

HELIOS

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**Performance Based
Communications**

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Overview

- Performance based ATM
- Developing a performance based plan
- Selecting technical solutions
- Performance based communications



Performance based ATM

- Performance based ATM is about responding to the needs of the customer:
 - Recognises the need to meet stakeholder expectation
 - Recognises the need for regional solutions consistent with the local environment
 - Supports the long term goal of global harmonisation



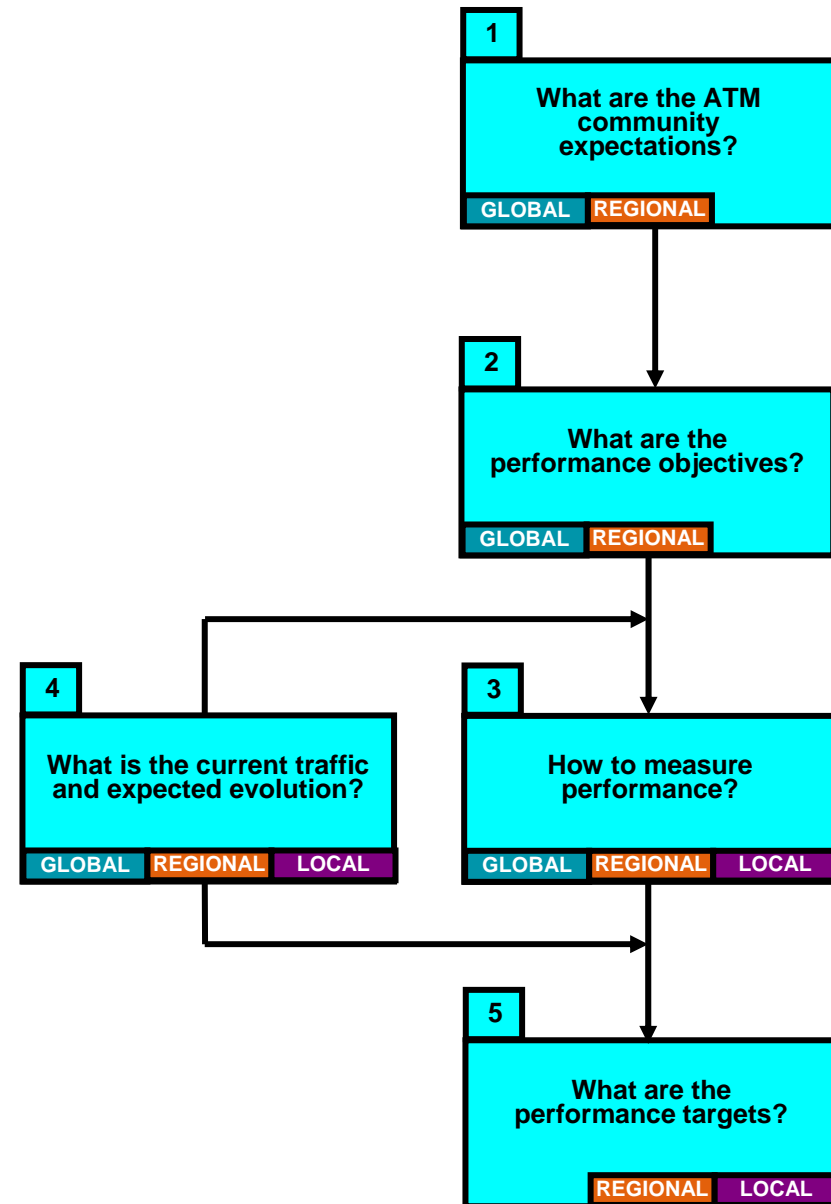
Developing a performance based plan

- Step 1: Set targets
 - Identify the required performance
- Step 2: Measure performance and identify performance gaps
 - Measure actual performance and establish the 'performance gap'
- Step 3: Address performance gaps
 - Update implementation plans to meet (or at least converge on) target

