# SUPPORTING DEPLOYMENT THROUGH HUMAN FACTORS

# THE PROBLEM

- SESAR requires substantial investment from ANSPs, both financially and in terms of effort, and can be a challenging process. At the end of 2-3 years, there may be little certainty that a solution will make its way into live operations, regardless of validated benefits.

- Confidence is needed for ANSPs and the wider industry to transition more concepts to benefit their operations and operational staff. This accelerates the industry's technical growth and enables tools and procedures to keep pace with long-term traffic growth.

- In a perfect world, any concept that is delivered to 'end of V3' via SESAR would get immediate and competitive buy-in from technical providers to be marketed to ANSPs across Europe.

- However, as we see time and time again, industry attraction to a good concept can fizzle out when the time comes to develop final products and seek regulatory approval due to the various risks involved.

THINK can help

# WHO ARE THINK?

Think Research is an Air Traffic Management and Airports consultancy based in Bournemouth, UK.

We are a data-centric consultancy – all our advice is evidence-based and validated using appropriate analytical techniques.

We work with our clients to develop concepts and technologies from initial idea to implementation using a range of services to mature, validate, standardise and deploy solutions that meet future performance requirements:

- We appreciate the risk that European ANSPs and suppliers accept by taking solutions into the transition process.
- We understand the strength and weaknesses of the E-OCVM, allowing us to anticipate potential issues.
- Through a focus on Human Factors, we produce value through V3-V5 by engaging with stakeholders and identifying gaps for further assessments.
- Across Human Performance, Safety and Regulatory assurance, we can gather the necessary evidence to deliver a solution to implementation.
- A rigorous yet pragmatic approach involves exploration of non-nominal, low workload and contingency scenarios.

This brochure explains how we can reduce the risks surrounding deployment projects, from a Human Factors perspective.


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Jonathan is an ATM consultant specialising in Human Performance and human-in-the-loop concept validation. He has coordinated several validation projects for NATS R&D and developed expertise within the SESAR 2020 research programme. Most recently, Jonathan has held the role of Solution Lead for PJ.02-01 in Wave 1.

Author: Diana Toma, ATM Consultant

As well as being a Human Factors specialist, Diana has extensive experience working with various ATC stakeholder representatives, ANSP's and has also been involved in key SESAR projects during her career. She has significant technical knowledge and experience running projects from concept development through to validation.

# IN THIS BROCHURE...

# STEPPING BEYOND SESAR

## INDUSTRIALISATION TAKE-OFF

SESAR requires substantial investment from ANSPs, so once a concept is delivered to 'end of V3', it should get immediate and competitive buy-in from technical providers to be marketed to ANSPs across Europe.

## A SMOOTH JOURNEY

Once multiple deployable products make it into the market, competition begins. This gives ANSPs a choice to determine which solution is most suitable for their technical infrastructure, airspace design and operational methods.

