



Key essential operational/technology opportunities/challenges

ARISE+ - Support ASEAN ATM Master Plan – V2
4 July 2019, Singapore

Michael Standar, SESAR JU Chief Strategy & External Affairs
Paul Bosman, Head of Aviation Cooperation & Strategies, Eurocontrol



Founding Members



GANP



- The Sixth Edition of the GANP approved by the ICAO Council
- The (<https://www4.icao.int/ganportal/>) is up and running. IT developments on the portal ongoing.
- GANP content is frozen until the Assembly.
- After the Assembly the Maintenance process of the different layers will start;
 - *Based on AN-Conf/13 Recommendation 1.1/1, ICAO will establish a GANP Study Group (GSG) to undertake work on future editions of the GANP*
 - *This group will subsume all teams working in GANP activities: the GMVT, the ASBU PPT and the new Global ICAO Performance Experts Group (GIPEG) (AN-Conf/13 Recommendation 4.3/1 refers)*

Basic Building Blocks

- The Basic Building Block (BBB) - The framework outlining the foundation of any robust air navigation system. Nothing new - identification of the essential services to be provided for international civil aviation in accordance with ICAO Standards.
 - *Essential services defined in the areas of aerodromes, air traffic management, search and rescue, meteorology and information management. In addition to essential services,*
 - *Identifies end users of these services as well as the assets (communications, navigation, and surveillance (CNS) infrastructure) necessary to provide them*
- An independent framework and not a block of the ASBU framework representing the baseline rather than an evolutionary step.
 - *Defined by essential services recognized by ICAO Member States as necessary for international civil aviation to develop in a safe and orderly manner. Once provided - the baseline for any operational improvement.*
- The BBB framework will be updated every two years taking into account amendments to ICAO provisions. GANP Portal (<https://www4.icao.int/ganpportal/BBB>) - a web-based application in a format similar to the ASBU framework.

The ASBU framework



The ASBU framework is part of Global Technical Level of the GANP.

Based on the evolutionary steps described in the conceptual roadmap available in the GANP Document;

ASBU blocks - six-year timeframes starting with Block 0 in 2013.

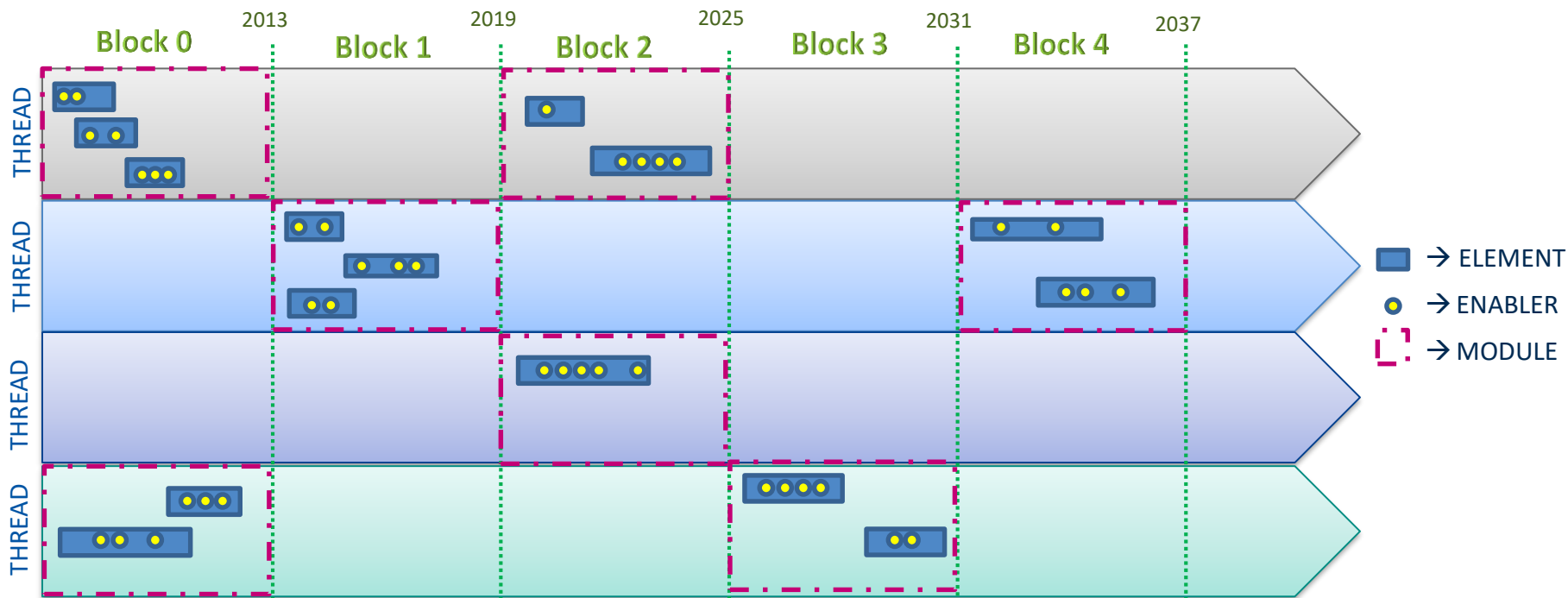
ASBU threads - different concept of operations have been described for the different areas of the air navigation system

