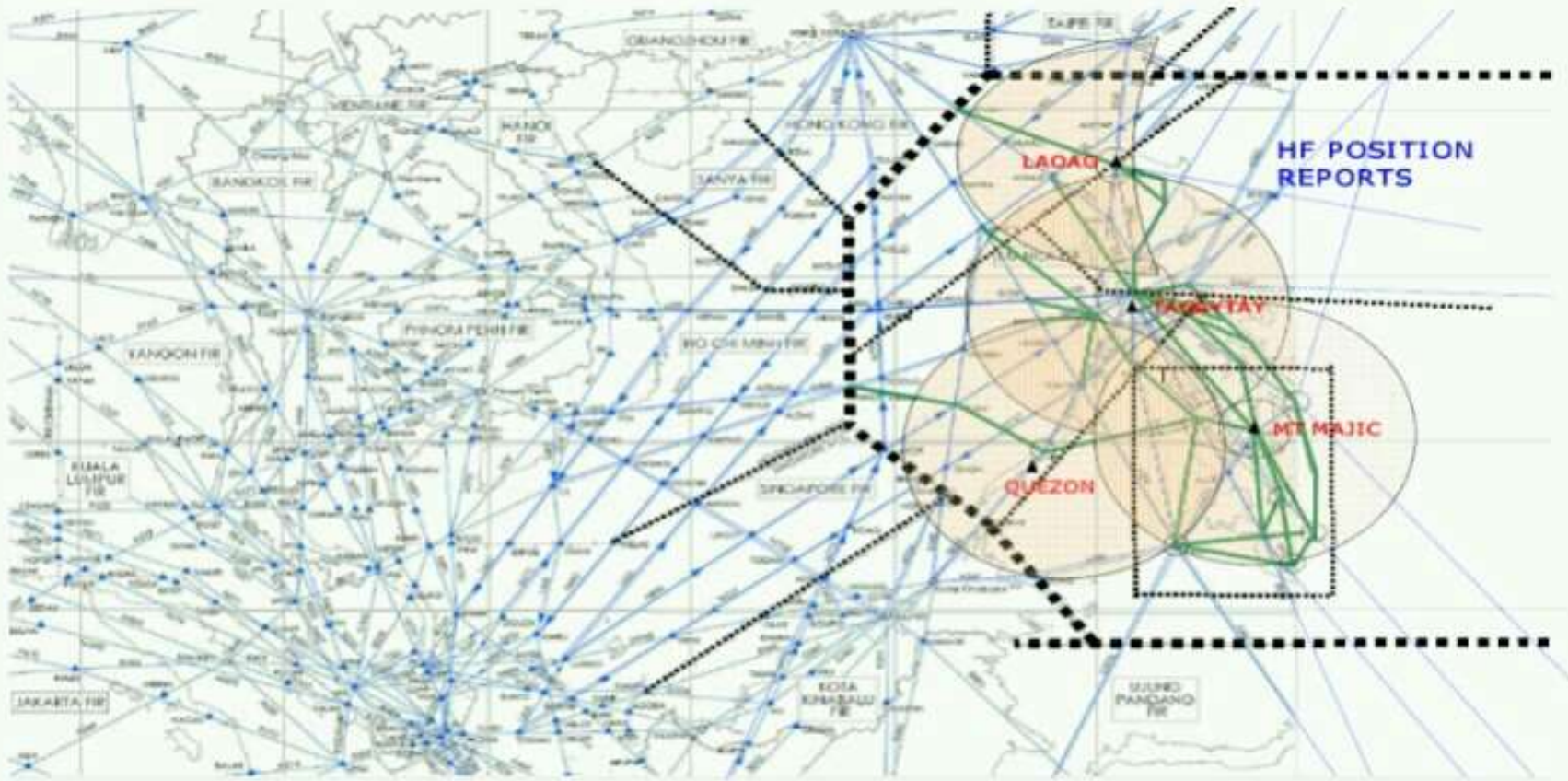
Total International = (62%)

Total Domestic = (38%)