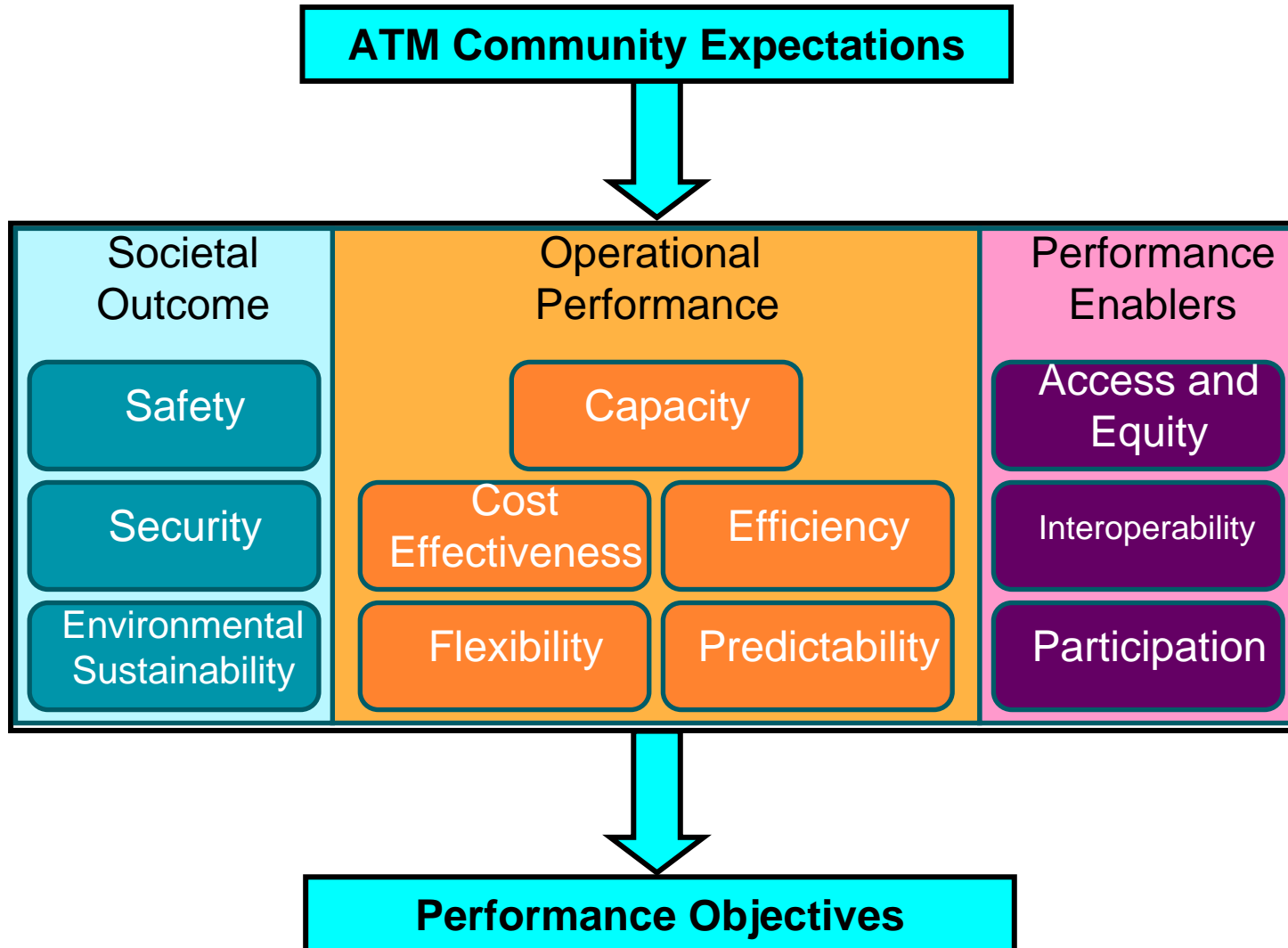


Step 1: Set targets

- The purpose of this step is to map ATM community expectations to performance targets
- ATM community expectations defined in the Global ATM Operational Concept (Doc 9854)