ASBU elements - concepts of operations have then been translated into specific operational improvements

ASBU enablers - in order to ensure full realization of benefits from the deployment of the operational improvements, the different components necessary for their implementation, have been identified. These components include technology, training and regulatory provisions as well as the stakeholder responsible of their implementation.

ASBU modules - are the crossing point between the threads and the blocks. An ASBU module is the group of elements from a thread that, according to the enablers' roadmap, will be available for implementation within the defined deadline established by the ASBU Block. By selecting one ASBU thread and one Block, we obtain the elements that constitute the module.

ASBU framework



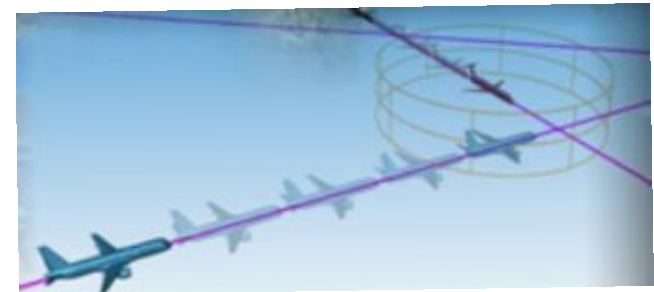
GANP Vision



- **Reflects the ultimate objectives of the air navigation system as well as the emerging challenges and opportunities stemming from aviation and technological trends.**
 - **The evolution driven by the vision will yield a high-performing global air navigation system that meets the ever-growing expectations of society.**
-
- The global air navigation system has witnessed significant improvements in recent decades. For the air transport system to continue to contribute to social development and economic progress worldwide, a safe, secure, efficient and sustainable global air navigation system, which limits the impact of aviation on climate change, must transform from conceptual approaches designed in the twentieth century.
 - Air and ground systems, including airports, will act as a single integrated infrastructure to accommodate the growth of air traffic and support a better performing aviation system in an intermodal environment. Remotely-piloted and unmanned platforms will expand traditional business models and accelerate the transition towards an environment that is rich in digital information.
 - This information-rich environment will fuel collaborative decision-making in a network-centric context to enable management by trajectory, which will improve mission- and business-oriented operations. Information will also play an integral role in the highly interconnected systems that will increasingly enable autonomous operations and human-machine collaboration.
 - At the core of this transformation is a strong need for a fully harmonized global air navigation system built on agreed performance-based standards with interoperable and scalable systems. Within this harmonized system, airspace users will have access to the air navigation resources consistent with their adherence to performance requirements.
 - The global vision and leadership embodied in the GANP outline an evolution in air navigation for all stakeholders, which will ensure that no country or stakeholder will be left behind.

GANP key changes

- Management by trajectory
- Information sharing
- Network and flight centric
- Integrated infrastructure
- Multi-modal transport system



