

# SESAR and Future ATM Development Projects

RAF Club, London

12 December 2008

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# Introduction

- » What's our role in the SESAR JU
- » What are we looking for from SESAR
  - » Benefits of participation
  - » How we hope to gain them
- » Our role in the Development phase
- » Industry members roles



## What is our role in the SESAR JU

### » NATS Ltd

- » NERL Regulated business covering area and oceanic operations
- » NSL 15 UK airport operations (unregulated)

### » NATS En-Route Ltd (NERL) is the member

### » NERL one of the pre-selected member ANSPs

- » Aeropuertos Españoles y Navegación Aérea
- » Luftfahrtverket Group
- » Deutsche Flugsicherung GmbH
- » Direction des Services de la Navigation Aérienne
- » ENAV S.p.A.

Collectively known as the “A6”

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# What is NATS looking for in SESAR

## » Performance Partnership

## » Capacity

- » Delay avoidance
- » Resilience to change

## » Safety

- » Safety nets and conformance monitoring.

## » Environment

- » Fuel Efficiency (cost and CO2 reduction)
- » Noise reduction

## » Cost

- » 50% reduction in costs



## Benefits of Participation in SESAR JU

- » **An interoperable future ATM system fit for UK**
  - » Participation is essential for defining solutions that meet our customer's needs.
- » **Accelerated Introduction of Advanced Concepts**
- » **Enhancing relationships with European ANSPs**
- » **Funding to offset development costs**
  - » We need the systems, any funding will reduce development outlay.
  - » Collaboration will allow us to share development costs
  - » NERL's efforts in the SJU will be partly reimbursed
- » **Reputation for leading and shaping the ATM industry**
  - » Maintaining NATS' position at the forefront of the industry



# Improving Capacity

- » Reduce Controller Work Load

- » Number of interventions
- » Actions to resolve interventions

- » We can achieve this by :

- § Improving strategic de-confliction
- § Resolving problems early –accurate trajectory data
- § Providing automation tools to support the controllers task
- § Reducing radio traffic- data-link
- § Delegating separation tasks to pilots

Trajectories and A/C - Ground Integration

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# Improving Capacity

- » Make better use of constrained resources
  - » Airspace
  - » Concrete
- » A European Airspace that facilitates Trajectory Based Operations
- » Airspace segregation- 'minimum space & minimum time'
- » Special use airspace features 'enhanced integration'
- » User preferred trajectories in low/medium density areas to be supported
- » High density fixed routes to meet the requirements of the ATM System
- » High and low density airspace to be defined in time and space

Shared information

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# Queue Management

## » Arrival Management

- » Cross Border issues
- » Multiple Airport
- » Multiple AMAN in single ACC

## » Departure Metering

- » Smoothing of flows into ENR using mini-slots

## » Departure Management

- » Integrated with airport surface management
- » Integrated with airport operations
- » Integrated Departure Arrival Management

Trajectories and shared information

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# Aircraft Capability

## » RNAV (Area Navigation)

- » B-RNAV FL95+ since 1998 in ECAC
- » P-RNAV operational trials
- » Performance Based Navigation
  - » Approach with Vertical Guidance
  - » Target for UK TMA

## » Enhanced Mode-S

## » ADS-B

## » Data-link

- » Pilot to Controller
- » FMS to Ground Trajectory Predictor



# Benefits of new aircraft capabilities

## » PRNAV

- » Departures (SIDs)
  - » Environmental benefits
  - » Flexibility of design
- » Arrivals
  - » Less reliance of ground infrastructure
  - » Greater Flexibility in design
  - » Continuous Descent Approaches
  - » Environmental benefits

