



NPF/SIP/2010-WP/8

Global Air Navigation Plan

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



Presentation Outline

- What is a Global ATM system?
- How do we get there?
- Planning structure
- Expectations
 - NextGen SESAR
 - ICAO
 - States
- Conclusions

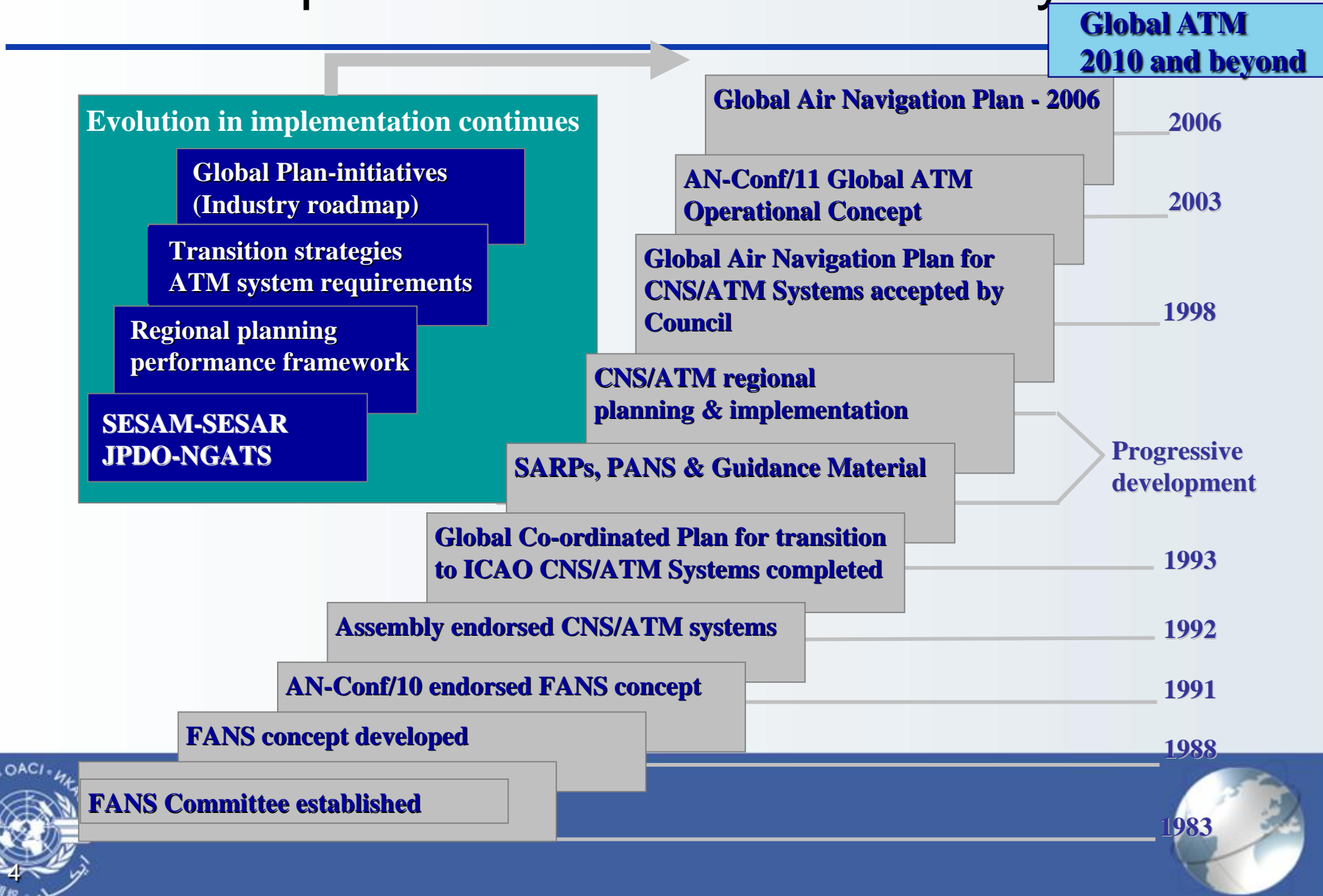


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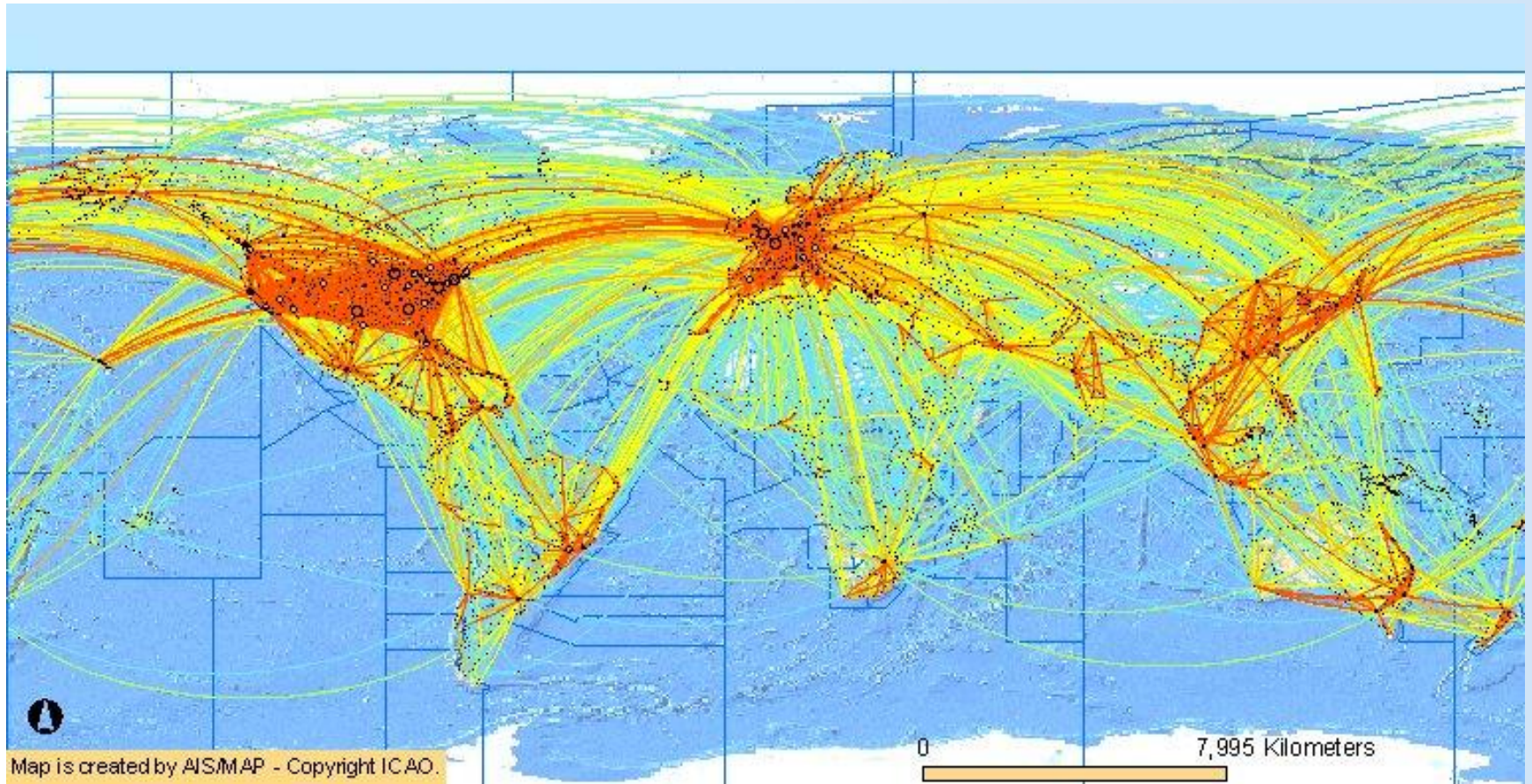


Historical: path toward Global ATM System



What is Global ATM?

Physical connectedness



What is global ATM?

Meeting expectations

