Balancing Safety Against Other Constraints
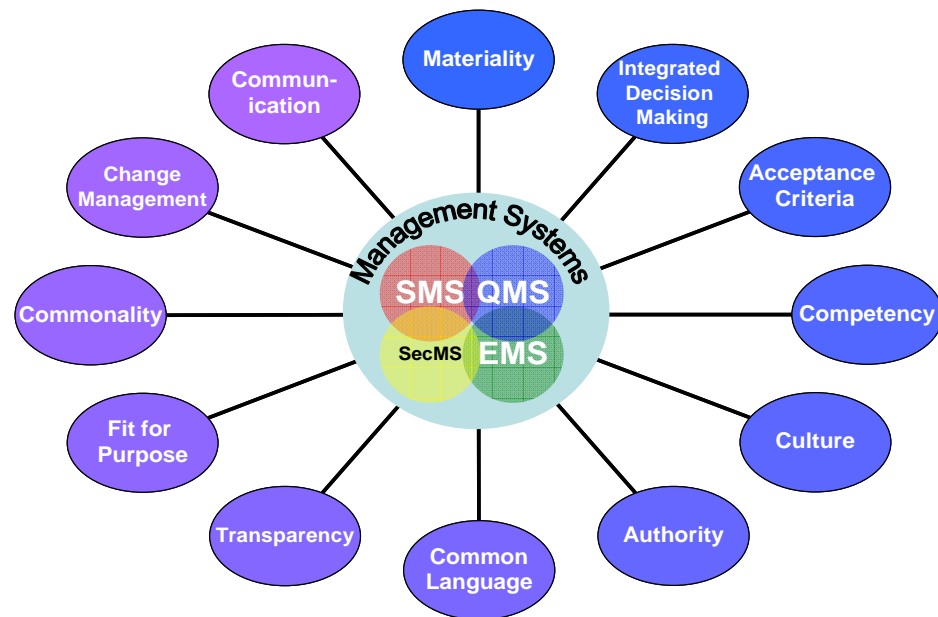
Tony Licu, EUROCONTROL
antonio.licu@eurocontrol.int
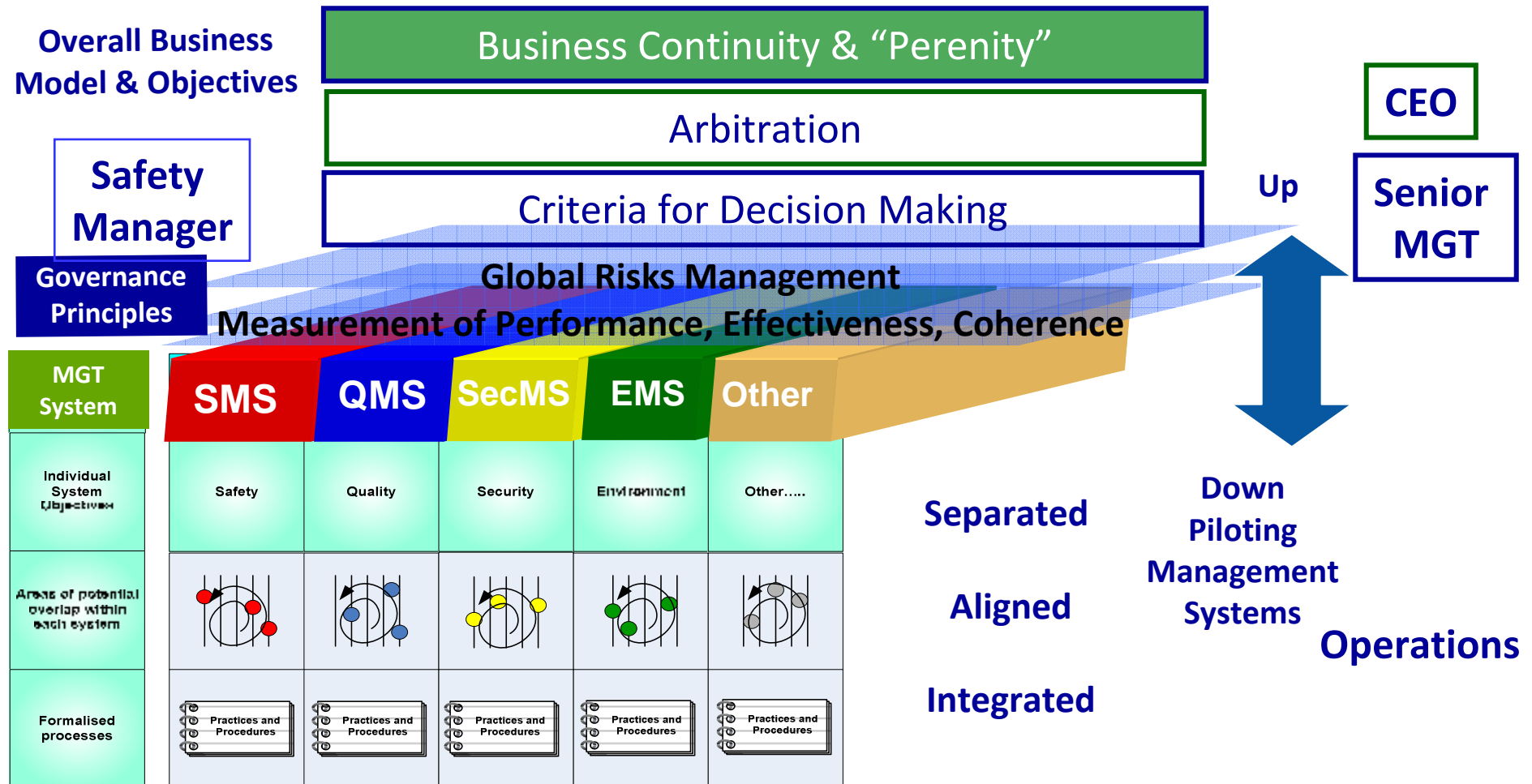**Belgrade, October 27th 2010**