## » Airborne Separation Assurance

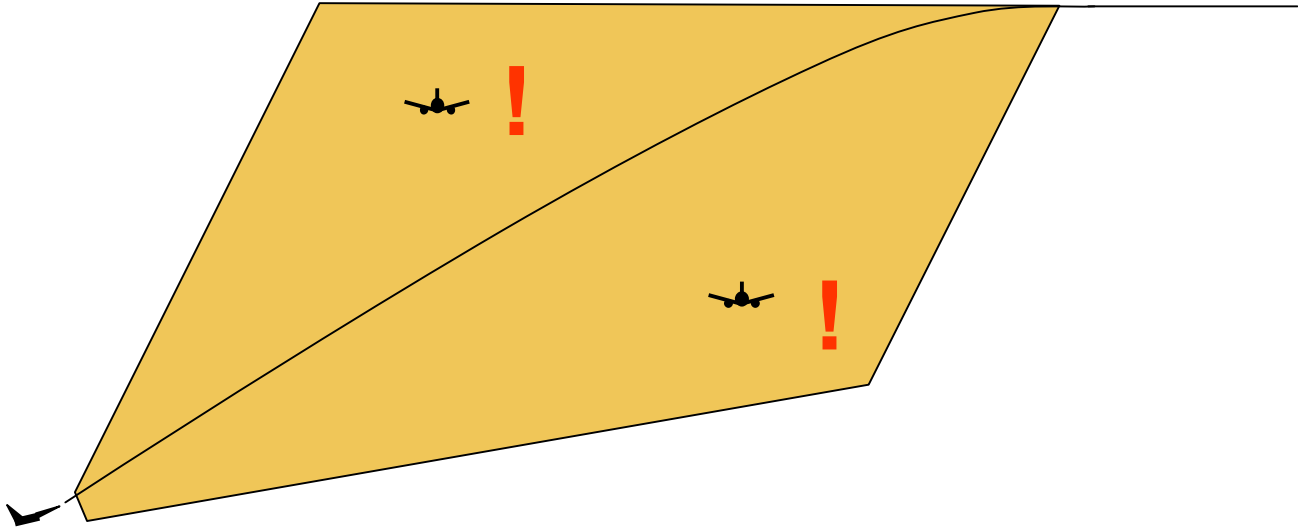
- » Delegated responsibility for separation to Pilot

## » Controller Tools reflect true aircraft performance

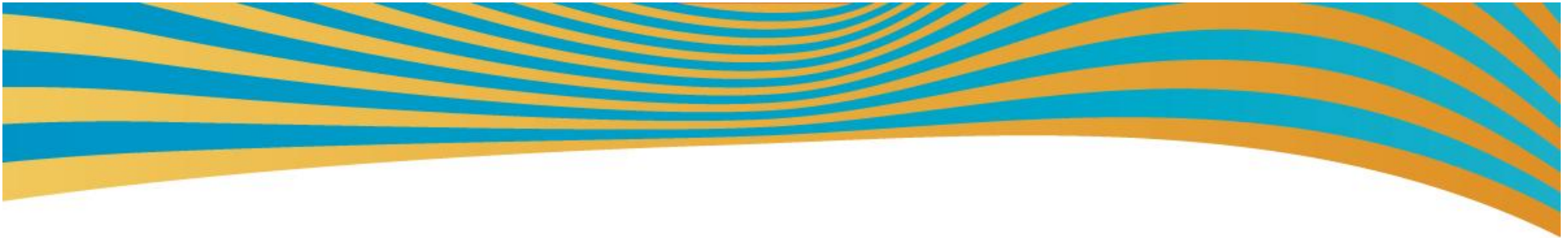
- » Release airspace for greater capacity