- Meeting the expectations of the aviation community
 - meeting safety objectives
 - operate along preferred 4D trajectories (business trajectories)
 - scheduling
 - gate availability
 - environmental objectives
 - other business requirements



What is global ATM?

Meeting expectations (cont'd)

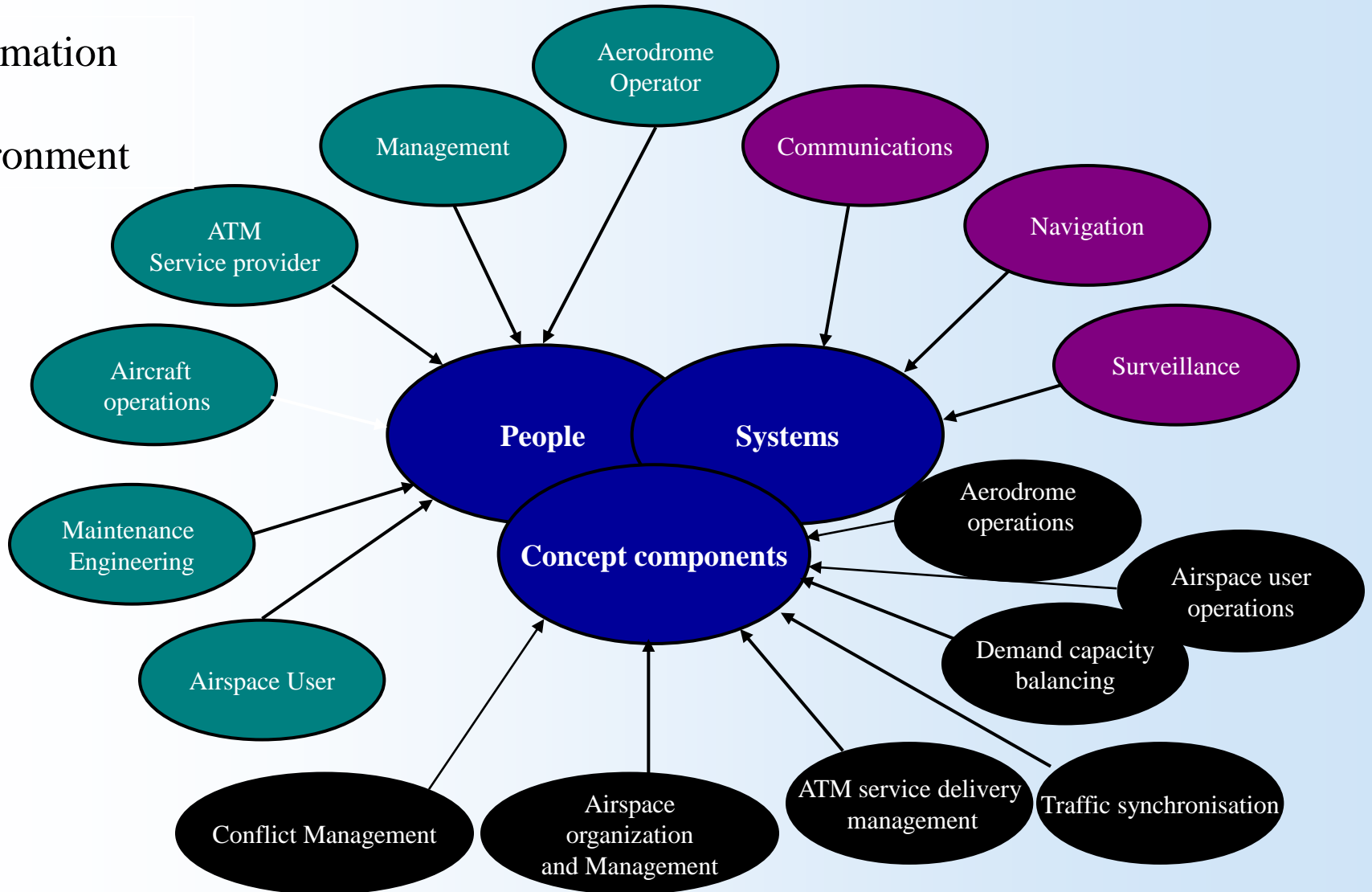
- Major impediments
 - the existing ATM system
 - thousands of aircraft operators each have their own best outcomes
 - best outcomes go beyond aircraft operators and extend outward to the larger ATM community as well



