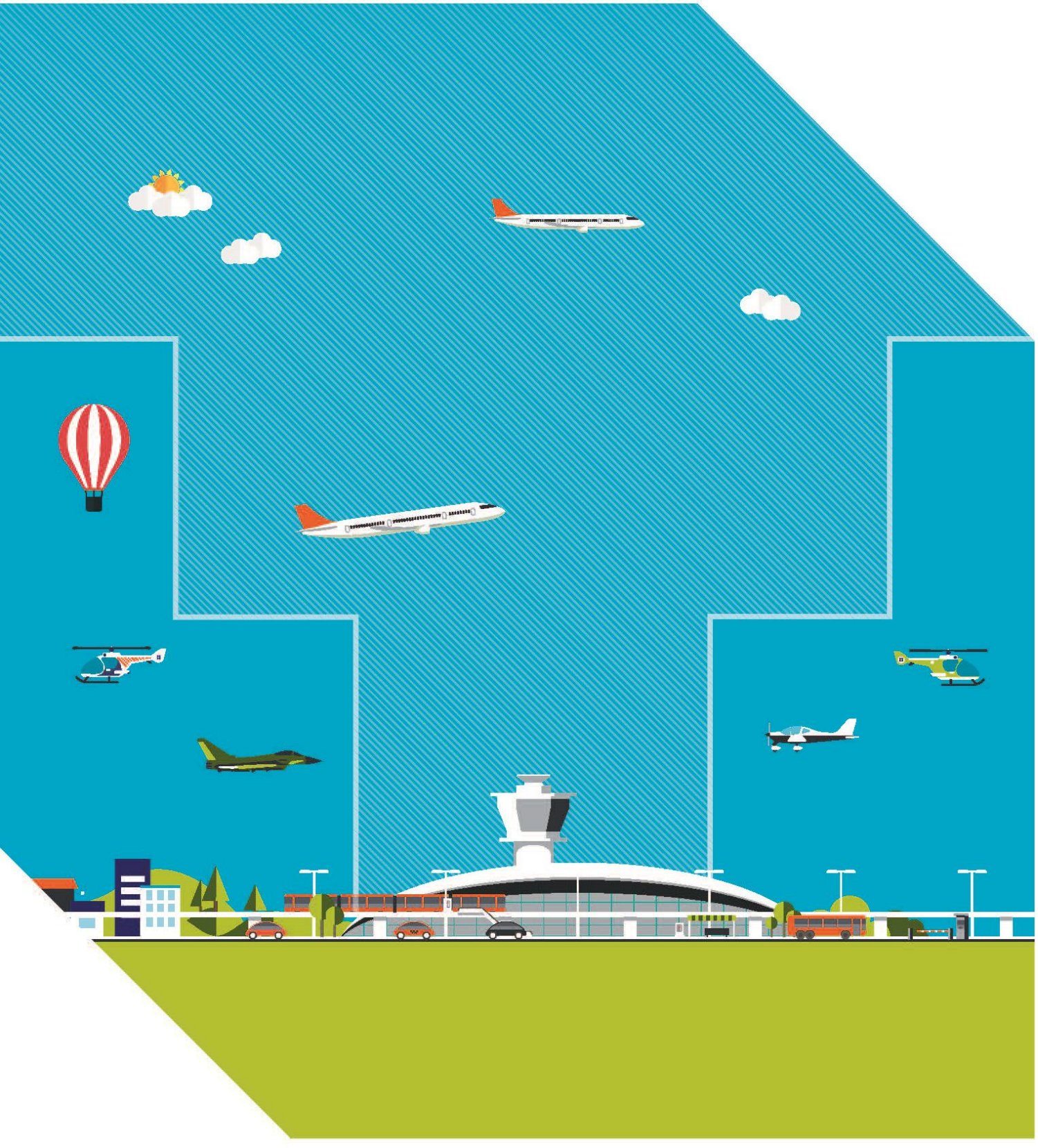
Airspace Modernisation – 2019 Progress Report

CAP 1862



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Revision history

This edition was first published in December 2019.

The latest version of this document is available in electronic format at www.caa.co.uk

Contents

Executive Summary

1. In 2017, the Government updated the CAA's strategic role for airspace modernisation by issuing new Air Navigation Directions. Consistent with our role as specialist aviation regulator and our statutory responsibilities, we are required to prepare and maintain a co-ordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace.

2. Our Airspace Modernisation Strategy[1] (AMS) responds to that requirement, setting out the detailed initiatives that industry must deliver to achieve the objectives envisaged in current government policy.

3. The strategy sets out the ends, ways and means of modernising airspace, initially focusing on the period until the end of 2024.[2] The **ends** are derived from UK government and relevant international policy and the **ways** of achieving them are set through 15 initiatives that include new airspace design, new operational concepts and new technologies. To establish the **means** of delivering modernised airspace, such as the resources needed, the strategy requires industry-led entities responsible for delivery to to draw up delivery plans, with progress overseen by the CAA.