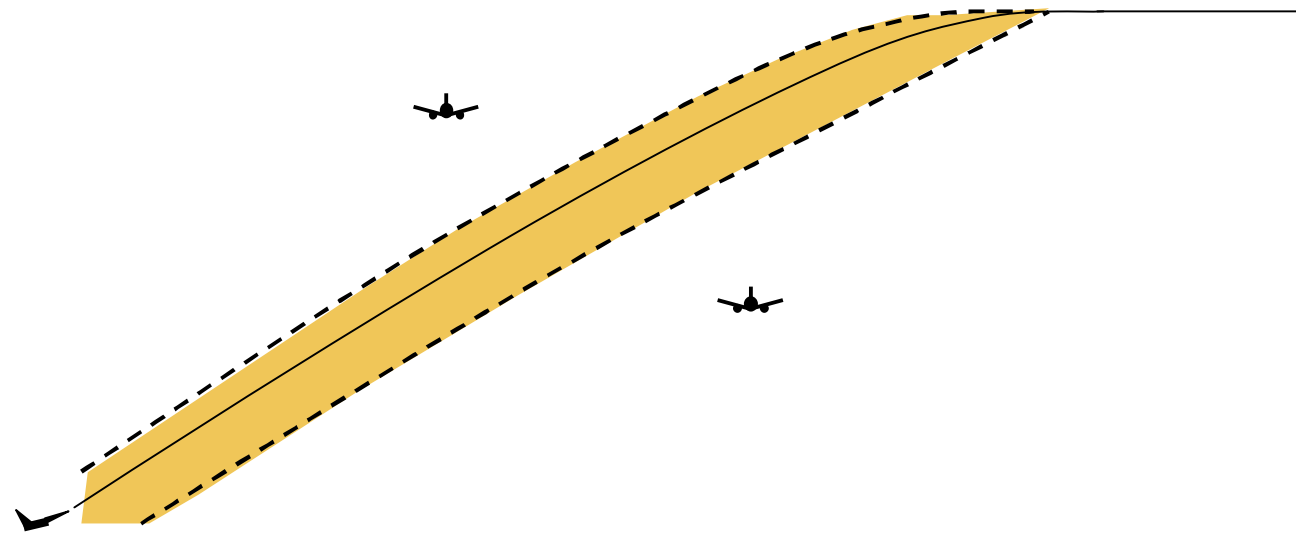
# Removal of Vertical Uncertainty



Vertical uncertainty results in a large protected area



## Removal of Vertical Uncertainty



Vertical containment releases a large volume of airspace  
- available for other aircraft