What is global ATM?

Integration and a common vision

Information
rich
environment



What is global ATM?

Seamlessness-Interoperability

- A seamless, interoperable, worldwide system based on:
 - Seamless safety across all regions
 - For all users during all phases of flight
 - Physical connectedness
 - Homogeneous ATM areas and Major Traffic flows
 - Common requirements, Standards and procedures
 - Integration (TMAs, aerodromes)
 - Performance based equipment carriage requirements
 - Common aeronautical information exchange models
 - Meets environmental objectives



What is Global ATM?

A wider perspective

- To make even greater gains in efficiency far-reaching cooperation is necessary
- A global vision
- Wider planning perspectives
- Implementation of facilities and services over larger geographical areas
- A global framework for performance measurement



What is Global ATM?

An example of a wider planning perspective

■ RVSM

- ICAO's role in supporting the realization of RVSM was and continues to be significant
- safety-related work leading to the development of Standards, Procedures and guidance material
- planning and safety assessments conducted by the regional planning groups
- RVSM could not have been implemented globally without ICAO's leadership



What is Global ATM?

Working together

- Toward a common vision
 - global ATM Operational Concept
- Using a common planning framework
 - Global Air Navigation Plan, the regional air navigation plans and several other documents and tools
 - Global Aviation Safety Plan (GASP)
- Utilizing performance objectives
 - Targets, metrics, indicators
- Global interoperability and harmonization are key to making further improvements



Eleventh Air Navigation Conference

How we get there

- Endorsed the global ATM operational concept
- Requested ICAO to:
 - develop ATM system requirements
 - address interoperability and seamlessness
 - define requirements for global AIM
 - publish the operational concept
 - amend the Global Plan
 - develop a performance framework



Eleventh Air Navigation Conference

How we get there

- That States and PIRGs consider the Global Air Navigation Plan for CNS/ATM Systems as a catalyst for change, providing a global safety and interoperability framework while allowing regional or local adaptation to efficiently meet regional and local needs



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Partnering with Industry

- That those industry partners in a position to do so, work together toward the development of a common roadmap/global action plan, aimed at attaining operational benefits in the near to medium term for inclusion in the ICAO Global Air Navigation Plan to ensure that the capabilities and capacities offered through existing aircraft equipage, ATM infrastructure and ATC systems is utilized to the maximum extent possible
- To deliver transitional benefits while we continue our evolution



35th Session of the Assembly Endorses the global framework

- Assembly Resolution A35-15
- Calls upon States, regional planning groups and the aviation industry to use the ICAO Global ATM Operational Concept as the common framework to guide planning and implementation of CNS/ATM systems and to focus all such development work on the operational concept



Global performance initiatives (GPIs)

How we get there

- Options for ATM improvements
- Relate to ATM objectives in older version of Global Plan
- Result in direct performance enhancements
- Meet performance objectives
- Based on Industry Roadmaps and current regional activities
- Bring near- and medium-term benefits to aircraft operators
- Regional planning groups establish work programmes



Global performance initiatives

How we get there

The approach to implementation of GPIs builds on:

- progress already achieved
- experience gained by PIRGs in the previous cycle of CNS/ATM systems implementation process
- existing capabilities of the air navigation systems; and
- successful regional implementation



Global performance initiatives

How we get there

- Reduced vertical separation minima
- RNAV and RNP (Performance-based navigation)
- Dynamic and flexible ATS route management
- Functional integration of ground systems with airborne systems
- Aerodrome design and management
- Data link applications





Global Plan Initiatives

(GPI-1) Flexible use of airspace

- **Scope: The optimization and equitable balance in the use of airspace between civil and military users, facilitated through both strategic coordination and dynamic interaction.**
- **Related Operational Concept Components: AOM, AUO**
- **Civil/military cooperation. Global Forum in Montreal held in October 2009**



Global Plan Initiatives

(GPI-2) Reduced vertical separation minimum

- **Scope: The optimization of the utilization of airspace and enhanced aircraft altimetry systems.**
- **Related Operational Concept Components: AOM, CM**
- **Implemented in all of ICAO regions on major international traffic flows**