Performance Ambitions

SUMMARY OF THE GANP PERFORMANCE AMBITIONS “A high performing system by 2040 and beyond”	
KPA	Ambition
ACCESS AND EQUITY	No aviation community member excluded or treated unfairly.
CAPACITY	Nominal capacity easily scalable with demand.
	Disruptive events do not interrupt service provision and do not significantly affect the performance of the system.
COST-EFFECTIVENESS	No increase of total direct ANS cost while maintaining the safety and quality of service.
	Significant increase of ANS productivity, irrespective of demand.
EFFICIENCY	Reduction of the gap between the flight efficiency achieved and the desired optimum trajectory of airspace users.
ENVIRONMENT	ANS-induced inefficiencies to be progressively removed to contribute to the global ICAO aspirational goals for CO ₂ emissions.
	To benefit from achieved flight efficiency gains.
FLEXIBILITY	To absorb required changes to individual business and operational trajectories.
INTEROPERABILITY	Essential at an operational and technical level.
PARTICIPATION BY THE ATM COMMUNITY	Pre-agreed level of participation to make the maximum shared use of the air navigation resources.
PREDICTABILITY	No increase in ANS delivery variability including asset availability.
SAFETY	Zero ANS-related accidents and a significant (50%) reduction of ANS-related serious incidents.
SECURITY	Zero significant disruptions due to cyber incidents