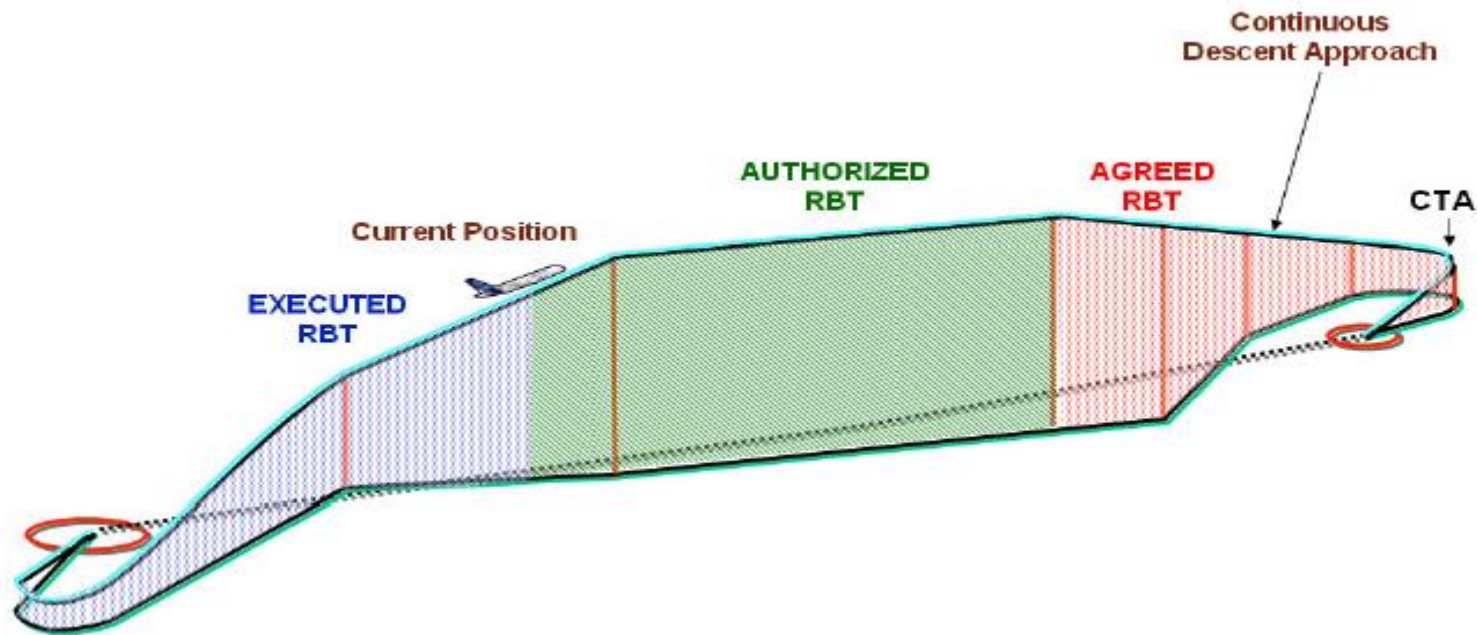


# Safety Nets

- » **Enhanced STCA**
  - » Data-link use of aircraft data
- » **Automated Conformance Monitoring**
  - » PRNAV routes
  - » Clearances
- » **Approach Monitoring**
  - » Glide Slope
  - » Non Transgression Zone
- » **Area Proximity Warning**
  - » Controlled Airspace Infringement Tool (CAIT)
- » **Minimum Safe Altitude Warning**