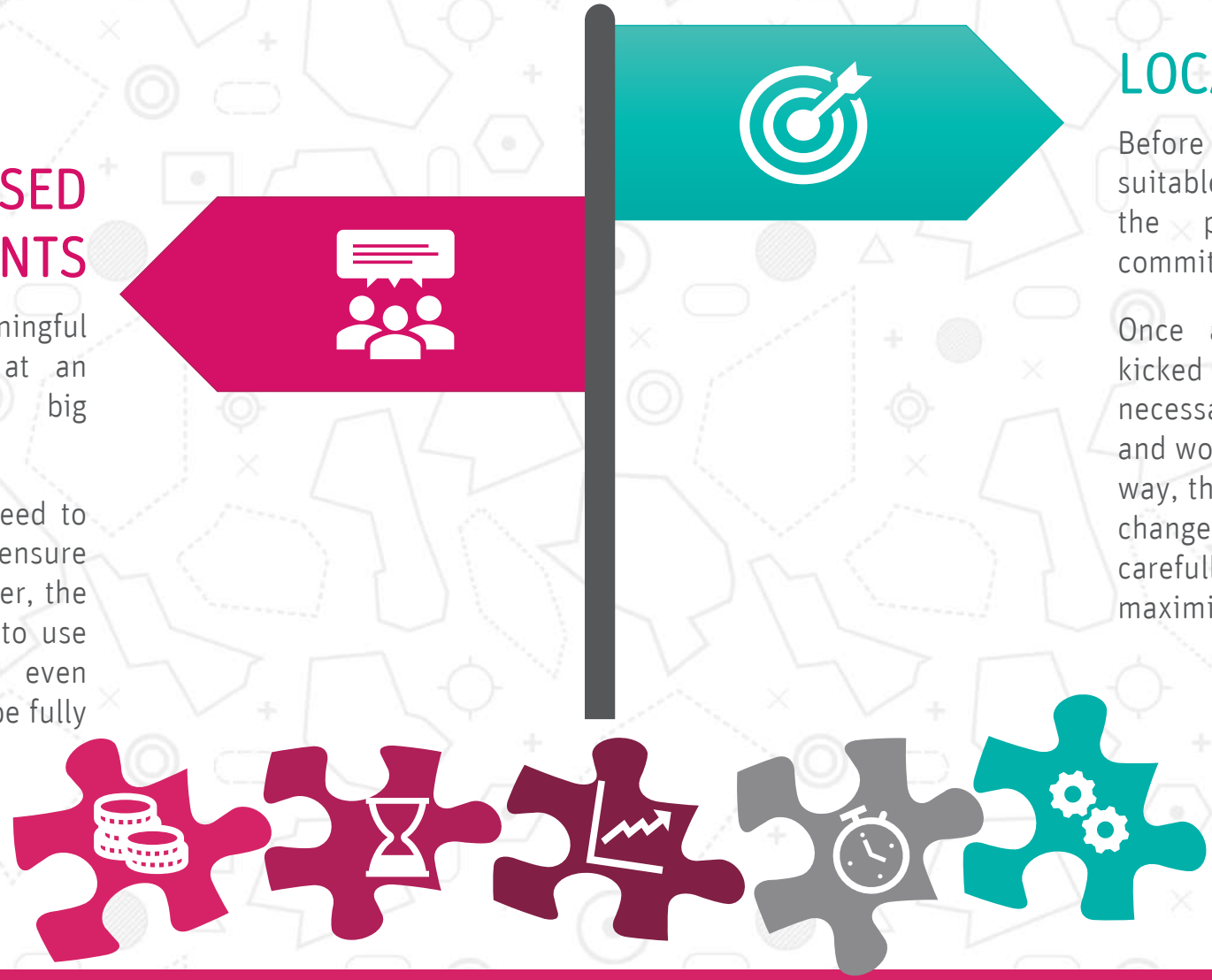
This process of implementation planning, training development, Human Performance and Safety assurance can be resource intensive, so efficient management will minimize the final cost and ensure timely implementation.

# UNDERSTANDING WHAT AND WHEN TO DEPLOY

## BIG, SYNCHRONISED DEPLOYMENTS

Disruptive advancements and meaningful ATM progress can be achieved at an industry-wide level through big synchronised deployments.

For synchronised changes, ANSPs need to collaorate in a Common Project to ensure consistency with neighbours. However, the expectation is for them to be able to use common specifications and even equipment. As such, ANSPs need to be fully committed to it from the start.



## LOCAL DEPLOYMENT

Before deciding which approach is suitable, an ANSP needs to understand the performance gains and feel committed to the change.

Once a local deployment process is kicked off, an ANSP will need to allocate necessary resources for local adaptation and work closely with the supplier/s. This way, the ANSP has more control over the change process, which needs to be carefully managed and controlled to maximise the performance enhancement.

# HUMAN FACTORS THROUGHOUT DEPLOYMENT

## BENEFIT ASSURANCE

It is important to look critically at work done during the V3 phase to identify gaps in Human Performane assessment and wider implications of the concept on wider operations.