European Master Plan Vision

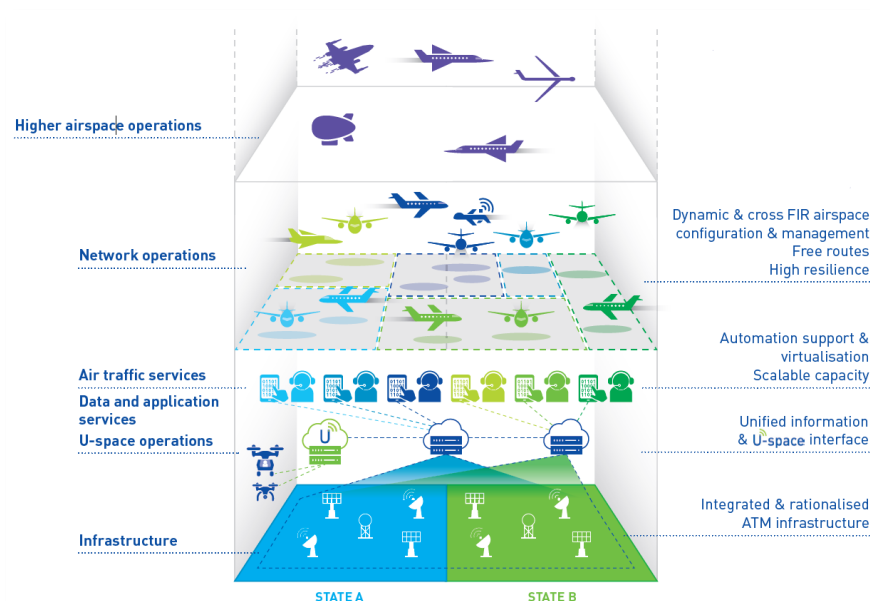
– towards the delivery of a digital sky

Fully scalable ATC system with strong air-ground integration

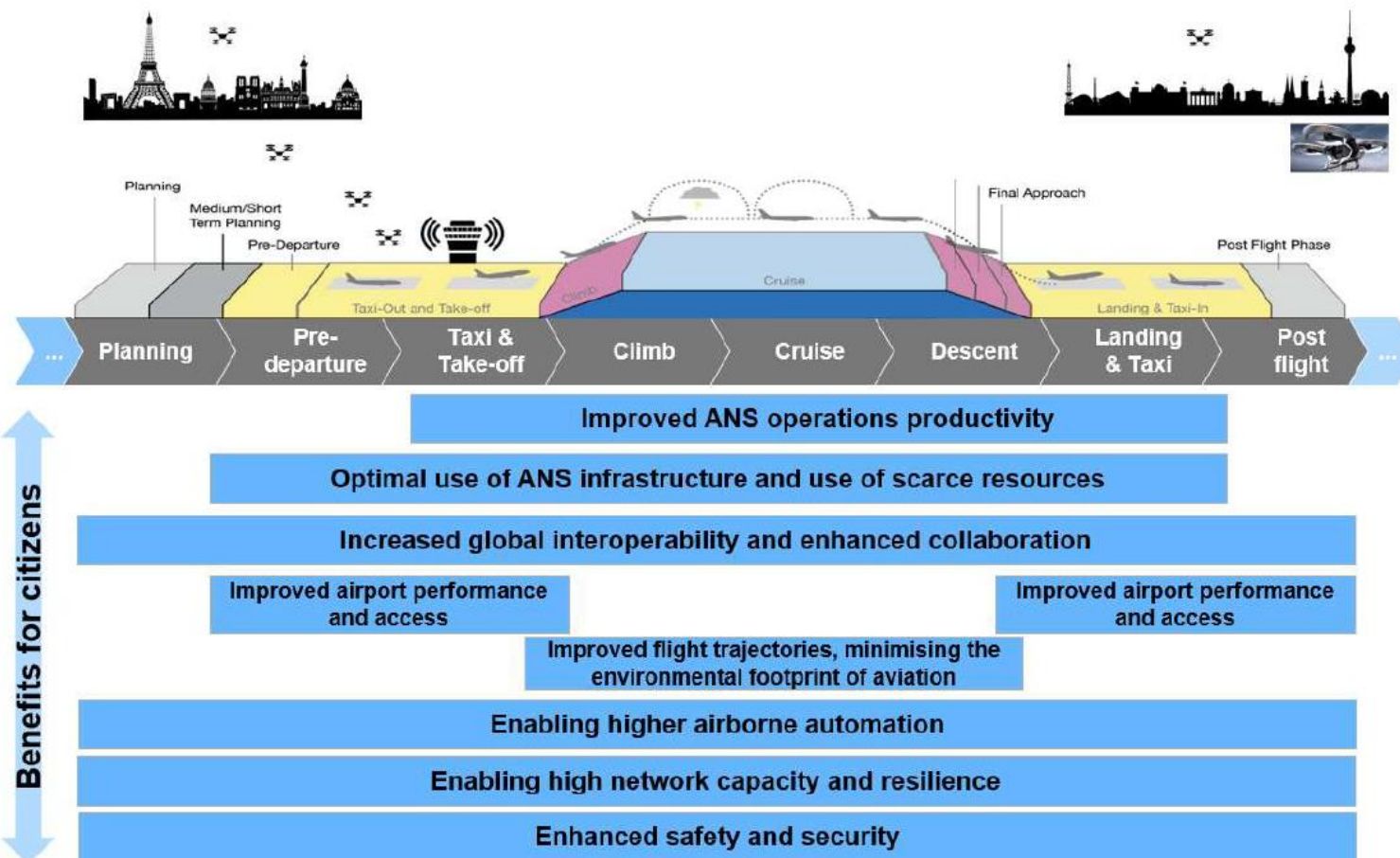
Relying on a **digital ecosystem**

Elimination of environmental inefficiencies caused by the aviation infrastructure

Ensuring that it offers solutions **that will fully exploit the potential offered by the next generation aircraft** for cleaner and quieter flight



Improvements across ATM



Embracing the digital transformation

Digital Transformation is about taking full advantage of digital technologies to generate new services, optimise current ones while delivering a better experience and benefits to all stakeholders.