# SESAR CONCEPT of OPERATIONS

Based on trajectories- NOT airspace,

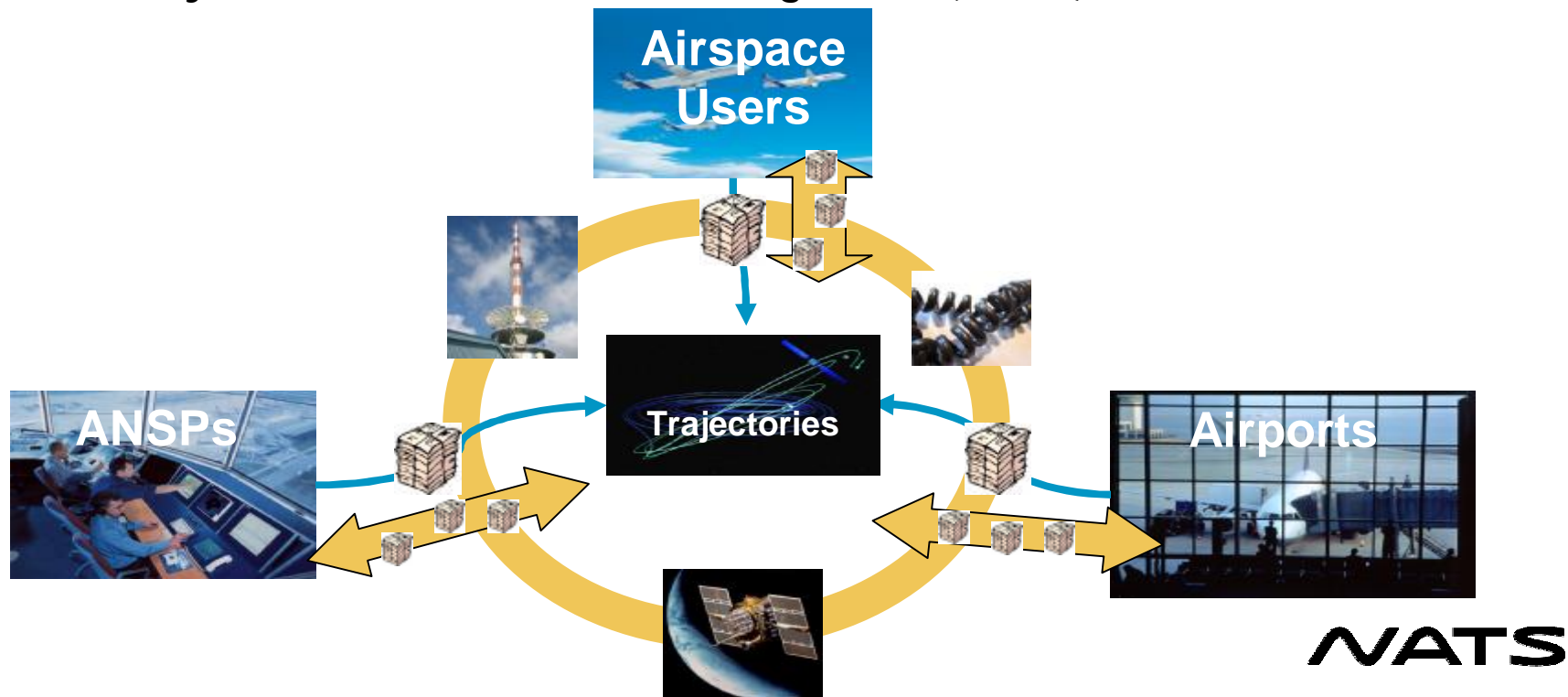


# SESAR CONCEPT of OPERATIONS

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Seven major features, the first two :-

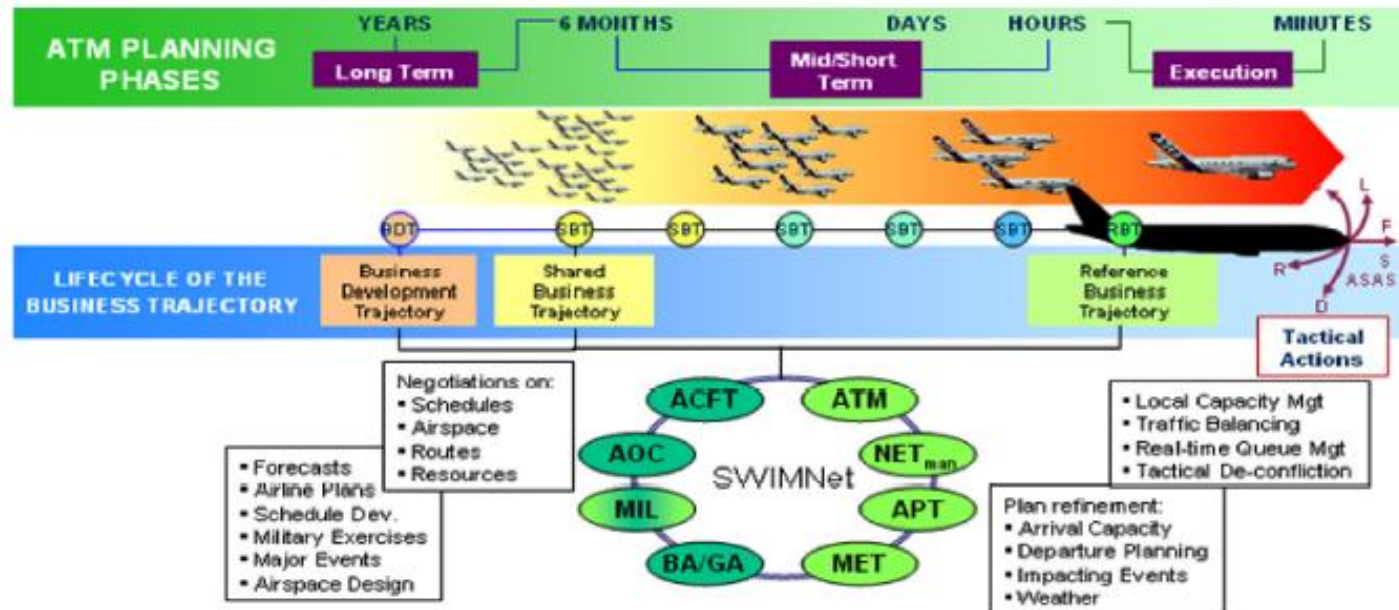
- » A System Wide Information Management (SWIM).