Very large demonstrations (VLDs) are extremely valuable in addressing these whilst at the same time, generating greater market interest for industrialisation. Building a more comprehensive set of evidence through HF assessments provokes more confidence in developers and ANSPs.

So where does HF fit into all of this?

## STAKEHOLDER ENGAGEMENT

Engaging with a wide group of stakeholders to understand indirect impacts and long term effects is key in building consensus on how a solution can be successfully delivered into operations.

## PREPARATION FOR CHANGE

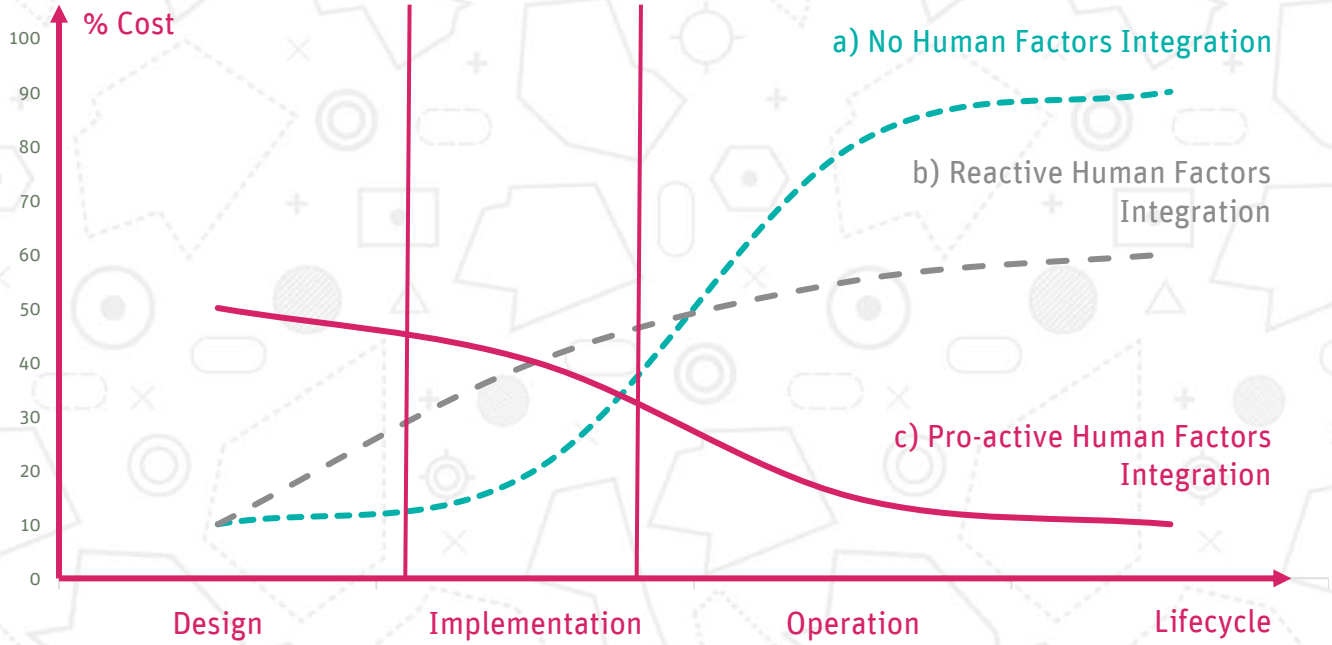
Ensure development and maintenance of a robust change memagement plan.
Investigate transition factors such as training, recruitment and rostering.
Put forward and support a change process.

# OUR HUMAN-CENTRED DESIGN APPROACH

## HUMAN-CENTRED DESIGN (HCD) IS IN EVERYTHING WE DO

At Think, we focus on the human components in all of our development processes; even where no direct impact is expected.

By sticking to these principles, we can assure that the final product will be acceptable to users and can be operated within their capabilities exploiting the advantages of the human operator in the process.