EUROCONTROL

Governance Principles of Management Systems

Governance Principles of Management Systems

• "Overlay" of best practice

• A series of principles which will assist ANSPs with their current management systems.

• Working across Management Systems

What are Governance Principles how it links with safety and other trade-offs ?

Overall Business Model & Objectives

Business Continuity & "Perenity"

Safety Manager

Governance Principles

Arbitration

Criteria for Decision Making

Global Risks Management

Measurement of Performance, Effectiveness, Coherence

CEO

Senior MGT

Up

MGT System	SMS	QMS	SecMS	EMS	Other
Individual System Objectives	Safety	Quality	Security	Environment	Other.....
Areas of potential overlap within each system					
Formalised processes	Practices and Procedures	Practices and Procedures	Practices and Procedures	Practices and Procedures	Practices and Procedures

Separated

Aligned

Integrated

Down

Piloting Management Systems

Operations

Conflicts as per Governance Principles

Conflicts?

- ……an *actual* or *perceived* opposition of requirements between one or more management system. It represents an **"inefficiency"** within the system and results in a poorer performance of the management system
  - e.g. conflict between capacity and environment
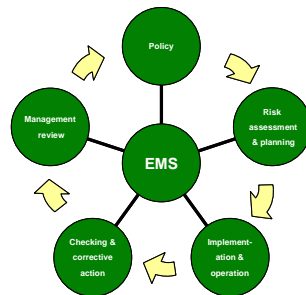
Why are conflicts an issue?

- ……are our management decision making process healthy ?
  - Wrong priorities
  - Delays
  - Wastage in system
  - Reduced effectiveness & Poor use of resources, etc
  - Are we still safe ?

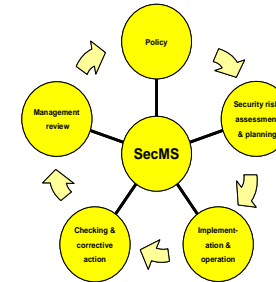# Today Need for Trade-Offs – examples of conflicts

- Balancing Noise Criteria vs Safety Objective
  - Crosswind and tailwind operations to major airports
  - Complex departure/ approach routes in TMA to minimise noise, etc.
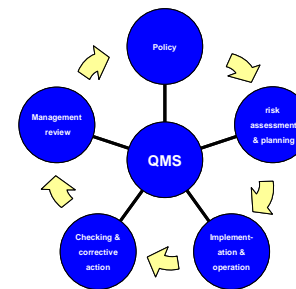

- Capacity vs. environment
  - Increasing use of CDA provides a challenge to maintain capacity in busy airspace

- Security vs. efficiency
  - Security measures reducing ability to perform efficiently, e.g. multiple passwords

- Resource allocation between the different management systems, etc.

A Way of Managing Conflicts and Priorities
Safety is more than just no accidents
Efficiency is more than just no delays

➔ Resources Allocation between Management Systems

- *Authority:* *Better balance of authority, alignment not only in terms of top-down within a system but also across the system(s) to drive improvement of efficiency and add value through a risk management approach*

- *Commonality:* *Utilization of overlaps*

- *But how to do that and with what tools ? How about balancing data and subject matter expert input ? What about tangible and intangible issues?*

➔ Optimisation is the balance between the two

Robert McNamara on Measurement

→ **"Measure what is important; don't make important what you can measure"**

Robert McNamara, US Secretary of State for Defence during the Vietnam War, advising his air force chiefs, when he discovered that they were using the number of buildings destroyed by bombs as a critical success factor

The 'McNamara Fallacy'

→ The first step is to measure whatever can be easily measured.