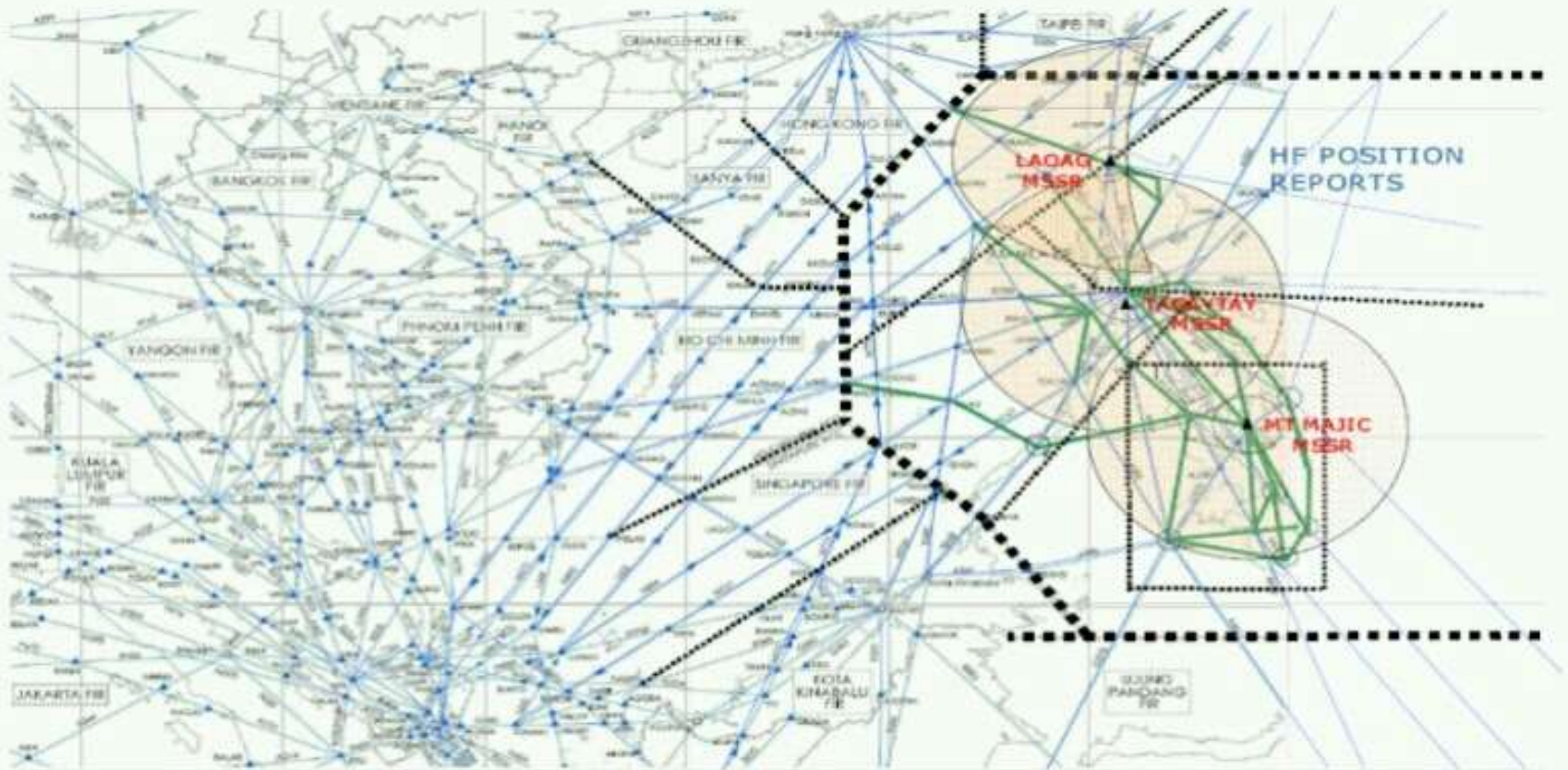
CURRENT ATM

- Based on existing CNS Infrastructure
 - i. Ground-based VHF/HF Communication
 - ii. Three (3) MSSR Surveillance
 - iii. Ground-based Navigational Aids
- Existing ATC Separation
 - i. Oceanic = 10 minutes with MNT/ RNP10
 - ii. Enroute = applicable radar separation
 - iii. Terminal /Approach= radar/PBN