Global Plan Initiatives

(GPI-3) Harmonization of level systems

- **Scope: The adoption by all States of the ICAO Flight Level Scheme based on feet as contained in Appendix 3 to Annex 2 – *Rules of the Air*.**
- **Related Operational Concept Components: AOM, CM, AUO**
- **Imperial/metric systems for altitudes and levels. Hence harmonization of level systems is to be pursued**



Global Plan Initiatives

(GPI-4) Alignment of upper airspace classifications

- **Scope: The harmonization of upper airspace and associated traffic handling through application of a common ICAO ATS Airspace Class above an agreed division level.**
- **Related Operational Concept Components: AOM, CM, AUO**
- **Should be based on Annex 11 airspace classification**
 - **Class A to G both intra-regionally and across several regions to ensure continuum of airspace**



Global Plan Initiatives

(GPI-5) Area Navigation (RNAV) and Required Navigation Performance (RNP)

- Scope: The incorporation of advanced aircraft navigation capabilities into the air navigation system infrastructure.**
- Related ATM objectives: Application of required navigation performance; Application of required surveillance performance; Reduced longitudinal separation; Reduced lateral separation**

Application of PBN; regional and national PBN plan



Global Plan Initiatives

(GPI-6) Air traffic flow management

- **Scope:** The implementation of strategic, tactical and pre-tactical measures aimed at organizing and handling traffic flows in such a way that the totality of the traffic handled at any given time or in any given airspace or aerodrome is compatible with the capacity of the ATM system.
- **Related Operational Concept Components:** AOM, AO, DCB, TS, CM, AUO
- **Implementation of demand and capacity measures**



Global Plan Initiatives

(GPI-7) Dynamic and flexible ATS route management

- **Scope: The establishment of more flexible and dynamic route systems, on the basis of navigation performance capability, aimed at accommodating preferred flight trajectories**
- **Related Operational Concept Components: AOM, AUO**
- **Change of routing requests from aircraft- RNAV routes**



Global Plan Initiatives

(GPI-8) Collaborative airspace design and management

- **Scope: The application of uniform airspace organization and management principles on a global basis, leading to a more flexible airspace design to accommodate traffic flows dynamically.**
- **Related Operational Concept Components: AOM, AUO**
- **Required time of arrival function in FMS, data link applications and integrated decision making**



Global Plan Initiatives

(GPI-9) Situational awareness

- **Scope: Operational implementation of data link-based surveillance. The implementation of equipment to allow traffic information to be displayed in aircraft supporting implementation of conflict prediction and collaboration between flight crew and the ATM system. Improve situational awareness in the cockpit by making available electronic terrain and obstacle data of required quality.**
- **Related Operational Concept Components: AO, TS, CM, AUO**
- **eTOD, MSAW, surveillance for surface movement, terminal, enroute and oceanic airspace: ADS-C; ADS-B, Multilateration**



Global Plan Initiatives

(GPI-10) Terminal area design and management

- **Scope: The optimization of the terminal control area (TMA) through improved design and management techniques.**
- **Related Operational Concept Components: AOM, AO, TS, CM, AUO**
- **RNAV and RNP arrival and departure procedures, wake vortex detection and mitigation, RNP based approach procedures**



Global Plan Initiatives

(GPI-11) RNP and RNAV

Standard instrument departures (SIDs) and Standard terminal arrivals (STARs)

- **Scope: The optimization of the terminal control area (TMA) through implementation of improved ATS route structures based on RNP and RNAV, connecting the enroute phase of flight with the final approach, based on improved coordination processes.**
- **Related Operational Concept Components: AOM, AO, TS, CM, AUO**
- **Segregation of departing traffic from arriving traffic, maintaining obstacle clearance requirements and environmental requirements**



Global Plan Initiatives

(GPI-12) functional integration of ground systems with airborne systems

- **Scope: The optimization of the terminal control area (TMA) to provide for more fuel efficient aircraft operations through FMS-based arrival procedures and functional integration of ground and airborne systems**
- **Related Operational Concept Components: AOM, AO, TS, CM, AUO**
- **Continuous decent capabilities, time of arrival computations and increased automation**



Global Plan Initiatives

(GPI-13) Aerodrome design and management

- **Scope: The implementation of management and design strategies to improve movement area utilization.**
- **Related Operational Concept Components: AO, CM, AUO**
- **Lighting, taxiway, runway, high speed exists, surface guidance in all weather conditions**



Global Plan Initiatives

(GPI-14) runway operations

- **Scope: Maximize runway capacity.**
- **Related Operational Concept Components: AO, TS, CM, AUO**
- **Establish runway capacity bench marks, achieving optimum capacity for each runway, reduced runway separations, PRM, RNP approaches for closely spaced parallel runways**



Global Plan Initiatives

(GPI-15) match IMC and VMC operating capacity

- **Scope: Improve the ability of aircraft to manoeuvre on the aerodrome surface in adverse weather conditions.**
- **Related Operational Concept Components: AO, CM, AUO**
- **Maintain VMC capacity during IMC conditions; A-SMGCS, Synthetic vision for situational awareness, Head-up displays, enhanced conflict detection like STCA/MTCAs**



Global Plan Initiatives

(GPI-16) Decision support and alerting systems

- **Scope: Implement decision support tools to assist air traffic controllers and pilots in detecting and resolving air traffic conflicts and in improving traffic flow.**
- **Related Operational Concept Components: DCB, TS, CM, AUO**
- **ATC automation tools such as MSAW, MTCA/STCA, FDPS, sequencing , AIDC**