# SESAR CONCEPT of OPERATIONS

Based on trajectories- NOT airspace,  
 Seven major features, the first two :-

- » A System Wide Information Management (SWIM).
- » Collaborative Decision Making.





## SESAR CONCEPT of OPERATIONS

Based on trajectories- NOT airspace,

Seven major features, the first two :-

- » A System Wide Information Management (SWIM).
- » Collaborative Decision Making.

Provide Foundation for:

- » A Trajectory Managed environment,
- » Human Centred with automation to reduce work load,
- » New separation modes take advantage:
  - » advanced aircraft navigation capabilities, to allow
  - » tasks to be delegated to pilots,
- » Aircraft and ATM system “ATM Capability Levels”.
- » Airports fully integrated into the ATM network.



## A New Architecture Model

### » Single Functional Architecture

- » Airborne & Ground-based systems being treated as one

### » New architecture development process

- » European ATM Enterprise Architecture (EAEA) framework
- » Service Oriented Approach (SOA)

### » All changes to the ATM System under one new process :

- » One shareable infrastructure for all SESAR Performance Partners
- » All present & future applications make use of ATM Services through published standard service interfaces

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**NERL's Involvement**  
**in the**  
**SESAR JU**

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# SESAR Phases

## Definition phase (2004-2008)

- » Led by Eurocontrol,
- » EC co-funded under TENS
- » Executed by consortium of air transport stakeholders.
- » Defined the ATM Target Concept
- » Defined the ATM Master Plan

## Development phase (2008-2013)

- » Deliver Early Wins
- » Develop Mature concepts
- » Research, validate and develop technological solution for future concepts

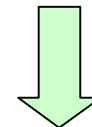
## Deployment phase (2014-2020)

- » Large scale production, and
- » Implementation of the new air traffic management infrastructure.
- » Deploy harmonised and interoperable Systems that guarantee high performance air transport activities in Europe.

SESAR CONSORTIUM



Joint Undertaking



Implementation

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WPB: Target Concept Maintenance

WPC: ATM Master Plan

WP3: Validation Infrastructure

WP4  
En Route  
Operations

WP5  
TMA  
Operations

WP6  
Airport  
Operations

WP7  
Network  
Operations

WP8: Information Management

WP10  
ATC Systems

WP11  
FOC/WOC

WP12  
Airport  
Systems

WP13  
NIMS

WP9: Aircraft Systems

WP14: SWIM

WP15: CNS

WP16: Transverse Areas



# NATS Strategy for SESAR

Recognise our capabilities and those of others

- » We do not have the resources to do everything, and
- » The five other ANSPs are all very capable

## Strategy

- » NERL to take a strong leadership role in development of:
  - » Common concepts & methods of operation,
  - » Architecture, and
  - » supporting controller tools & technologies, for
  - » TMA operations & their integration with airport, network & en-route services,
- » Collaborate within the A6 with those working in other areas,
- » NATS to be a leading player in a pan-European consortium to develop future integrated systems.