Automation
& AI



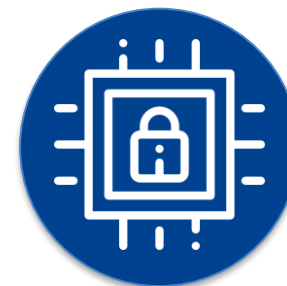
Connectivity



Data sharing
& data services

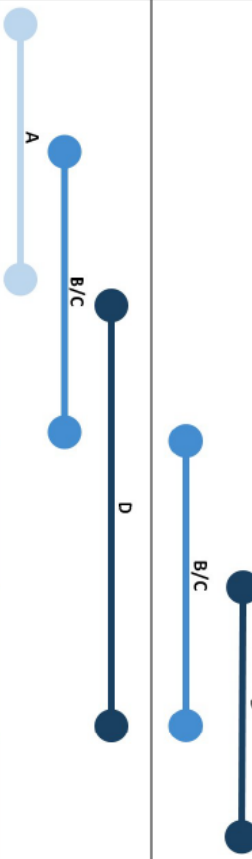


Virtualisation



Cybersecurity
& safety

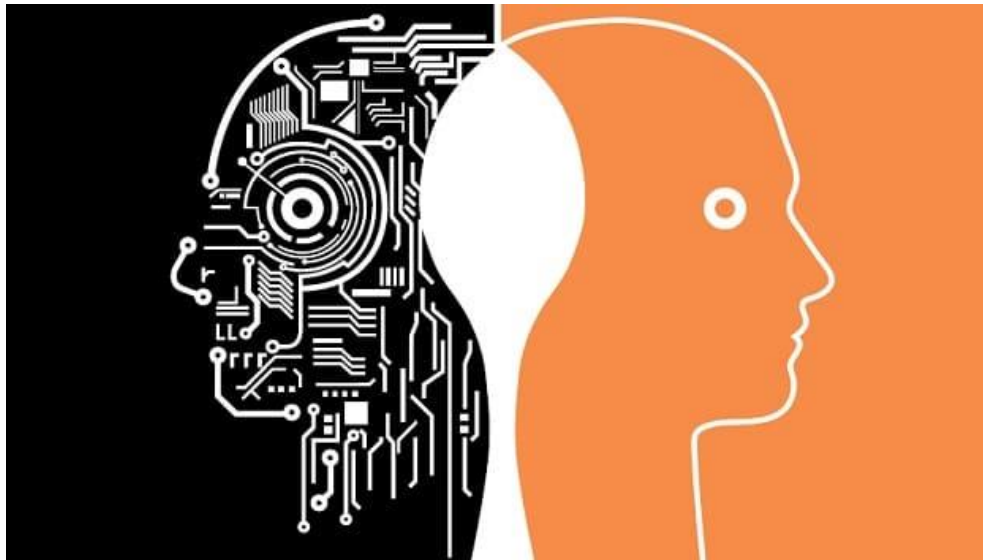
Embracing the digital transformation

Definition			Definition of Level of Automation per Task				Autonomy	Automation Level Targets per MP phase (A, B-C, D)	
			Information Acquisition and Exchange	Information Analysis	Decision and Action Selection	Action Implementation		Air Traffic Control	U-space services
Actions can only be initiated by Human	Level 0 <i>Low Automation</i>	Automation supports the human operator in information acquisition and exchange and information analysis							
	Level 1 <i>Decision Support</i>	Automation supports the human operator in information acquisition and exchange, information analysis and action selection for some tasks/functions							
	Level 2 <i>Task Execution Support</i>	Automation supports the human operator in information acquisition and exchange, information analysis, action selection and action implementation for some tasks/functions . Actions are always initiated by Human Operator. Adaptable/adaptive automation concepts support optimal socio-technical system performance.							
Action can be initiated by Automation	Level 3 <i>Conditional Automation</i>	Automation supports the human operator in information acquisition and exchange, information analysis, action selection and action implementation for most tasks/functions . Automation can initiate actions for some tasks . Adaptable/adaptive automation concepts support optimal socio-technical system performance.							
	Level 4 <i>High Automation</i>	Automation supports the human operator in information acquisition and exchange, information analysis, action selection and action implementation for all tasks/functions. Automation can initiate action for most tasks . Adaptable/adaptive automation concepts support optimal socio-technical system performance.							
	Level 5 <i>Full Automation</i>	Automation performs all tasks/functions in all conditions. There is no human operator.							

Degree of automation support for each type of task



A well recognised human dimension



Evolving roles

Change management

Training

Social

Gender equality

Staff involvement

SESAR ConOps

Essential Operational Changes

9

Essential Operational Changes

- Trajectory based operations
- Integrated CNS infrastructure and services
- ATM interconnected network
- Digital AIM and MET services
- U-space services
- Virtualisation of service provision
- Airport and TMA performance
- Fully dynamic and optimised airspace
- Multimodal mobility and integration of all airspace users



Structure Essential Operational Changes

Essential Operational Change

Description

Related SESAR deployment and development activities

➤ In deployment

Solutions are **already in deployment** - either through regulation or voluntarily