Global Plan Initiatives

(GPI-17) data link applications

- **Scope: Increase the use of data link applications.**
- **Related Operational Concept Components: DCB, AO, TS, CM, AUO, ATMSDM**
- **D-ATIS, CPDLC for all phases of flight**



Global Plan Initiatives

(GPI-18) aeronautical Information

- **Scope: To make available in real-time, quality assured electronic information (aeronautical, terrain and obstacle).**
- **Related Operational Concept Components: AOM, DCB, AO, TS, CM, AUO, ATMSDM**
- **eTOD, eAIP, WGS 84**



Global Plan Initiatives

(GPI-19) Meteorological systems

- **Objective: To improve the availability of meteorological information in support of a seamless global ATM system.**
- **Related Operational Concept Components: AOM, DCB, AO, AUO**
- **Access to real time OPMET information, global systems such as WAFS, IAWA, TCWS, D-ATIS, D-VOLMET**



Global Plan Initiatives

(GPI-20) WGS-84

- **Objective: The implementation of WGS-84 by all States.**
- **Related Operational Concept Components: AO, CM, AUO**
- **Migration from local geodetic datum to universal reference system –WGS 84 – 1 Jan 1998; Fundamental to GNSS**



Global Plan Initiatives

(GPI-21) navigation systems

- **Scope: Enable the introduction and evolution of performance-based navigation supported by a robust navigation infrastructure providing an accurate, reliable and seamless global positioning capability.**
- **Related Operational Concept Components: AO, TS, CM, AUO**
- **GNSS for all phases of flight**



Global Plan Initiatives

(GPI-22) Communication infrastructure

- **Scope: To evolve the aeronautical mobile and fixed communication infrastructure, supporting both voice and data communications, accommodating new functions as well as providing the adequate capacity and quality of service to support ATM requirements.**
- **Related Operational Concept Components: AO, TS, CM, AUO**
- **VHF data link Mode2, HF data link and satellite data link and VHF and SATCOM for voice**



Global Plan Initiatives

(GPI-23) aeronautical radio spectrum

- **Scope: Timely and continuing availability of adequate radio spectrum, on a global basis, to provide viable air navigation services (communication, navigation and surveillance).**
- **Related Operational Concept Components: AO, TS, CM, AUO, ATMSDM**
- **WRC 2011- call for support to ICAO position**



Table 1. Global Plan initiatives & their relationships to the major groupings ... (1/3)

	GPI	En-route	Terminal Area	Aerodrome	Supporting Infrastructure	Related Operational Concept Components
GPI-1	Flexible use of airspace	X	X			AOM, AUO
GPI-2	Reduced vertical separation minima	X				AOM, CM
GPI-3	Harmonization of level systems	X				AOM, CM, AUO
GPI-4	Alignment of upper airspace classifications	X				AOM, CM, AUO
GPI-5	RNAV and RNP (Performance-based navigation)	X	X	X		AOM, AO, TS, CM, AUO
GPI-6	Air traffic flow management	X	X	X		AOM, AO, DCB, TS, CM, AUO
GPI-7	Dynamic and flexible ATS route management	X	X			AOM, AUO
GPI-8	Collaborative airspace design and management	X	X			AOM, AUO



Table 1. Global Plan initiatives & their relationships to the major groupings ... (2/3)

	GPI	En-route	Terminal Area	Aerodrome	Supporting Infrastructure	Related Operational Concept Components
GPI-9	Situational awareness	X	X	X	X	AO, TS, CM, AUO
GPI-10	Terminal area design and management		X			AOM, AO, TS, CM, AUO
GPI-11	RNP and RNAV SIDs and STARs		X			AOM, AO, TS, CM, AUO
GPI-12	Functional integration of ground systems with airborne systems		X		X	AOM, AO, TS, CM, AUO
GPI-13	Aerodrome design and management			X		AO, CM, AUO
GPI-14	Runway operations			X		AO, TS, CM, AUO
GPI-15	Match IMC and VMC operating capacity		X	X	X	AO, CM, AUO
GPI-16	Decision support systems and alerting systems	X	X	X	X	DCB, TS, CM, AUO