CURRENT AIR – GROUND COMMUNICATION



CURRENT SURVEILLANCE



FUTURE ATM

- Transition Activities

Based on Seamless ATM Plan

7 APAC SEAMLESS ATM PRIORITIES

☐ **PBN**

- Performance Based Navigation

☐ **AIS-AIM**

- Aeronautical Information Management

☐ **AIDC**

- ATS Inter Facility Data Communication

☐ **ATFM/CDM**

- Air Traffic Flow Management

- Collaborative Decision Making

☐ **ASUR**

- ATS Surveillance

☐ **SUA-FUA**

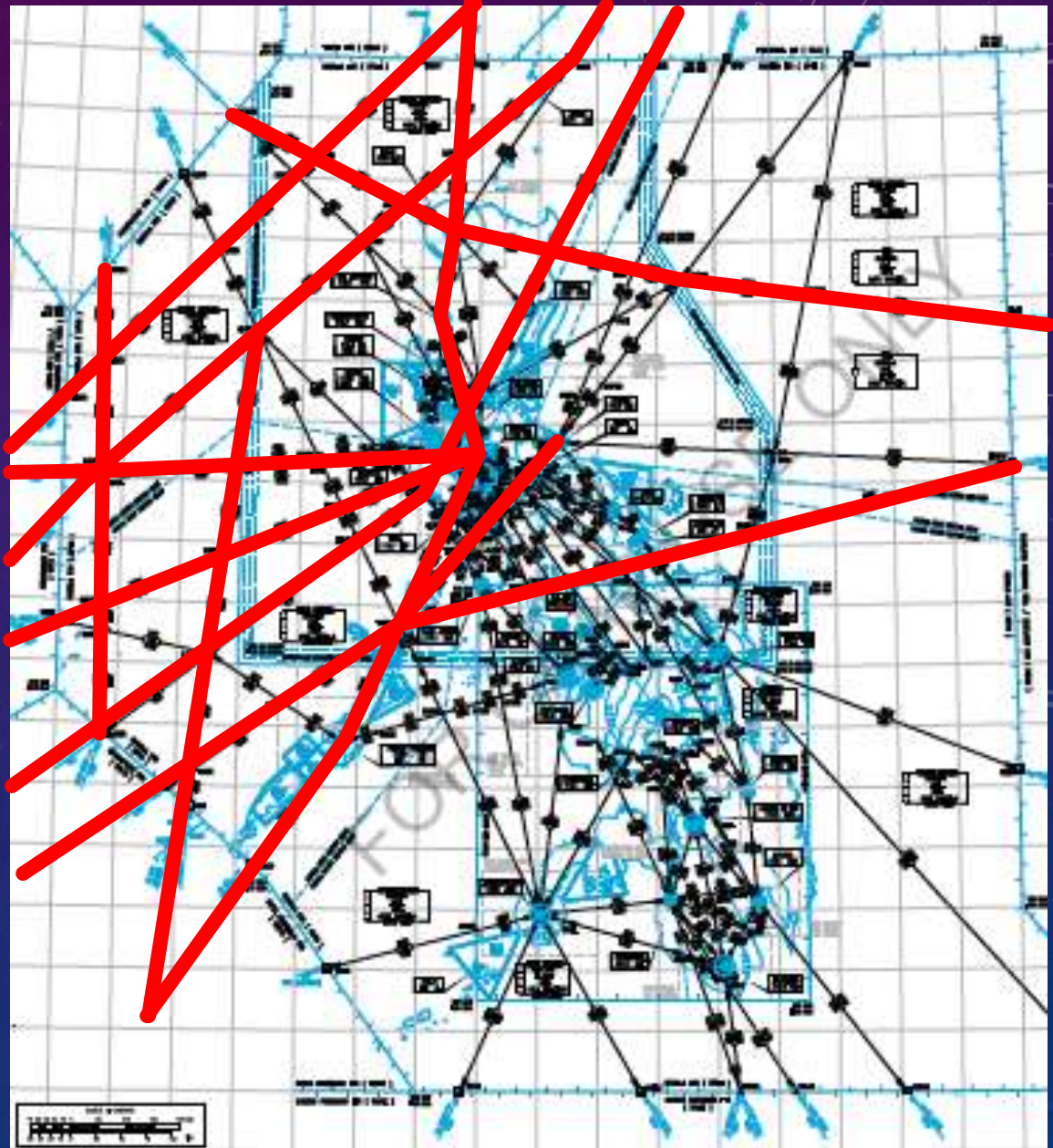
- Flexible Use of Airspace

☐ **ADS/CPDLC**

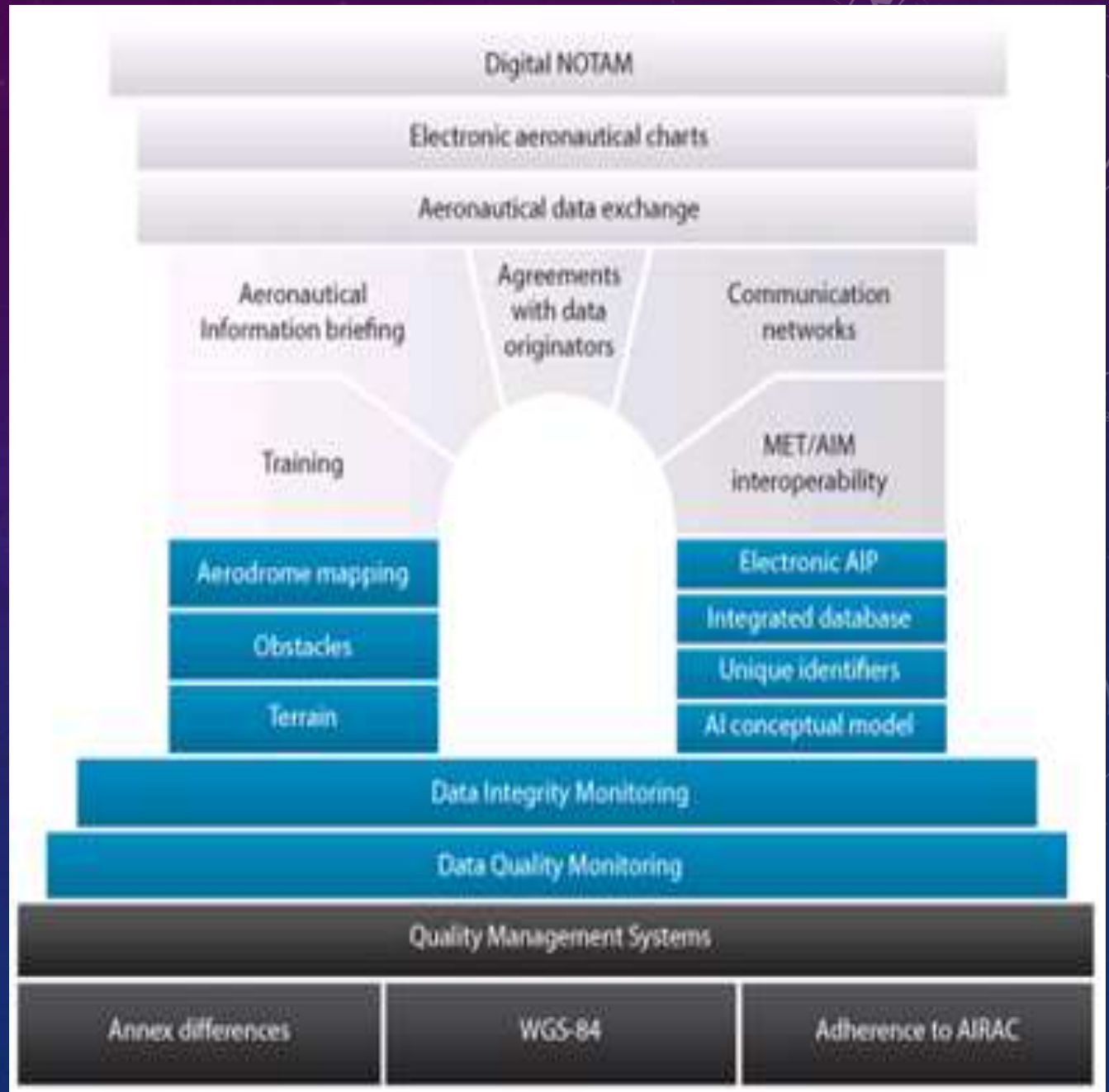
- Automated Dependent Surveillance

- Controller-Pilot Data Link Communication

PBN ROUTES



AIS- AIM



AIDC

ABI (Advance Boundary Information)