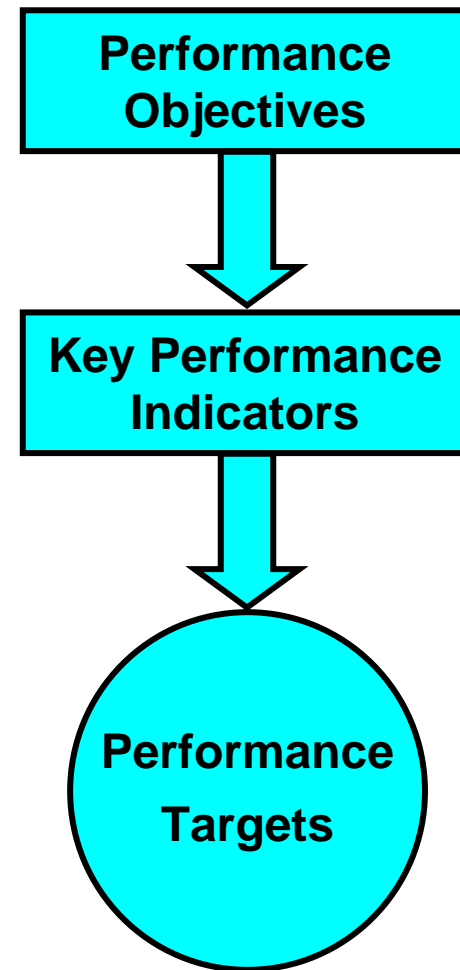


Key Performance Areas



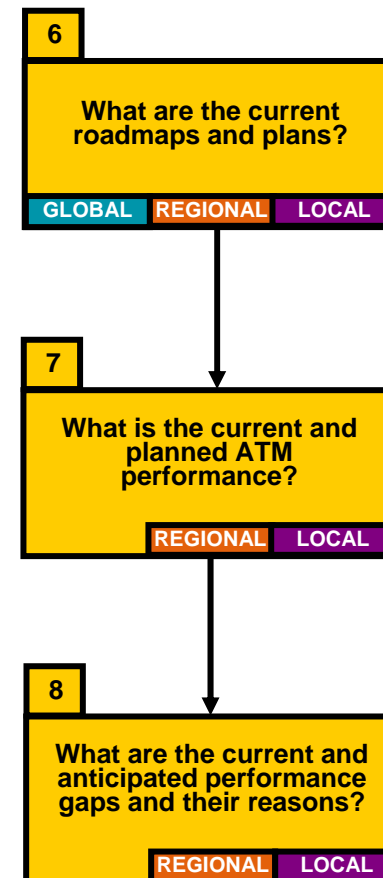
Developing targets

- Performance Targets must take account of existing performance, traffic evolution and potential service improvements
- Target Setting techniques
 - Trend Analysis
 - Benchmarking
 - Influence Models



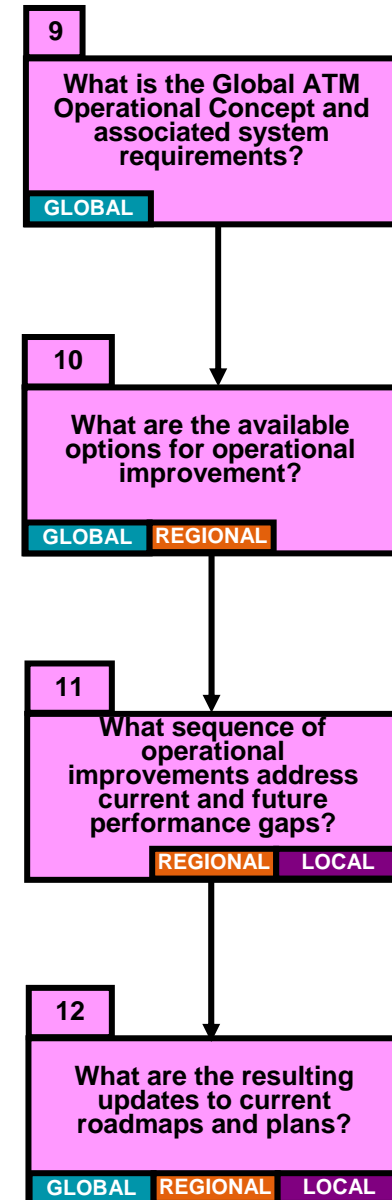
Step 2: Measure performance and identify performance gaps