This is okay as far as it goes.

→ The second step is to disregard that which can't be measured or give it an arbitrary quantitative value.

This is artificial or misleading.

→ The third step is to presume that what can't be measured easily really isn't very important. This is blindness.

This is blindness.

→ The fourth step is to say that what can't be easily measured really doesn't exist.

This is suicide.

from …..Smith, The Last Day of Cowboy Capitalism, THE ATLANTIC MONTHLY, Sept. 1972, at 43, 54 (quoting Daniel Yankelovitch).

We need to measure not to count !

"Quantification has been the rage in business and economics these past 50 years. Accountants have proliferated as fast as lawyers. Yet we do not have the measurements that we need.

…Neither of our concepts nor our tools are adequate for the control of operations, or for managerial control. And, so far, there are neither concepts nor the tools for business control…

…In the past years we became increasingly aware of the need for such measurements. It may take years, decades perhaps, until we have the measurements we need in all areas. But at least we know that we need new measurements and what they have to be. Slowly, still groping, we are moving from counting to measuring.

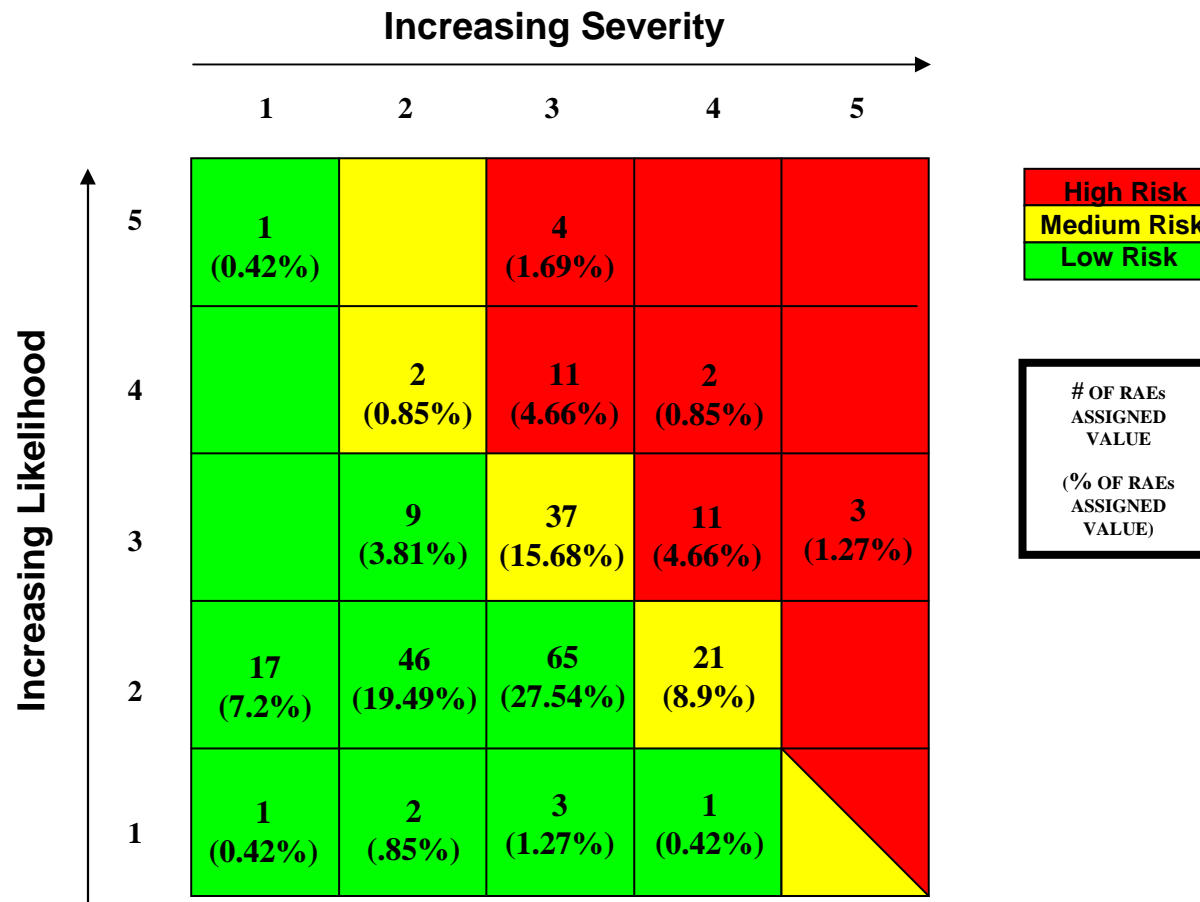*from …..Peter Drucker – Wall Street Journal "We need to Measure, Not Count."*

Risk Management System

→ Aviation Safety is driven by a clear commercial requirement to manage the operational risks an airline or an ANSP faces in a proactive manner.