## Operational Work Package Leadership Roles

WP B	High Level Target Concept & Architecture	DFS
WP C	Master Plan	Eurocontrol
WP 3	Validation Infrastructure	ENAV
WP 4	En-Route Operations	DSNA
WP 5	TMA Operations	NATS
WP 6	Airport Operations	AENA
WP 7	Network Operations	Eurocontrol
WP 8	Information Management	LFV



## Scope of TMA Work Package

- » TMA and En-route co-operative Planning
- » TMA Trajectory Management Framework
  - » Improved Airline Flight Plan info to ATC TP
- » Queue Management in TMA and En-route
  - » Ground Airborne capabilities
  - » Improve Vertical Profile
  - » Tactical TMA En-route Queue management
- » TMA Trajectory & Separation Management
  - » 4D Based operations
  - » Controller team organisation
- » TMA Controller Working Position
  - » Usability Requirements and
  - » Human Factors Aspects



# Our leading role in other Work Packages

## » Work Package 4 En-route Operations

- » En-route Trajectory management
- » PBN for separation purposes
- » ATSA –In trail Procedures
- » ASAS for Separation assurance
- » Controller team organisation

## » Work Package 16 Transverse Areas

- » Environmental Sustainability

## » Work Package B Target Concept Maintenance

- » Develop and Maintain European ATM Enterprise Architecture, and
- » Associated business model

## » NERL Contributions to other Work Packages



## SESAR JU Members:- Industry candidates

- » **INDRA Sistemas S.A..**
- » **Airbus S.A.S.**
- » **Alenia Aeronautica S.p.A.**
- » **North European ATM Industry Group**
- » **SESAR European Airports Consortium**
- » **Selex Sistemi Integrati S.P.A.**
- » **Frequentis AG**
- » **Thales Group**
- » **Honeywell International Inc.**