EST (Coordination Estimate)

PAC (Pre-activation)

ACP (Acceptance)

TRU (Track Update)

AOC (Assumption of Control)

MIS (Miscellaneous)

LAM (Logical Acknowledgement)

ASM (Application Status Monitor)

FCN (FANS Completion Notification)

CPL (Current Flight Plan)

MAC (Coordination Cancellation)

CDN (Coordination)

REJ (Rejection)

TOC (Transfer of Control)

EMG (Emergency)

TDM (Track Definition Message)

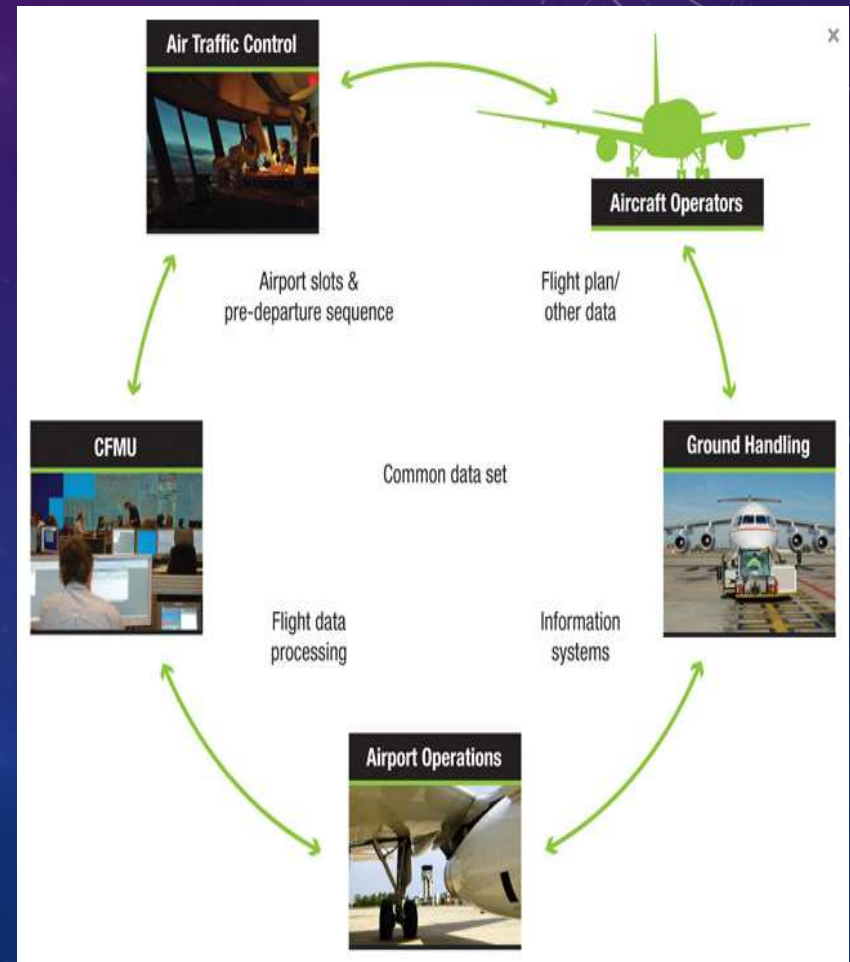
LRM (Logical Rejection Message)

FAN (FANS Application Message)