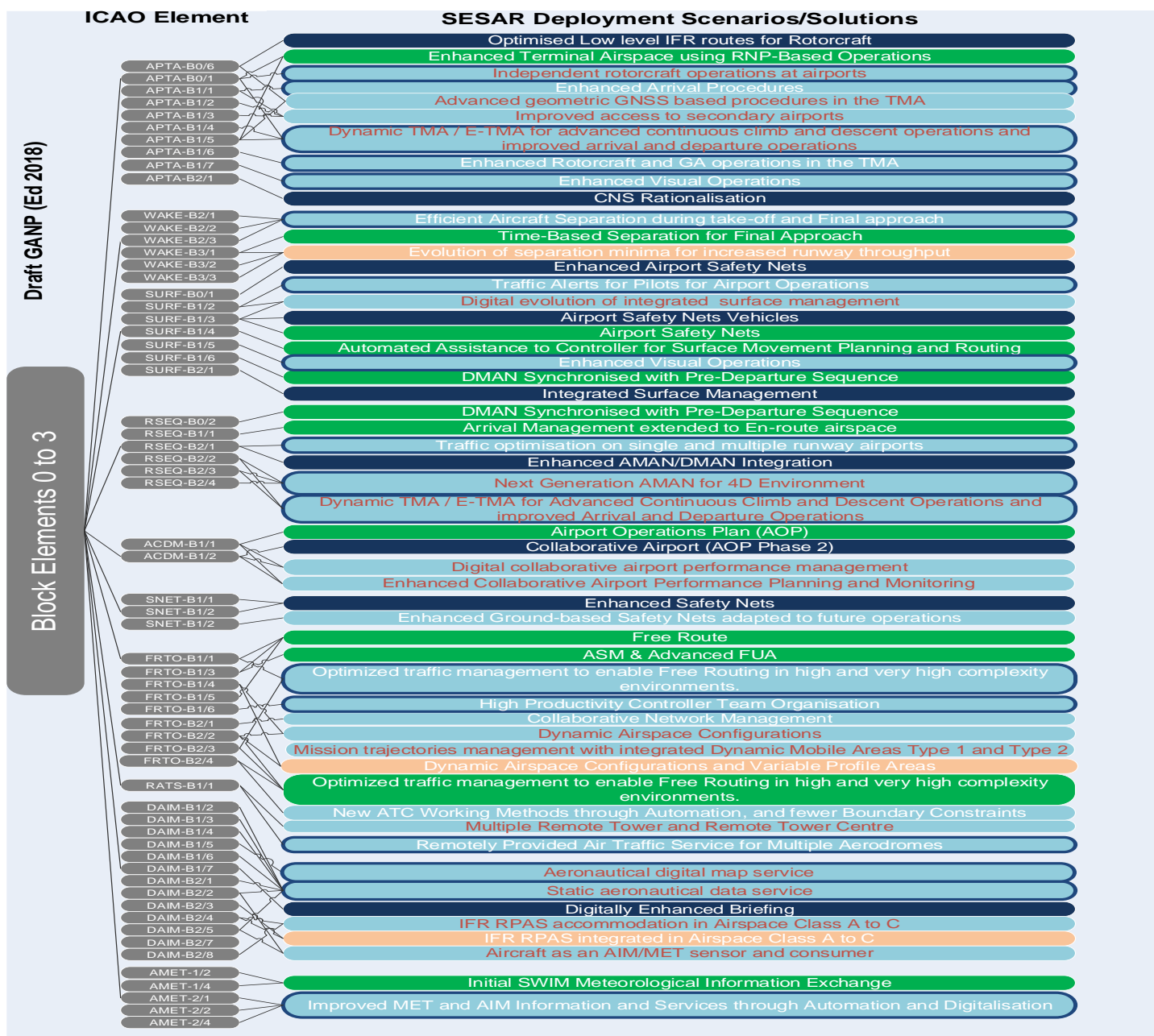
➤ In development phase

Solutions approaching maturity

Solutions still at the development stage but are expected to reach validated maturity and thus start of **industrialisation phase by end 2020**

Key R&D activities

Prioritised candidate Solutions under development within the SESAR, **expected to deliver the end of phase C** of the vision