→ Through the integration of an organisational learning model within the risk management cycle (airlines & ANSPs can understand what range of event inputs (from individual errors to commercial threats), a 'system sensory net' needs to gather from a wide range of technical, human performance and system data)

→ These risk trigger signals are then fed into an intelligence process, classifying and analysing causal patterns. In turn, this drives decision-making, intervention design and monitoring.

→ This way the cycle of learning and organisational memory then continues.

Risk Management System - Tools

→ Risk Analysis Tool – RAT. Retained in the SES IR 629/2010 on performance and operated by FAA as Oct 2009

Increasing Severity

	1	2	3	4	5
5	1 (0.42%)		4 (1.69%)		
4		2 (0.85%)	11 (4.66%)	2 (0.85%)	
3		9 (3.81%)	37 (15.68%)	11 (4.66%)	3 (1.27%)
2	17 (7.2%)	46 (19.49%)	65 (27.54%)	21 (8.9%)	
1	1 (0.42%)	2 (.85%)	3 (1.27%)	1 (0.42%)	

Increasing Likelihood

High Risk
Medium Risk
Low Risk

\# OF RAEs ASSIGNED VALUE

(% OF RAEs ASSIGNED VALUE)

Actual results of the **236** events reviewed thus far this year, using the ATO SMS risk matrix and risk assessment program jointly developed by FAA & EUROCONTROL

Detailed analyses are triggered by a loss of separation greater than 34% of standard separation.

Serious Loss Event = High Risk Matrix Event (Red)

Risk Management System - Tools

✈ Aerospace Performance Factor -

Risk Management System - Tools

→ Aerospace Performance Factor – not just in Europe

- Improve total system performance by leveraging state-of-the-art air traffic management technology and procedures

- Increase capacity and efficiency at congested airports and in constrained airspace by implementing airspace modifications, procedures and technologies

- Promote early international collaboration to develop and harmonize standards for technology, procedures, airspace changes and environmental stewardship

- Expand the use of modeling and simulation to examine and enhance service and efficiency

- Ensure the efficient management of the NAS while supporting security, environmental and defense interests

Metrics:

- Establish and evaluate aerospace performance factors for safety

- Establish and evaluate aerospace performance factors for efficiency

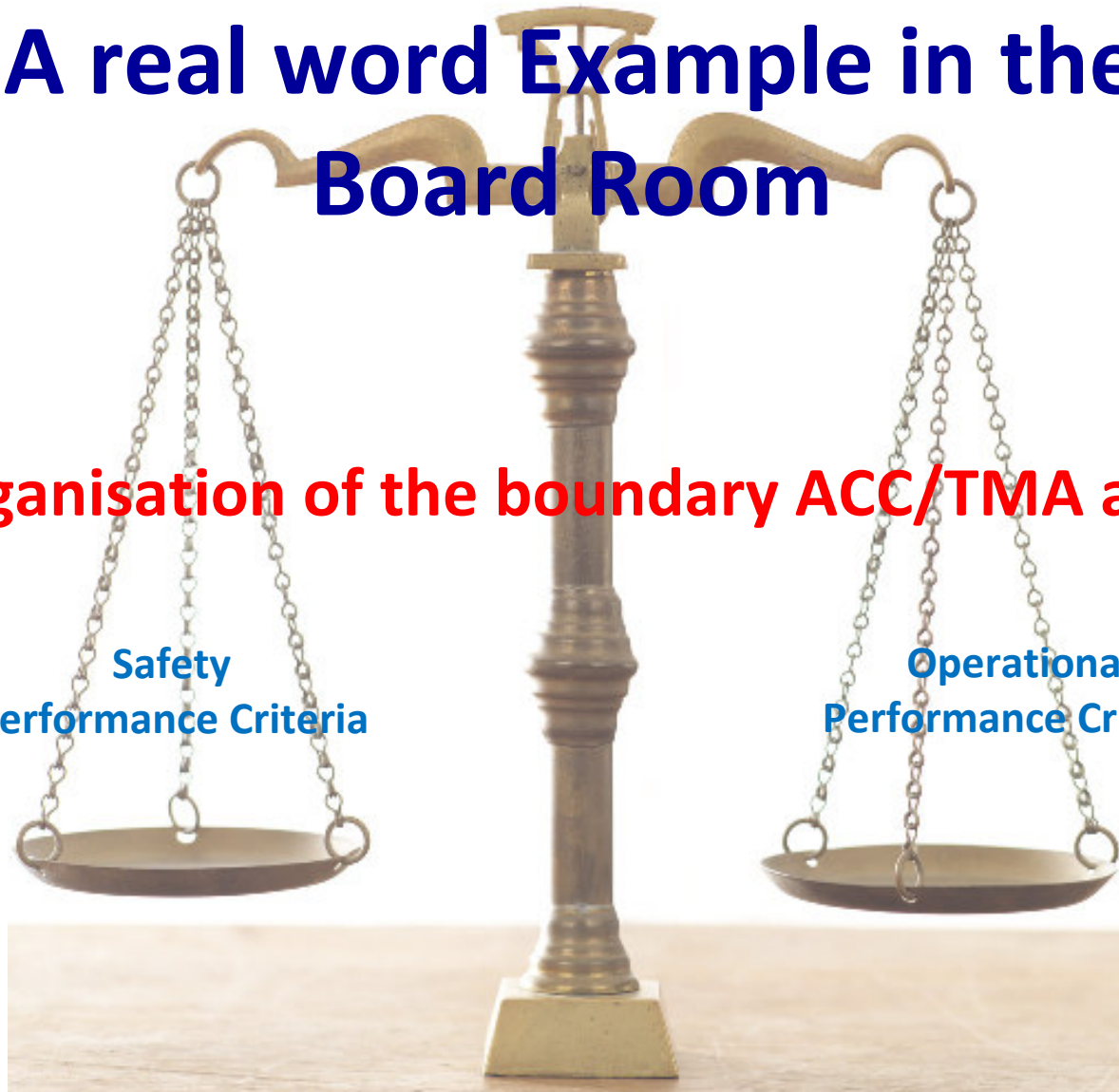- Adjusted operational availability performance target