- Operational data used to measure current performance
 - Data availability is often a key factor
- Planned performance includes existing deployment plans
 - Based on analysis, fast and real time simulations



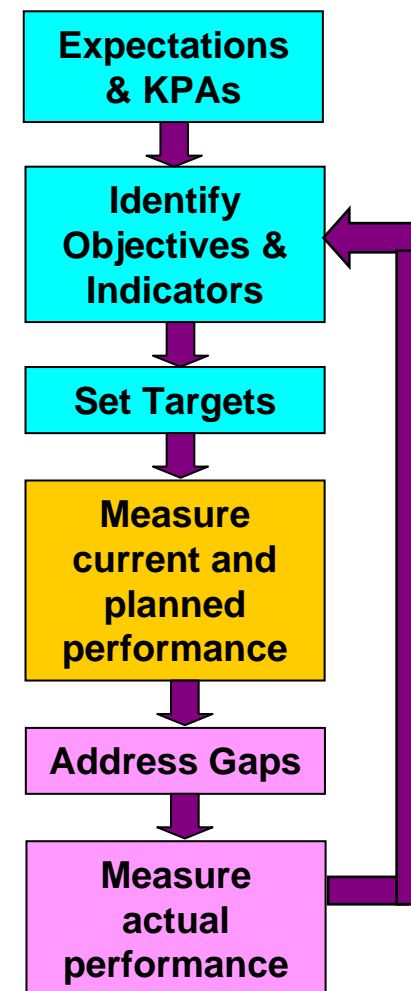
Step 3: Address performance gaps

- Identify operational improvements:
 - To achieve targets
 - To support regional planning
 - To maintain global interoperability
- Update implementation plans and forecasts of performance



Performance planning process

- Performance planning is a continuous process
- Reacting to:
 - Actual performance of planned improvements
 - Changing traffic
 - Changing objectives