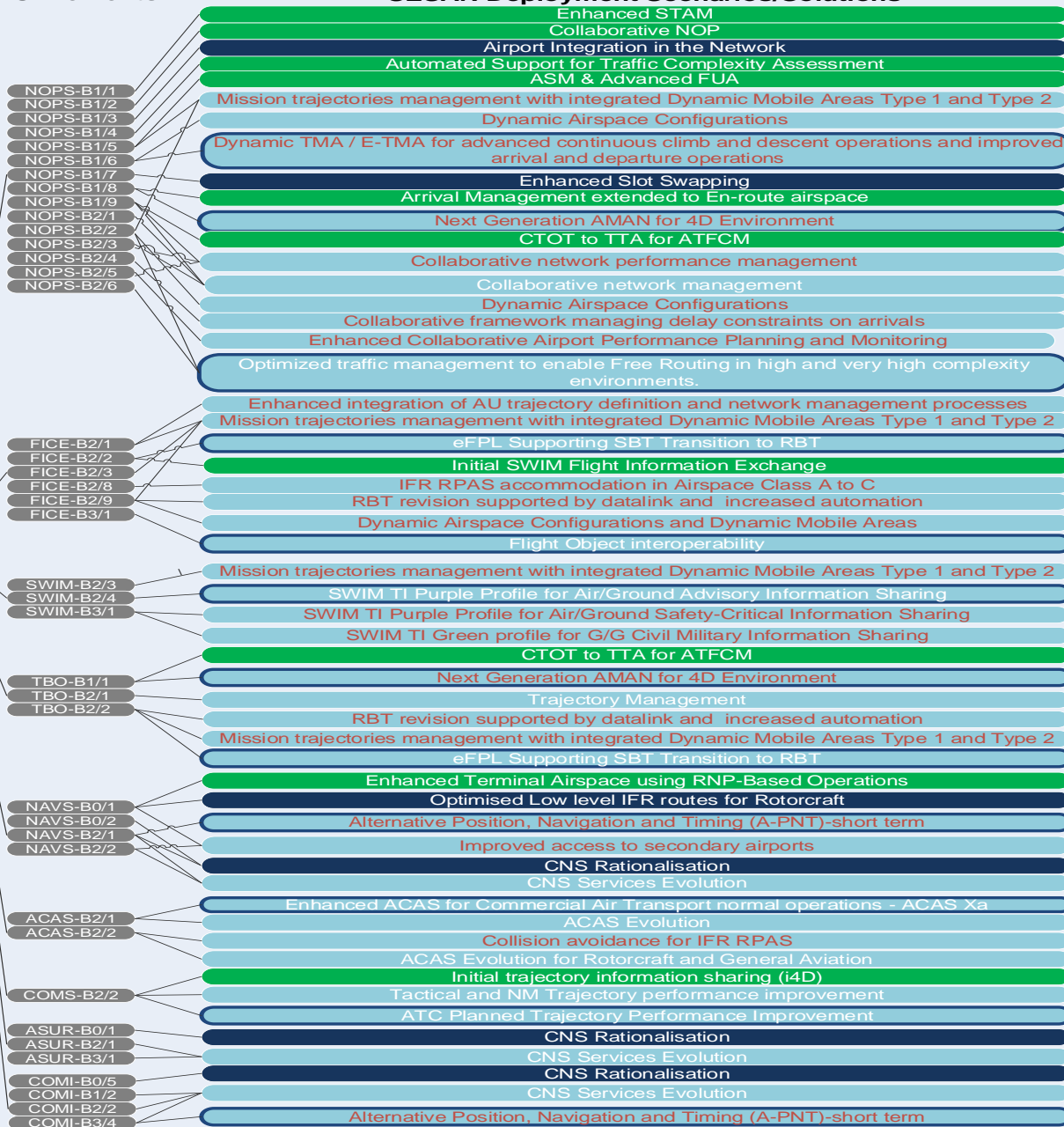


ICAO Elements

SESAR Deployment Scenarios/Solutions

Draft GANP (Ed 2018)

Block Elements 0 to 3 (continue)



Globally Interoperable and Harmonised

- Ensure that the same aircraft can operate in all systems;
- Align strategic views of Aviation/ATM modernisation and its enabling asset capabilities/services
- Ensure common standards available and applicable when needed;
- Increasing operational and economic performance by sharing results and efforts;

SESAR – NextGen

Current state of play



Supporting the ICAO GANP, GASP and GAsEP

**Top down/bottom-up risk/issue/opportunity registry
supporting cooperation decision making**

Roadmap comparisons - standardisation, avionics, CNS etc.

**Economic Impact Assessments, CBA models and
assumptions, new or amended business models**

State of Harmonisation document

SESAR – NextGen

New/Burgeoning Influences



Trajectory Based Operation – a joint transition strategy

A joint strategy for Integrated CNS and radio spectrum

UAS/RPAS New Entrants Integration - RPAS (IFR),
UTM/ATM, UAM and HALE and HAO

Safety and Security Methodologies

- Information Integrity for an evolving IP-based aviation ecosystem

Human performance/factors with higher levels of
automation and connectivity



Thank you for your attention



Founding Members



EUROPEAN UNION



EUROCONTROL