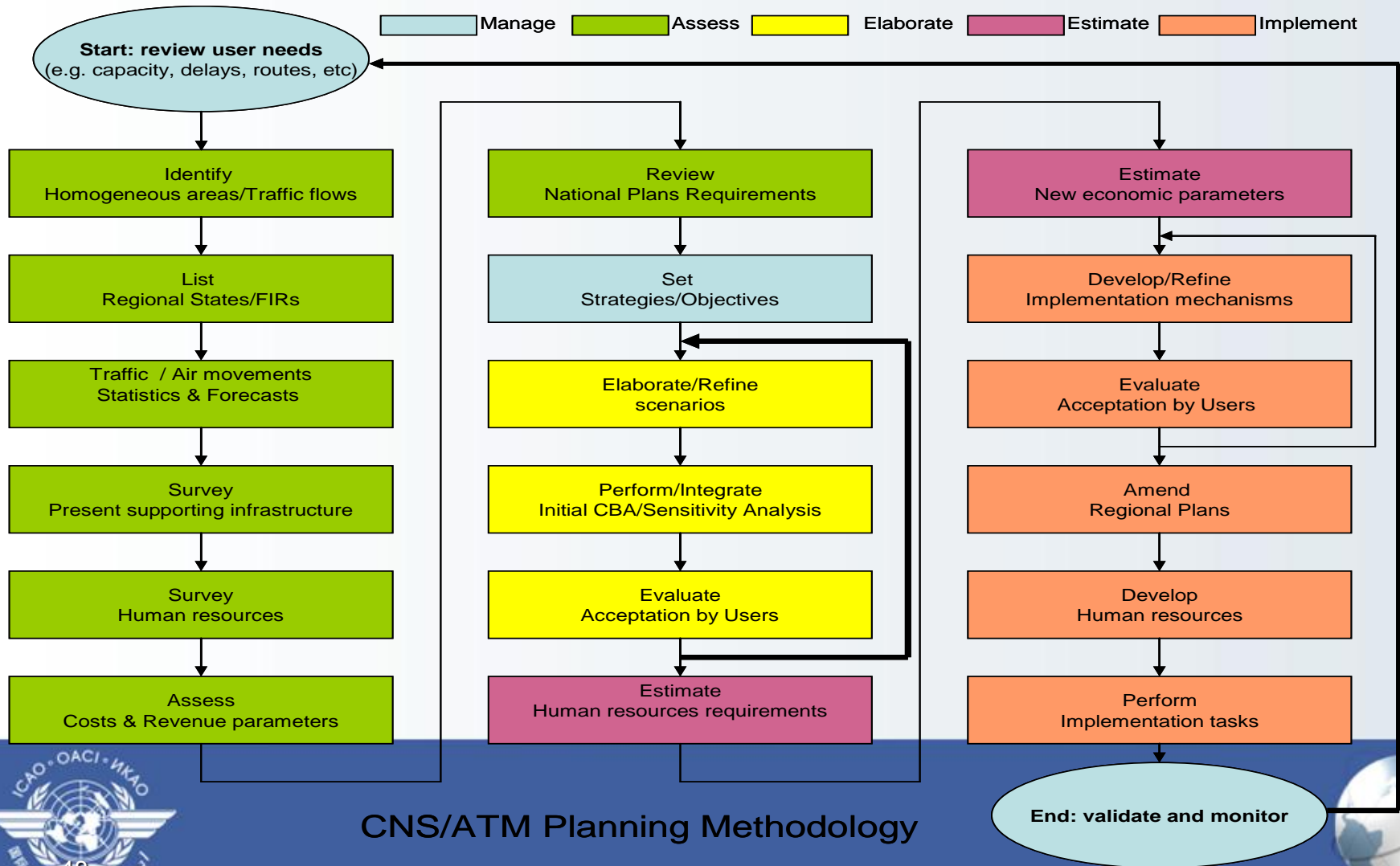


Table 1. Global Plan initiatives & their relationships to the major groupings ... (3/3)

	GPI	En-route	Terminal Area	Aerodrome	Supporting Infrastructure	Related Operational Concept Components
GPI-17	Data link applications	X	X	X	X	DCB, AO, TS, CM, AUO, ATMSDM
GPI-18	Aeronautical information	X	X	X	X	AOM, DCB, AO, TS, CM, AUO, ATMSDM
GPI-19	Meteorological systems	X	X	X	X	AOM, DCB, AO, AUO
GPI-20	WGS-84	X	X	X	X	AO, CM, AUO
GPI-21	Navigation systems	X	X	X	X	AO, TS, CM, AUO
GPI-22	Communication infrastructure	X	X	X	X	AO, TS, CM, AUO
GPI-23	Aeronautical radio spectrum	X	X	X	X	AO, TS, CM, AUO, ATMSDM