15

A real word Example in the Board Room

Reorganisation of the boundary ACC/TMA airspace

Safety
Performance Criteria

Operational
Performance Criteria

15

Objective: Reduce Noise Nuisance

Proposed solution: raise the ILS interception altitude

Environment friendly

Procédures environnementales
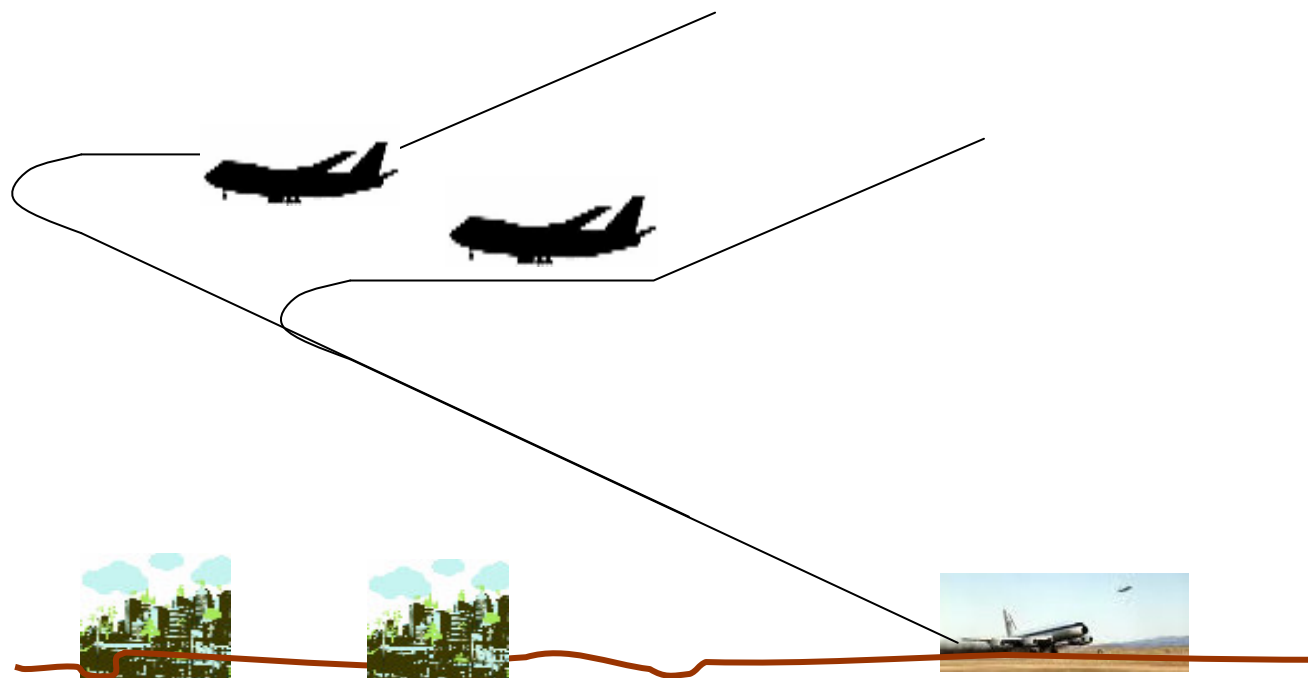