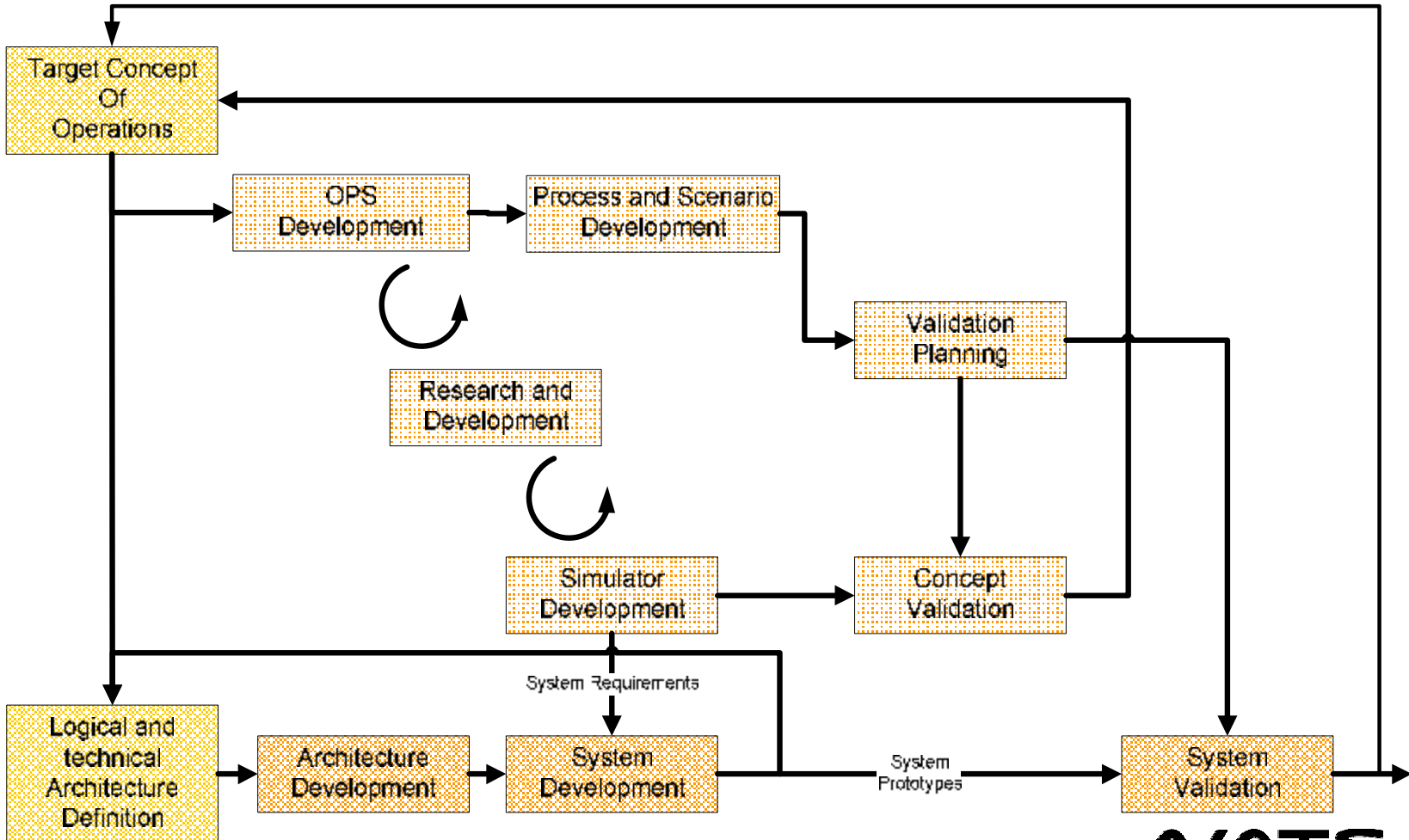
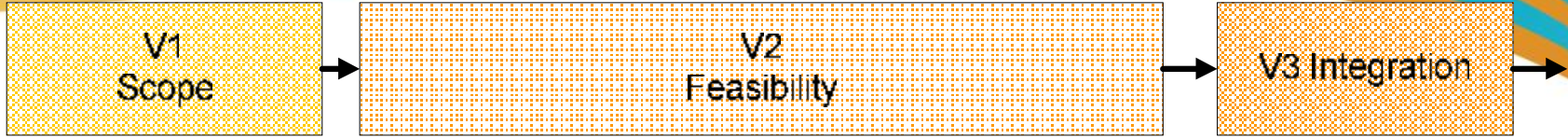
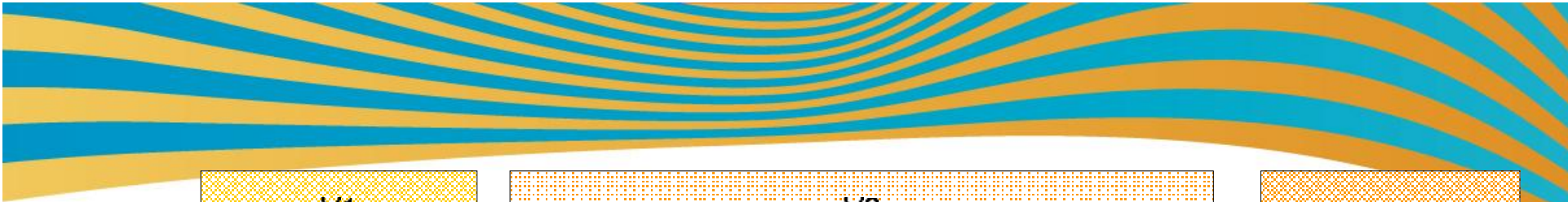


# System Work Package Leadership Roles

WP 9	Aircraft Systems	Airbus & Honeywell
WP 10	En-Route & TMA ATC Systems	Indra & Thales
WP 11	Airline Operational Control Systems AOC)	SESAR JU
WP 12	Airport Systems	Selex & Indra
WP 13	Network Information Management Systems (NIMS)	Eurocontrol
WP 14	System Wide Information Management	Selex & Thales
WP 15	Ground CNS Systems	Selex & Thales
WP 16	ATM Transversal Areas R & D	Eurocontrol, NATS & LFV

# Questions

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