## PATH TO SUCCESS

We understand that no projected benefit to key performance areas can be realised if Human Performance is not mainitained or improved.

## THE REAL EXPERTS

End users are always best-equipped to inform the design of new systems or improvements. Therefore, HCD relies on engagement with operational staff.

## TIMING IS KEY

Time and time again, we've seen budget and weeks go to waste due to a reactive approach adjustment to HCD. We always advocate for a user focus from Day 1.

## OUR TOOLBOX

Think consultants are highly familiar with a range of HCD methods. We can deploy methods best-suited to the development process in question.

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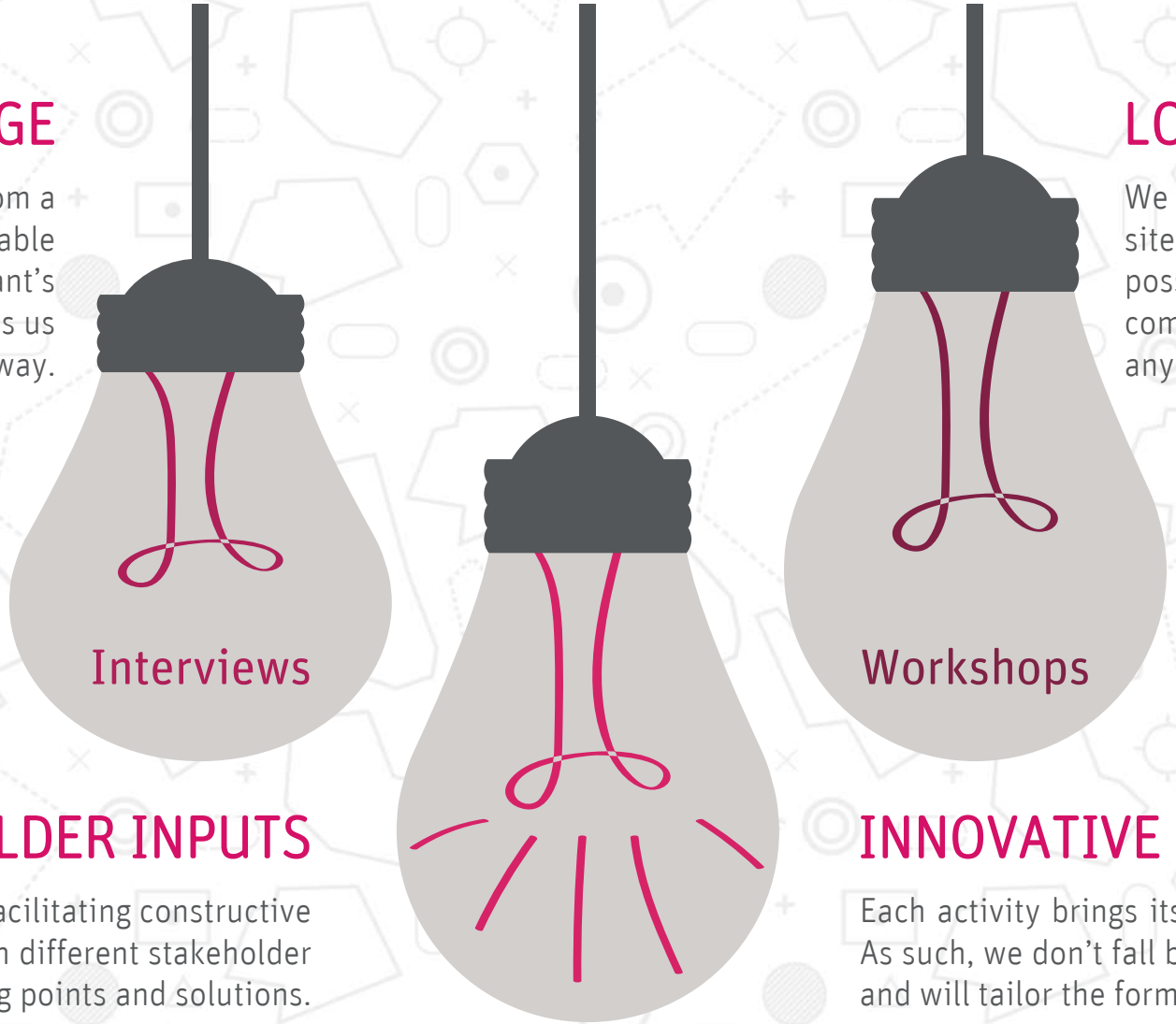
# STAKEHOLDER ENGAGEMENT