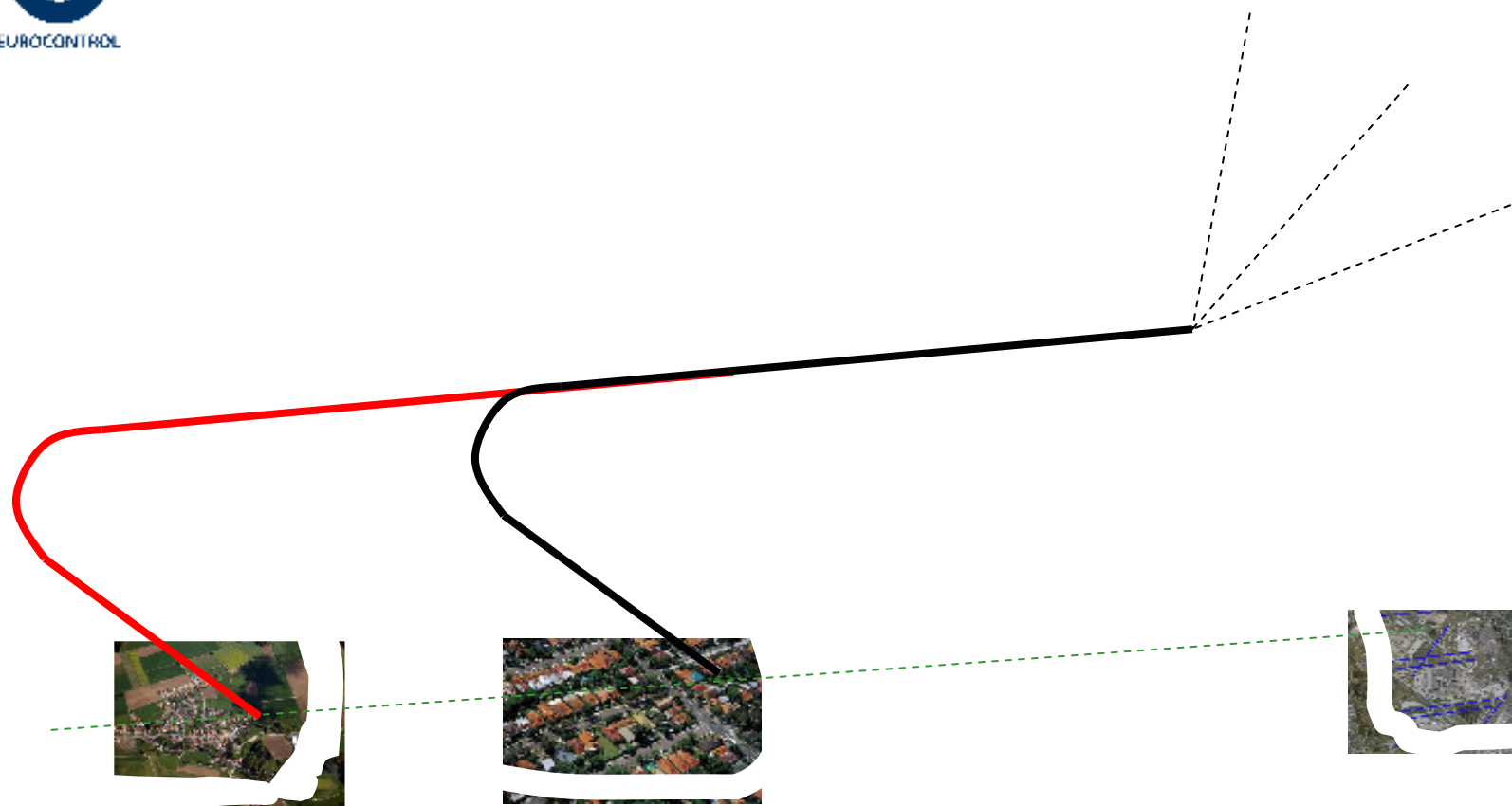Standard interception

Interception standard

Procédures capacitives

ATC friendly

In brief, the lower the interception altitude the more flexibly the traffic can be handled

Conversely the higher the interception altitude the more constraining it becomes for ATC

Effect of increased track distance.