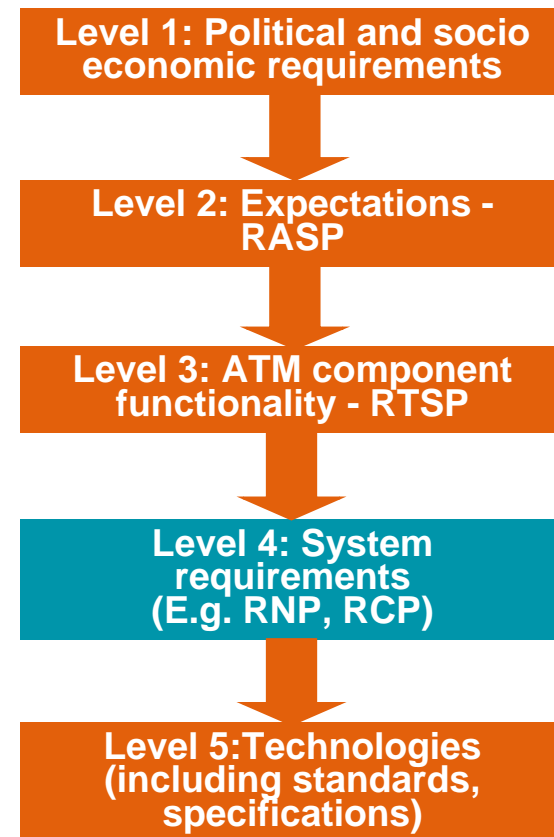


Global Planning Initiatives

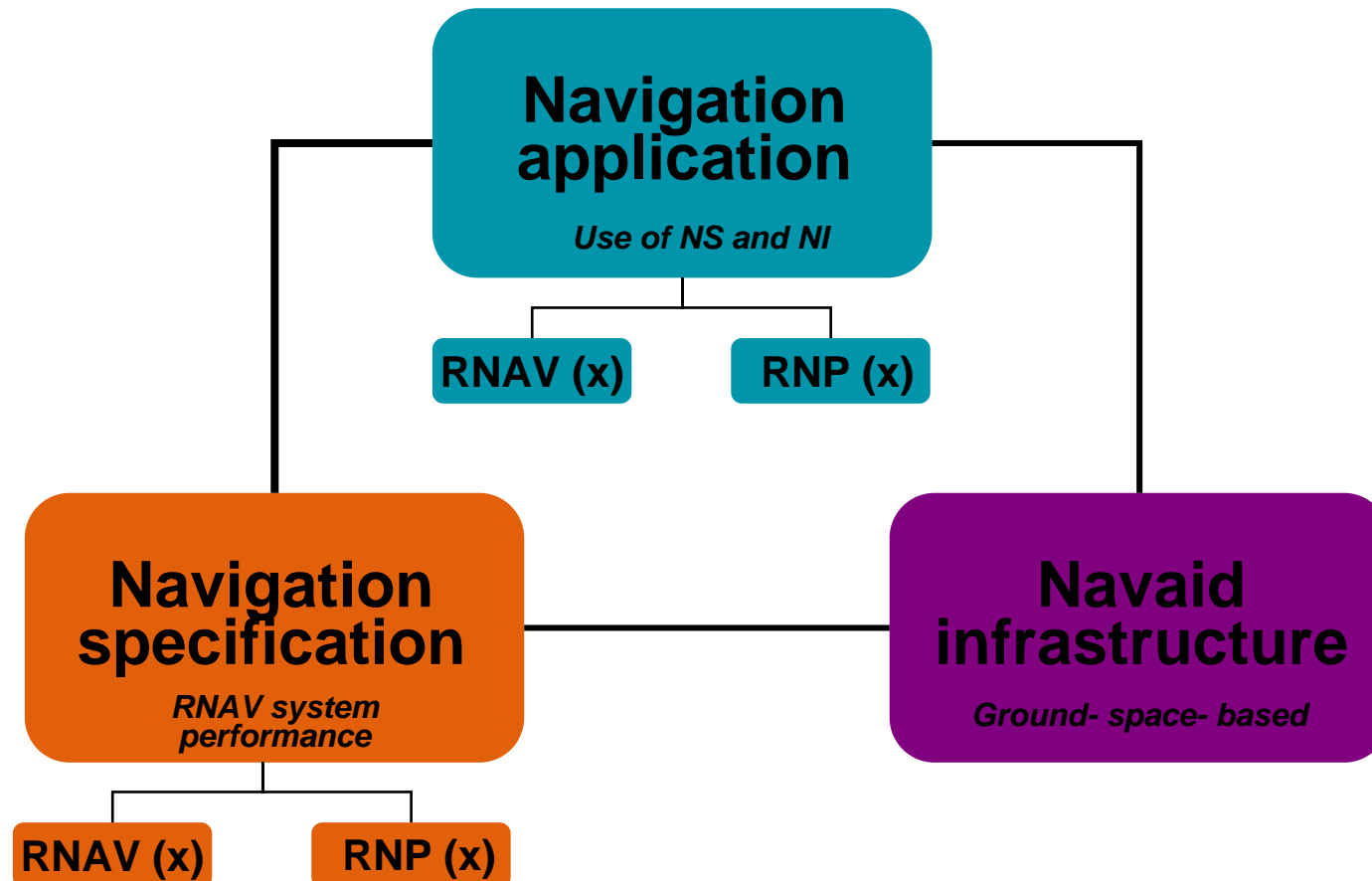
- GPI-1 Flexible use of airspace
- GPI-2 RVSM
- GPI-3 Harmonization of level systems
- GPI-4 Alignment of upper airspace classifications
- GPI-5 RNAV and RNP
- GPI-6 ATFM
- GPI-7 Dynamic and flexible ATS route management
- GPI-8 Collaborative airspace design and management
- GPI-9 Situational awareness
- GPI-10 Terminal area design and management
- GPI-11 RNP and RNAV SIDs and STARs
- GPI-12 Functional integration of ground systems with airborne systems
- GPI-13 Aerodrome design and management
- GPI-14 Runway operations
- GPI-15 Match IMC and VMC operating capacity
- GPI-16 Decision support and alerting systems
- GPI-17 Data link applications
- GPI-18 Aeronautical information
- GPI-19 Meteorological systems
- GPI-20 WGS-84
- GPI-21 Navigation systems
- GPI-22 Communication infrastructure
- GPI-23 Aeronautical radio spectrum