## KEY KNOWLEDGE

To generate valuable outputs from a workshop or interview, you need to be able to ask the right questions. Our consultant's extensive operational knowledge allows us to pompt participants in the right way.




## LOCATION

We take advantage of opportunities to visit sites to meet face-to-face. Where not possible, we will make effective use of communication technologies to mitigate any impact from hosting remotely.

## STAKEHOLDER INPUTS

We are comfortable facilitating constructive discussions between different stakeholder groups to identify sticking points and solutions.

## INNOVATIVE FORMATS

Each activity brings its own challenges and peculiarities. As such, we don't fall back on one-size-fits-all approaches and will tailor the format to the need.

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# HUMAN ERROR ANALYSIS

## METHODOLOGIES

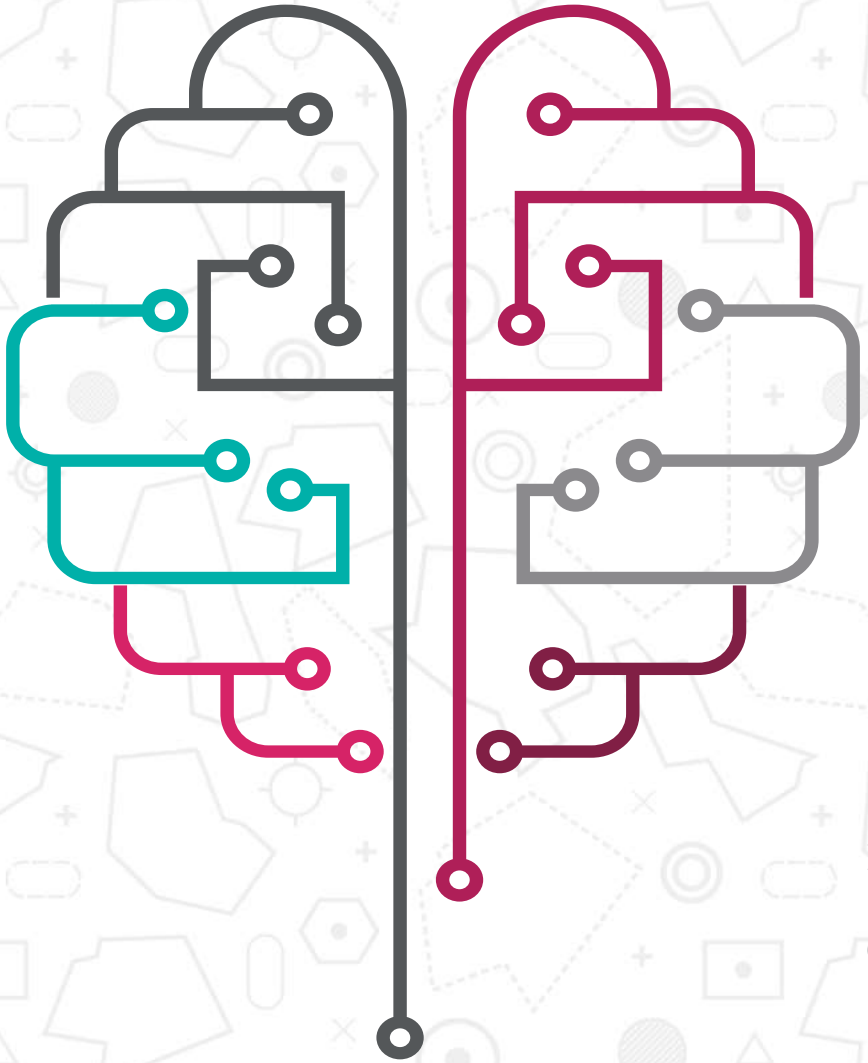
Our HF experts are well-versed in recognised analysis methods such as SHERPA, HET, HEART and hierarchical task analysis.