- Rough calculation of CO^2 emission increase
- Estimated average of 6Km track distance increase (~3NM)
- Assuming this will affect only 1/3 of all arrivals: ~ 30 000 flights
- Total additional flown distance would be 3x30 000=90 000NM
- Assuming an average speed of 3.5NM/min this would mean 90 000/3.5~25 000 additional minutes of flight
- Assuming a consumption of 100kg/min (aircraft are levelled at slow speed)
- This in turn means 25 000x100=2 500 000 kg additional fuel burnt
- Knowing that 1kg JetA1 burnt produces 3,1Kg CO2, this means an increase in CO2 production of 3.1x2 5000 000 ~7 500 000 kg ~ seven thousand tons
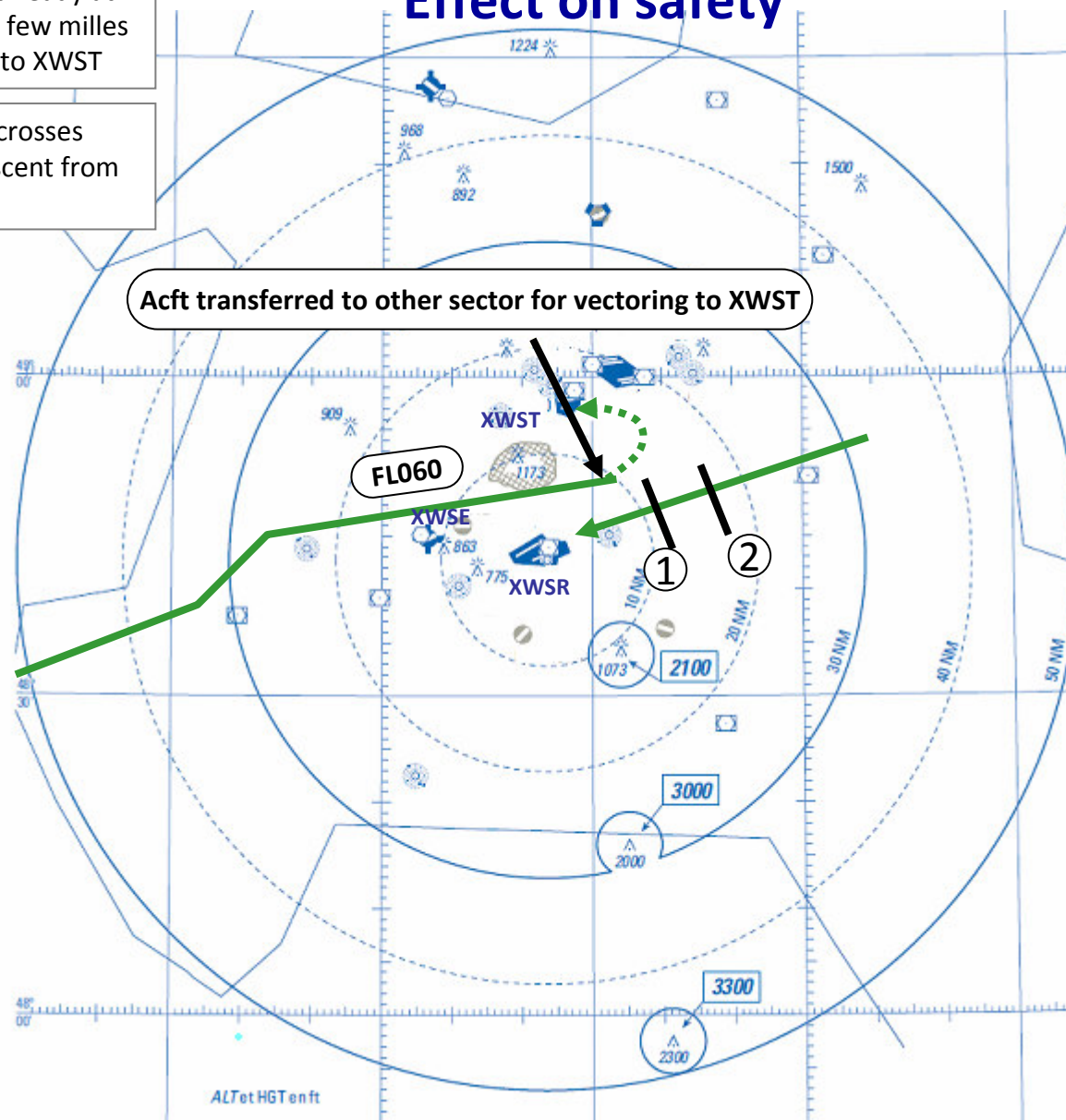
Effect on safety

① Case acft to XWSR already at 3000' levelled for a few milles when crossing acft to XWST

② Case acft to XWSR crosses acft to XWST in descent from 4000'