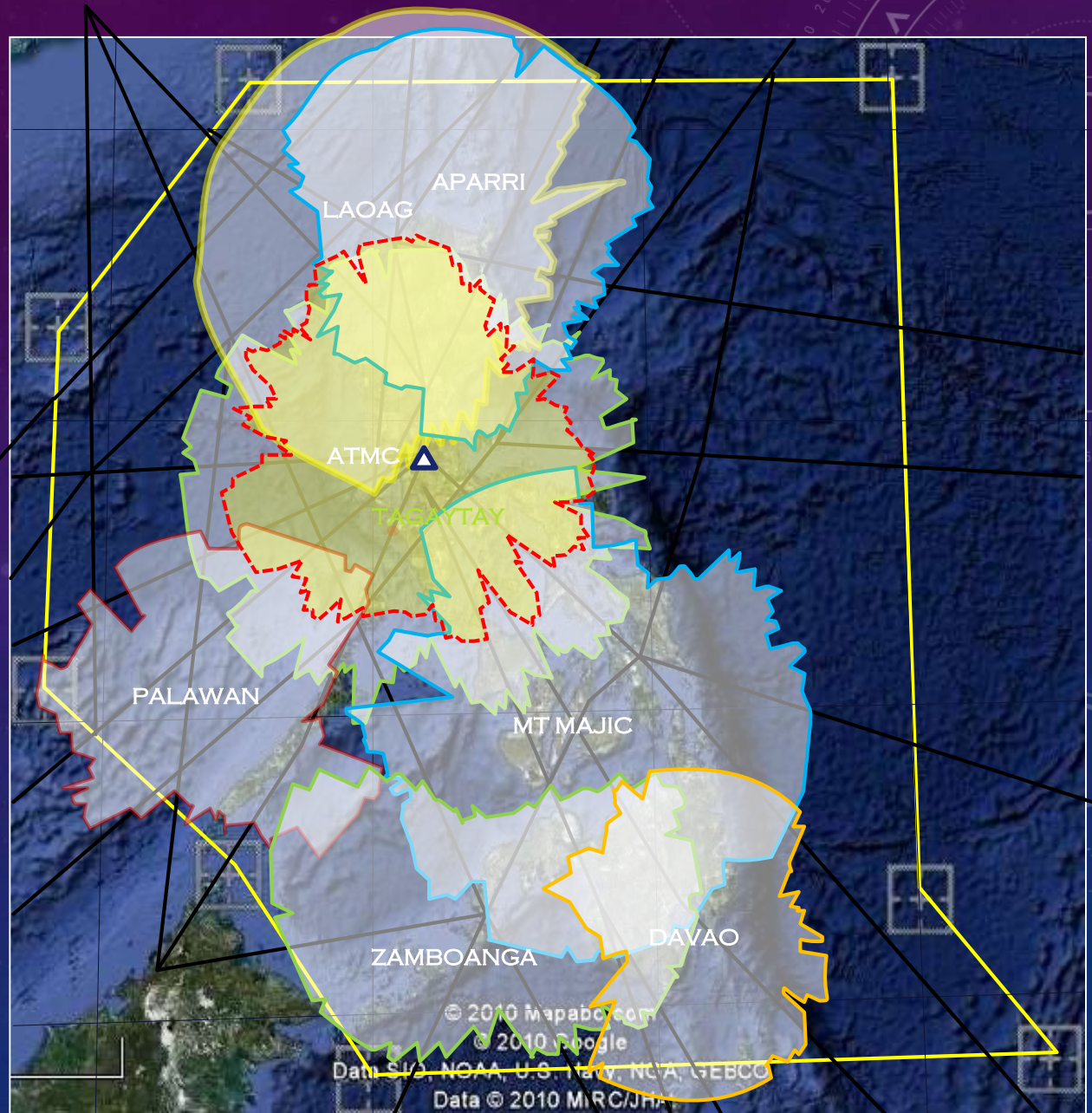
ADS (Surveillance ADS-C)