## CURRENT OPERATIONS

Analysis of human error in normal operations can help to identify weaknesses in training, impacts of increasing traffic and differences in staff age demographics.

## FUTURE SOLUTIONS

Equally, it is important to conduct comparative analysis for proposed operational improvements that may impact human performance.



## CONTROLLER TOOLS

Impacts from changes to the controller tool-set may not be apparent from small-scale validation activities and require further investigation.

## HMI DESIGN

It only takes slight variations to the interface to trigger an increase in errors in the long-term. Identifying this before implementation is safety-critical.

## HARDWARE

Input devices, display equipment and CWP layout all influence the controller's ability to carry out tasks without error. This needs to be understood and mitigated where needed.

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# AN EVIDENCE-DRIVEN PROCESS

Taking a product through V4 to deployment requires Safety, HF and regulatory assurance.

## HUMAN PERFORMANCE VARIABILITY

Comprehensive Human Error identification demands that Human Performance be considered under all operational scenarios, not the just peak conditions typically simulated in validation.


## HUMAN IN THE LOOP

Maintaining collaboration with end users through to live operations is critical in identifying gaps in evidence and implications from local operating environments.

## SAFETY CASE

Achieving regulatory approval is reliant on an ironclad safety case. Expertise and the right approach are both needed to provide confidence to regulators.

## CONTINGENCY

A solution is truly tested in non-nominal and contingency scenarios, which need to be fully-explored to determine ultimate suitability for implementation.

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# DE-RISKING THROUGH HUMAN PERFORMANCE

## USER WORKSHOPS

Based on our experience in leading ATCO workshops as co-creation sessions, we select the most appropriate methods and techniques from our HCD toolkit in order to validate and drive HITH design while collecting necessary supporting evidence.

## HMI REQUIREMENTS

One key cost driver during deployment is the HMI design and refinement. Thus, our counsultants capture a robust set of requirements as part of the HMI Specification early in the design phase, in order to deliver cost-efficient solutions.

## EXPERT REVIEW

In order to de-risk and deliver the final Human Performance Assessment, while contributing to Safety Assurance, our HF experts provide evidence-based rewies throughout the process.

## DESK RESEARCH AND BENCHMARKING

In conjunction with User Requirements, our HMI experts collate and provide user-centred state-of-the art design solutions to further support Human Performance.

## REGULATORY COMPLIANCE

Our HMI experts work in accordance standard HMI Design principles, HPSoE and ANSP HMI style guides, if available.

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# IN SUMMARY

## How we can uniquely support the deployment of your solutions

Summary of what Think can offer:

- We appreciate the risk that European ANSPs and suppliers accept by tasking solutions into the transition process.
- We understand the strength and weaknesses of the E-OCVM, allowing us to anticipate potential issues.
- Through a focus on Human Factors, we produce value in V3-V5 by engaging with stakeholders and identifying gaps for further assessments.
- Across HF, Safety and Regulatory assurance, we can gather the necessary evidence to delivery a solution to implementation.
- A rigorous yet pragmatic approach involves exploration of non-nominal, low workload and contingency scenarios.

Each of these advantages contribute to a reduction in risk for our clients. This provides assurance that choosing to deploy SESAR concepts is a worthwhile pursuit.

Trajectory Based Operations

Remote and Digital Tower

Wake and Time Based Separation

Airport CDM

Performance Based Navigation

Flexible Use of Airspace

Unmanned Aerial Systems

Runway Optimisation

Virtual Centre

Enterprise and Airspace Architecture

Airspace Change

ATCO Team Organisation & Training

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