Acft transferred to other sector for vectoring to XWST

XWST

FL060

XWSE

XWSR

① ②

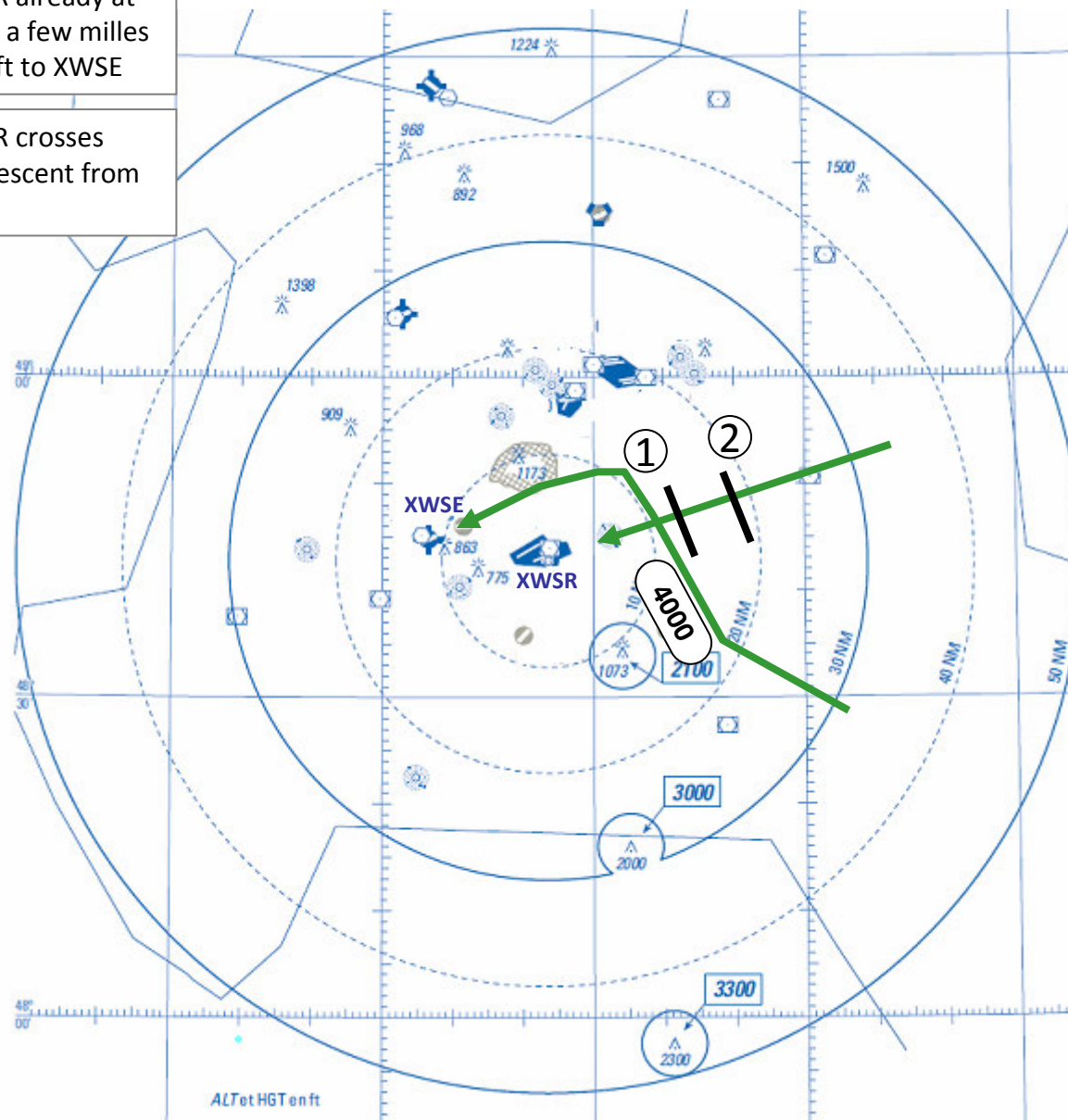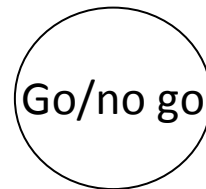2100

3000

3300

ALTet HGTen ft

① Case acft to XWSR already at 3000' levelled for a few milles when crossing acft to XWSE

② Case acft to XWSR crosses acft to XWSE in descent from 4000'

Go/no go

Go/no go decision mindmap

(there are some safety issues, and possibly increased workload)

Safety

(there will be a cost, due to necessary reorganisation of ACC/TMA interface)

Cost

(there are gains and losses)

Environment

Go/no go

Political pressure

(there is pressure from both government and environmentalists-but that could go both ways because of the CO_2 issue not addressed)

(neutral if not negative)

Capacity

Efficiency

(negative impact, increased track distance-reaction from airlines expected)

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Thanks for your attention