ATFM/ACDM

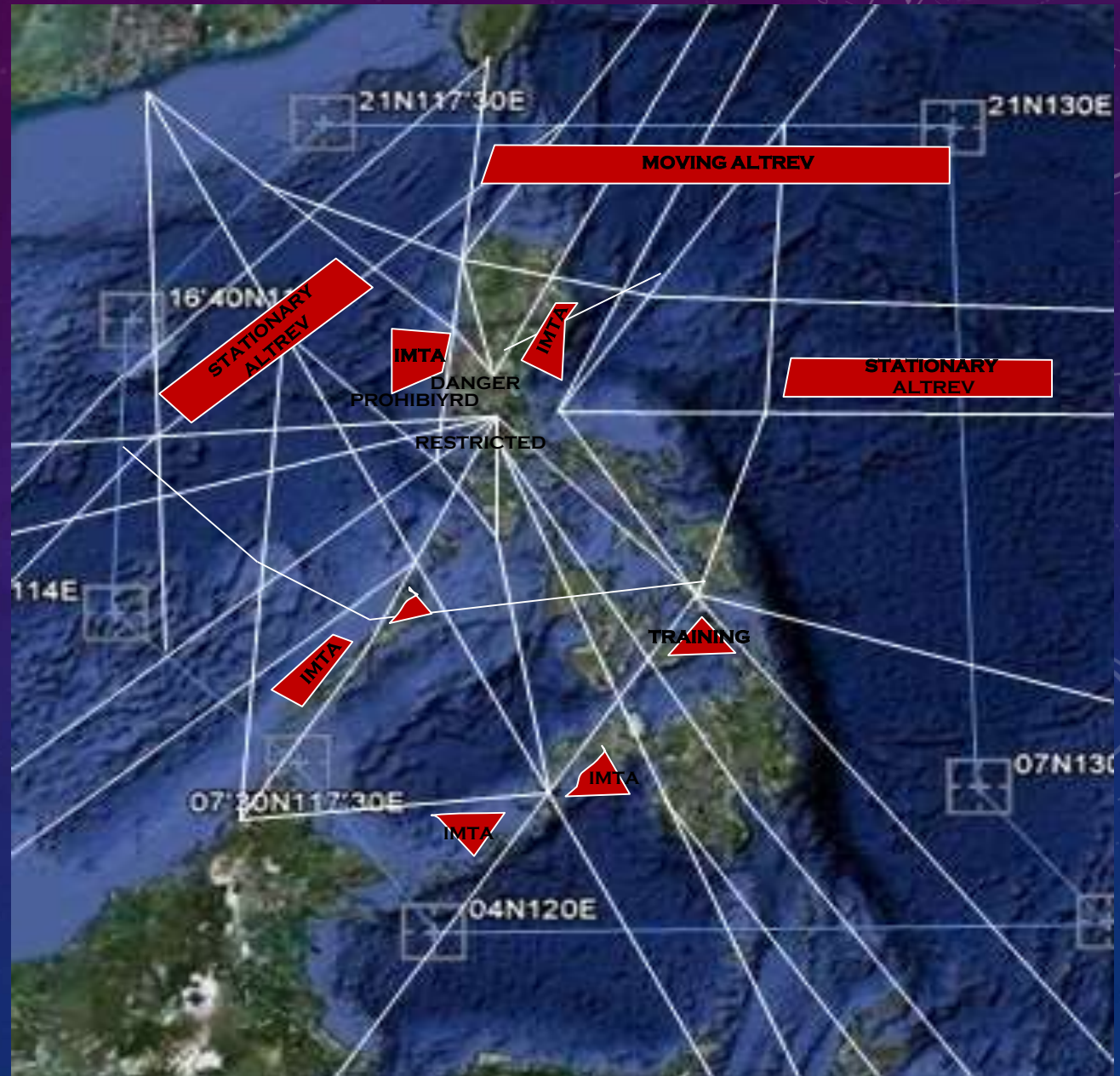
CALL	GATE	GATE	ETA	ETA
SIGN ▼	ET ▼	eATFM ▼	NA ▼	eATFM ▼
PAL431	432	0436	447	0449
JAL741	432	0433	447	0446
CEB384	427	0430	442	0443
PAL407	425	0427	440	0440
		0424		0437
GAP2926		0421	432	0434
CEB7945	415	0418	431	0431
CEB960	415	0415	430	0428
PAL437	412	0412	427	0425
		0406		0422
		0403		0419
GAP2546		0400	413	0416
MAS806	354	0357	410	0413
CEB964	349	0354	404	0410
PAL454	346	0351	401	0407
CEB618	346	0348	401	0404
GAP2266		0345	357	0401
GAP2032		0342	353	0358
GAP2132		0339	352	0355