The link to technical performance

- The key is to select the technical improvements' that support achieving the performance targets
- One method is the ICAO performance Hierarchy
 - Each layer is a different view of the ATM System
 - Allows tracing of performance impact
 - Helps understand and communicate performance



Performance based navigation



RNP and PBN



- Benefits:
 - Reduction to number of sensor-specific routes
 - Allows more efficient use of airspace
 - Clarifies how RNAV systems are to be used
 - Facilitates operational approval process for operators by providing limited set of navigation specifications intended for global use
 - Provides potential to exploits capabilities of advanced RNAV systems
 - Enables navigation applications for Terminal Airspace

Which surveillance enhancement?

SSR Mode A/C

SSR Mode S

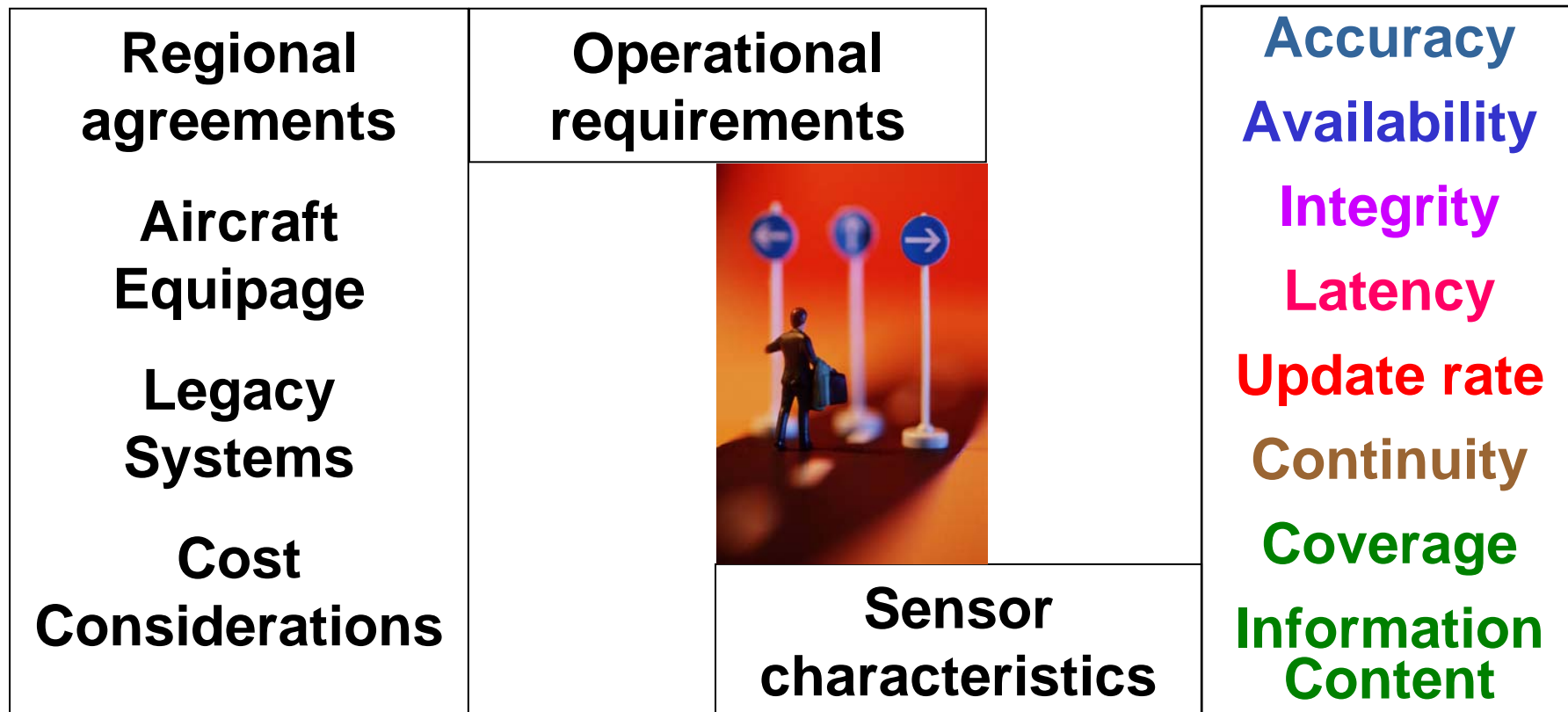


MLAT

PSR

ADS-B

Which surveillance enhancement?



RSP could help...but no mature definition yet!

Required Communications Performance

- RCP type specifies communication transaction time, continuity, availability, integrity

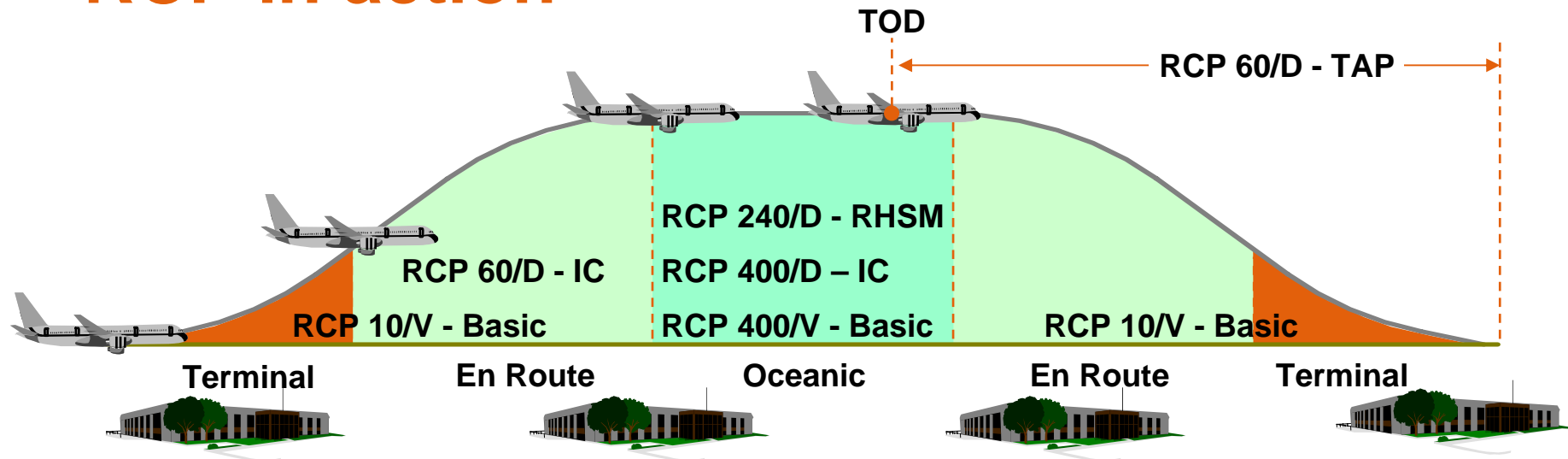
RCP type	Transaction time (sec)	Continuity (probability/flight hour)	Availability (probability/flight hour)	Integrity (acceptable rate/flight hour)
RCP 10	10	0.995	0.99998	10^{-5}
RCP 60	60	0.99	0.9995	10^{-5}
RCP 120	120	0.99	0.9995	10^{-5}
RCP 240	240	0.99	0.9995	10^{-5}
RCP 400	400	0.99	0.999	10^{-5}