Global Planning Methodology

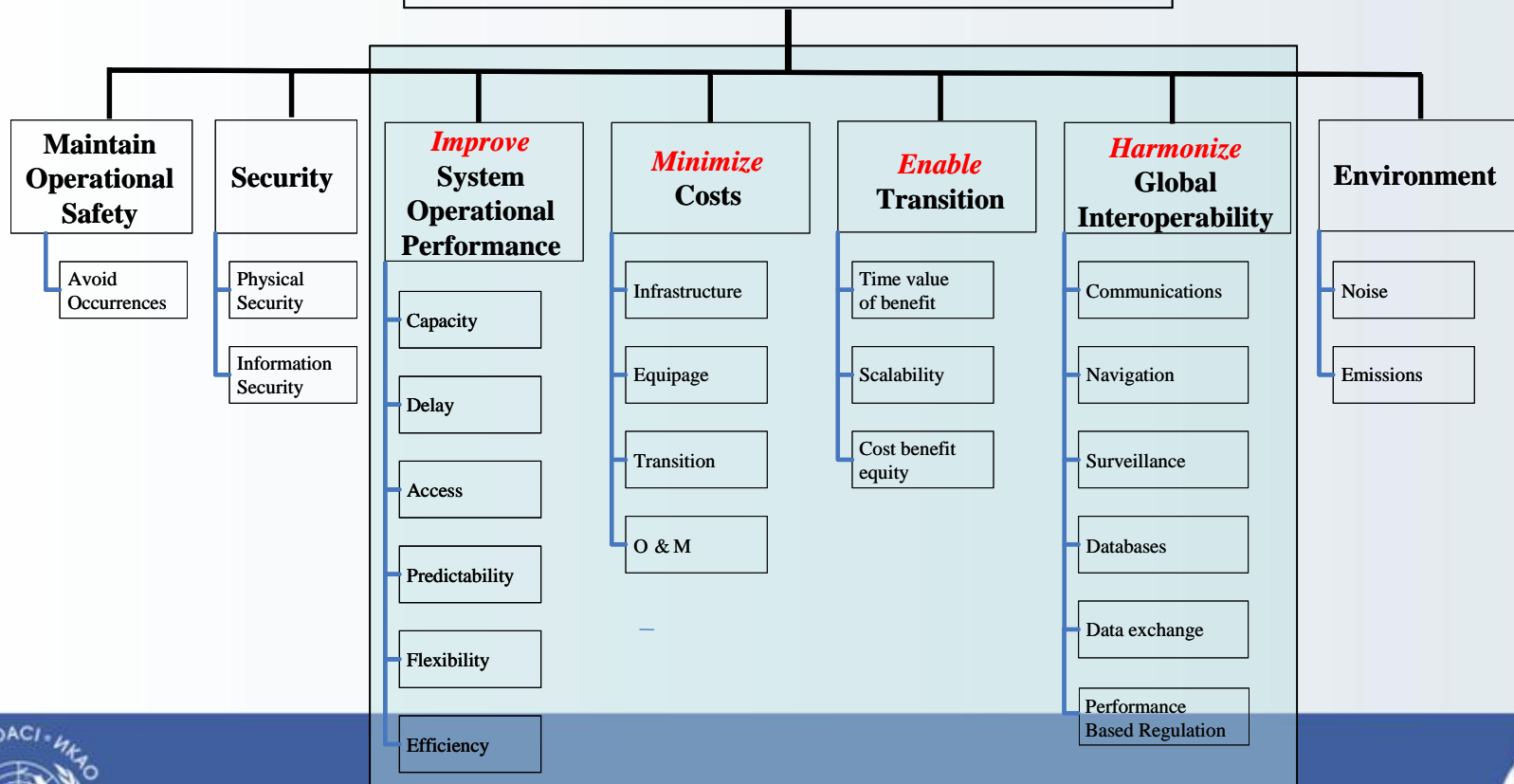


CNS/ATM Planning Methodology



EXPECTATIONS

Global Air Navigation Plan System Expectations Supported by Global Plan Initiatives



Efficiency Strategic Objective Focus Areas



- Provides consistent information for performance measurement

- Automates & integrates Business Plan processes

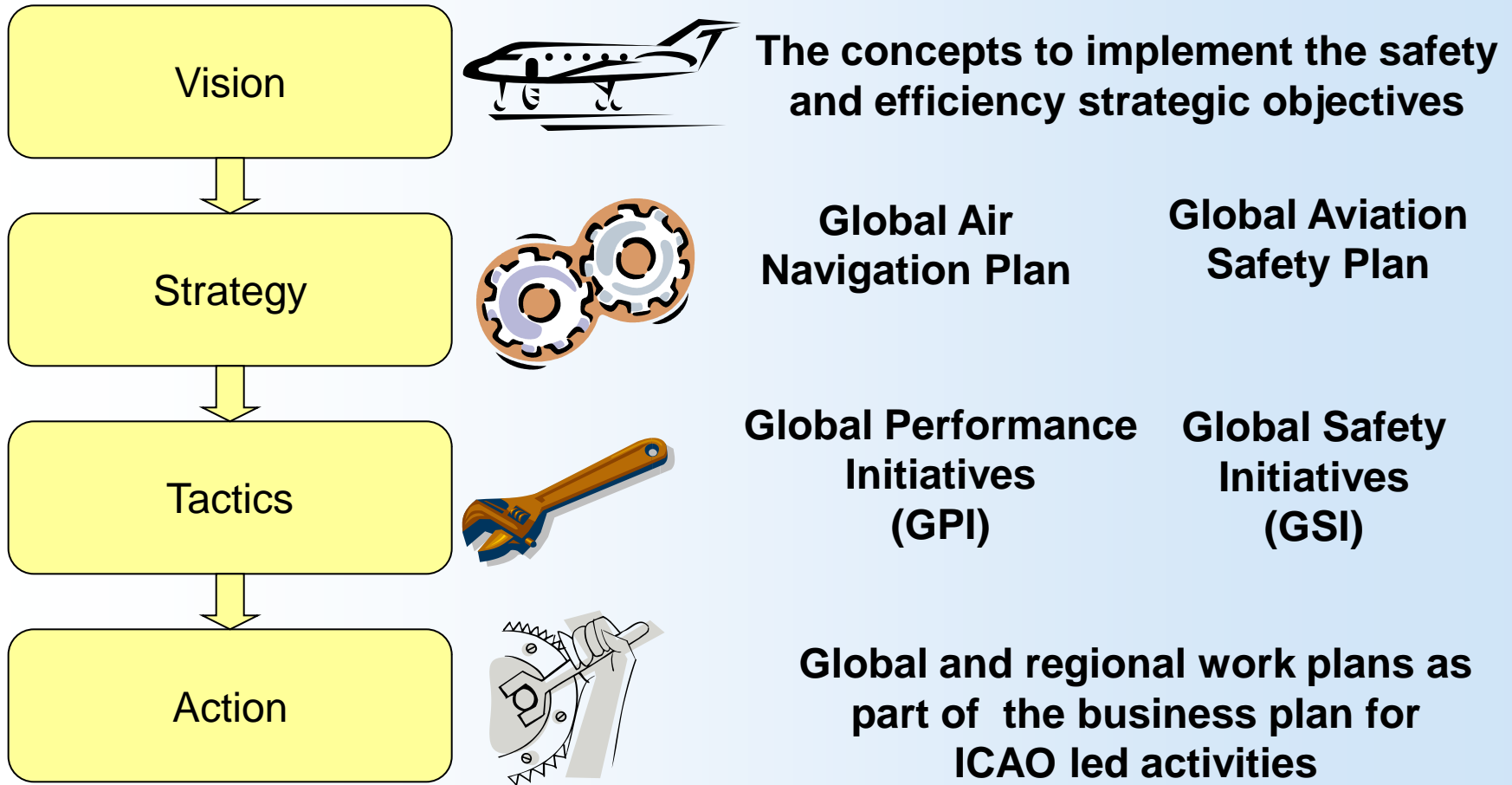
**The
Global Air
Navigation Plan
is an Implementation
Framework
that ...**