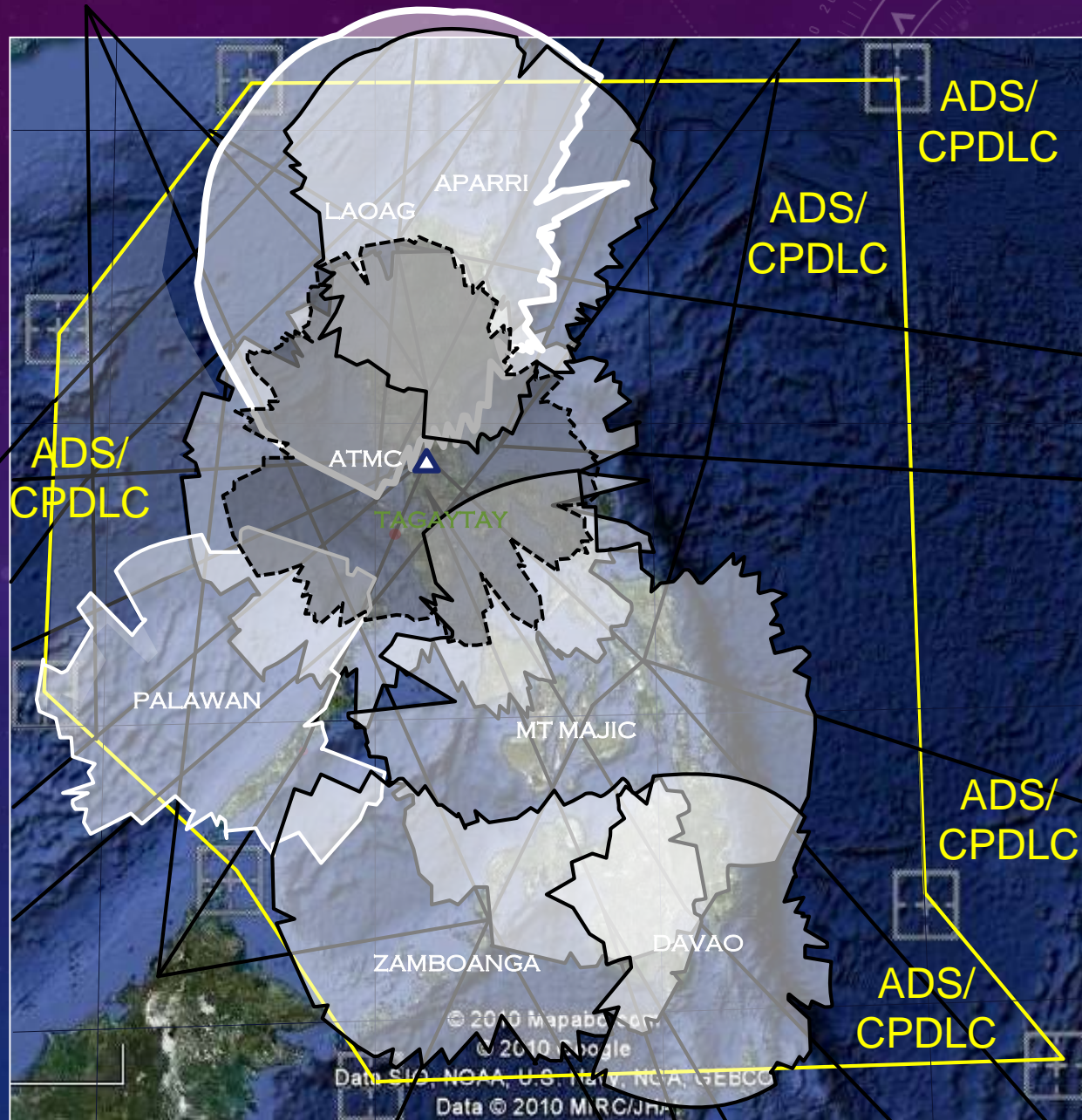
ASUR



SUA-
FUA



ADS/ CPDLC



PHILIPPINE ATM CENTER



The background is a deep blue gradient with a subtle pattern of white stars. Overlaid on this are several faint, white, circular graphic elements. In the top right, there is a large circular scale with numerical markings from 0 to 210 in increments of 10, and a dashed line with an arrow pointing clockwise. In the bottom right, there are concentric circles with dashed lines and arrows. In the bottom left, there is a partial circular graphic with an arrow. The text is centered in the middle of the image.

THE FUTURE IS IN THE SKIES!