- Qualifier is normally added:
 - /V indicates voice service
 - /D indicates data service

RCP and ATM Operations

- Terminal
 - RCP 10 /V Basic – Normal voice operations in radar airspace
- En-route
 - RCP 10 /V Basic – Normal voice operations in radar airspace
 - RCP 60 /D IC – Increased capacity through data link applications
- Oceanic
 - RCP 240 /D RHSM – Reduced Horizontal Separation Minima
 - RCP 400 /D IC – Initial FANS
 - RCP 400 /V Basic – HF Voice

RCP in action



1. RCP types for service level(s) published in AIPs and charts
2. Ground side monitors communication service
3. Eligible Operators file for service level(s)
4. Air side monitors aircraft system
5. Pilot/controller know RCP type, just as they know RNAV/RNP type
6. Pilot/controller operates according to RCP type
7. Pilot/controller receives alerts for communication failures

D - Data
V - Voice
IC - Increased capacity
RHSM - Reduced horizontal separation minima
TAP - Tailored Arrival Procedure

Standards & guidance material

- ICAO completed standards and guidance material for RCP
 - Provisions for RCP in Annex 6 and Annex 11
 - Manual on RCP → ICAO Doc 9869
- RTCA SC-189/EUROCAE WG-53 completed standards for data link services
 - Continental Safety and Performance Standard
 - Oceanic Safety and Performance Standard



How it is used

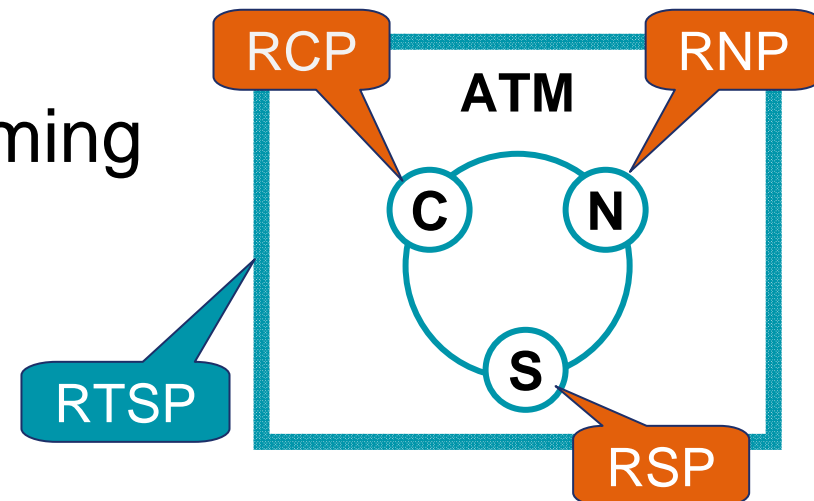
- Performance-based criteria is used to
 - Determine viability of a particular technology
 - Qualify, certify, and approve various parts of an implementation
 - Manage performance levels needed to provide a basic level of service and, for eligible operators, higher levels of service
 - Real time monitoring and alerting (air and ground)
 - Historical monitoring and evaluation
 - Adapting the airspace based on the results of monitoring

Performance-based communications

- PBC = RCP + Operational Factors, for example:
 - Messages or phraseology, transaction types, and intended use
 - Interactive capability of voice communication
 - Air–ground integration capability of data communication
 - Performance monitoring and alerting
 - Adapting the airspace to changes in performance level
- Performance based communications can be applied to ground-ground communications services
 - Supports leasing / third party supply of services

Conclusions

- Performance based ATM is a new way of thinking about modernisation
- Provides separation between operational requirements and technologies
- PBN is here
- Performance Based Communications is coming



Any questions?

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