- Produces the baseline for measurable achievements and implementation of the ICAO ATM Operational Concept

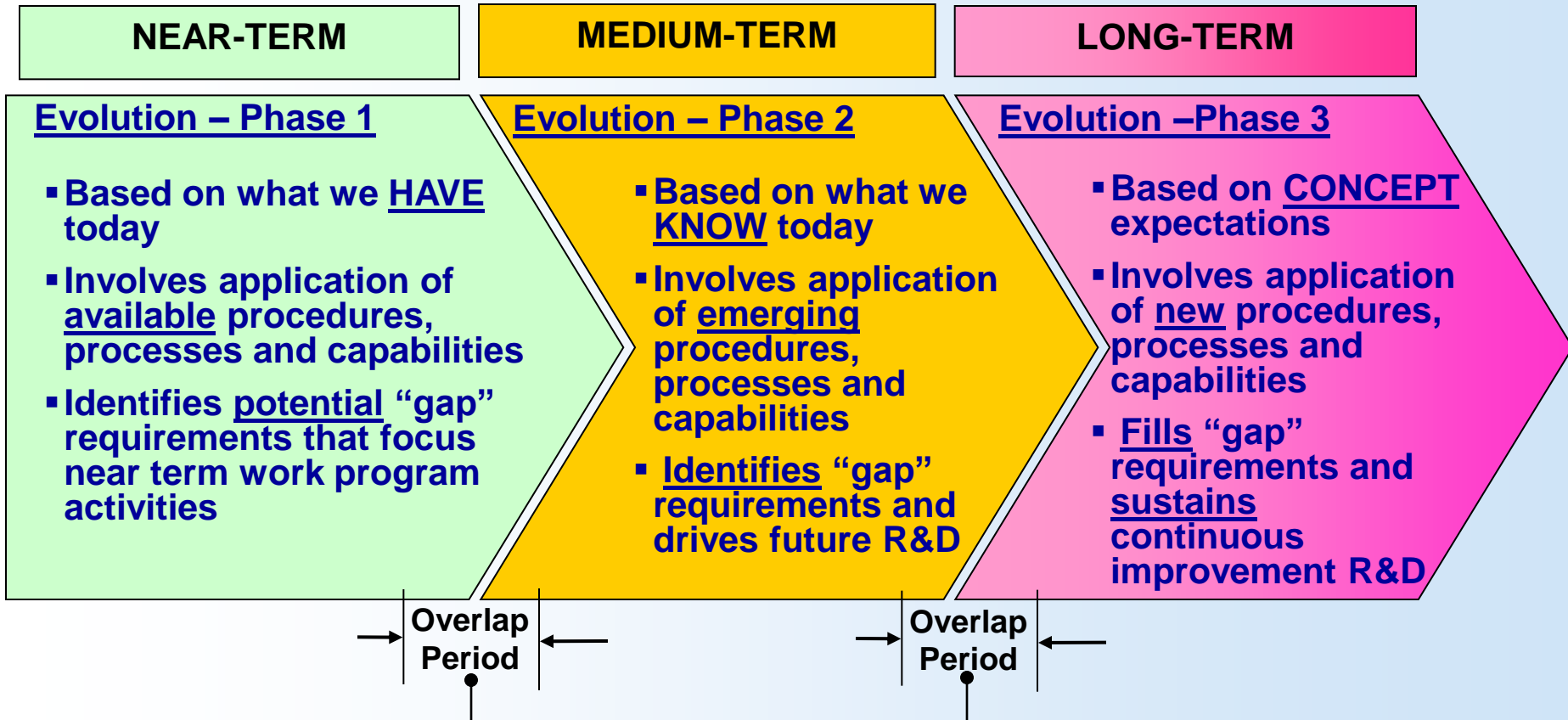
- Shares common data & processes



The ICAO Process Framework



Transition Strategy



The “Overlap Period” indicates that there is no set date by which the objectives of each transition should be met – other than within a time band of perhaps 2-3 years. It also recognizes that some States or Regions may not have a specific performance requirement that would need the application of changes identified in the transition maps at the same time as another State or Region.

Expectations

- NextGen (in their own words)
 - Many of the concepts build on ICAO's Global ATM Operational Concept which represents a globally harmonized set of concepts for the future
 - We recommend that ICAO assess NextGen and other future systems to advance harmonization efforts and to ensure global collaboration in the development and acceleration of standards for required future systems



Expectations

- SESAR (in their own words)
 - Planning should be In accordance with the Global Plan
 - Planning should be based on specific performance objectives supported by Global Plan Initiatives
 - The terminology and methodology used in the Master Plan are consistent with ICAO



Expectations

- ICAO
- To harmonize all the regional/national initiatives to guarantee seamlessness.



Expectations

- States
- To guarantee that the best service is delivery at the correct time to the correct customer with high level of efficiency and attending the agreed levels of safety.



In Summary

- The goal is a more seamless Global Air Navigation System
- We are getting closer
- Global ATM Operational Concept
- Global Air Navigation Plan
- We should work under one common umbrella
 - Performance based transition
 - Continued operational improvements
 - Toward a common vision
 - Using the ICAO framework
- Expectations



Thank you.



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