4. The CAA must report to the Secretary of State annually on the delivery of the strategy, and for 2019 this is provided in the following chapters.

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1 CAP1711 Airspace Modernisation Strategy December 2018

2 2024 corresponds to the end of the next Single European Sky Performance Scheme reference period (RP3). https://ec.europa.eu/transport/modes/air/single-european-sky/ses-performance-and-charging/performance-and-charging-schemes_en

5. In Chapter 2 we provide an update on governance, policy and regulatory process since the publication of the airspace modernisation strategy. Key steps have been taken including:

- The refinement of the governance structure.
- The establishment of the Airspace Change Organising Group (ACOG).
- The identification of support funding.
- The progression of legislation[3] to compel sponsors to develop airspace changes.
- Increasing CAA resources to deal with our new roles and workload.

6. In Chapter 3 we provide an overview of current delivery plans and our assessment of progress towards completion of each major initiative. This has been done in the form of a 'RAG' status.

7. Six of the 15 initiatives are assessed as on track overall (green), with nine requiring attention (compared to eight previously reported in the AMS). None are assessed as having 'major issues'.

8. Initiative 1 'Direct Route Airspace' has been implemented, and NERL will monitor usage by airlines. Initiative 2 'Free Route Airspace' has been assessed as green (compared to amber previously) with NERL currently consulting[4] on a phased delivery programme.

9. However, the complexity and uncertainty in Initiatives 10 – 'Airspace Classification Review' and 12 – 'Radio Frequency Spectrum' means we have assessed these as amber (compared to green previously).

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3 The Air Traffic Management and Unmanned Aircraft Bill was announced in the Queen's Speech on 14 October 2019 and introduced in the House of Lords on 22 October 2019. The Bill was subsequently dropped when Parliament was dissolved on 6th November 2019.

4 https://consultations.airspacechange.co.uk/nats/fra-d1/

10. For Initiative 10, whilst short term actions are in progress to respond to recent amendments to the Air Navigation Directions[5], including launching an airspace classification review consultation[6], the longer term timescales are driven by EU laws. The UK's current bespoke airspace arrangements (compared to other Member States) will require a longer period to reach compliance. It is also dependent on other initiatives, and will require careful co-ordination to ensure safety is maintained during this large scale change. The CAA has been liaising with European Union Aviation Safety Agency (EASA) and the European Commission who are aware of the complexity involved in UK airspace, and the need for an extended transitional period. The updated RAG status therefore reflects the current position until an extended period is formalised.

11. Initiative 12 has now been assessed as amber (requiring attention), to reflect the uncertainty around securing adequate spectrum at the World Radio Conference without robust studies that define system characteristics and protection criteria. This is also subject to requirements from other non-aeronautical industries for spectrum allocations as demand for radio spectrum is increasing sharply, particularly as societal use of wireless technologies grows.

1.2 NERL has set up ACOG to undertake impartial and objective coordination to prepare an airspace change masterplan, starting with southern UK. The co-ordinated airspace redesign (covered by Initiatives 4 and 5) is one of the most complex challenges of the AMS. ACOG have now also taken on the programme management of FASI-N. The legislation introduced into the House of Lords would have enabled sponsors to be directed to develop airspace changes in the masterplan process. Ministers will need to consider whether to reintroduced it based on preference and

5 https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Legislative-framework-to-airspace-change/

6 https://consultations.caa.co.uk/corporate-communications/airspace-classification-review-2019-2020/

Parliamentary time. The CAA remains of the view that this legislation is fundamental to the delivery of the future UK masterplan.

12. A number of delivery risks were presented in the Strategy in 2018. We judged that the highest risk was in relation to a potential lack of co-ordination in Initiative 4 ‘FAS Implementation South’ due to the complexity expected. This risk is expected to reduce in 2020 now that ACOG has been established within NERL, but will remain critical. We will continue to monitor this. Further detail on the work that needs to be undertaken in 2020 is included in this report, including the need for a new regulatory process to assess and accept a co-ordinated implementation plan for airspace changes.

13. There are also significant dependencies on ACOG’s success across other initiatives such as 6 ‘Queue Management’, 7 ‘Satellite Navigation Route Replications’ and 8 ‘Satellite Navigation Route Redesigns’.

14. The CAA intends to develop a more comprehensive progress report in 2020 when the CAA’s oversight team is in place.

Chapter 1

Co-sponsor updates

Governance

1.1 In the last year the CAA has run a joint engagement programme, alongside the Department for Transport (DfT), to reach all entities listed in the engagement section of the governance structure. We have updated stakeholders and listened to feedback.

1.2 The CAA have since refined the Governance structure. In particular we intend to:

- Include working groups covering initiatives that are at a developmental stage i.e. where policy must be developed before industry can commence delivery.
- Simplify the industry delivery entities and the means of tracking progress.
- Amend the stakeholder engagement groups based on the feedback received.

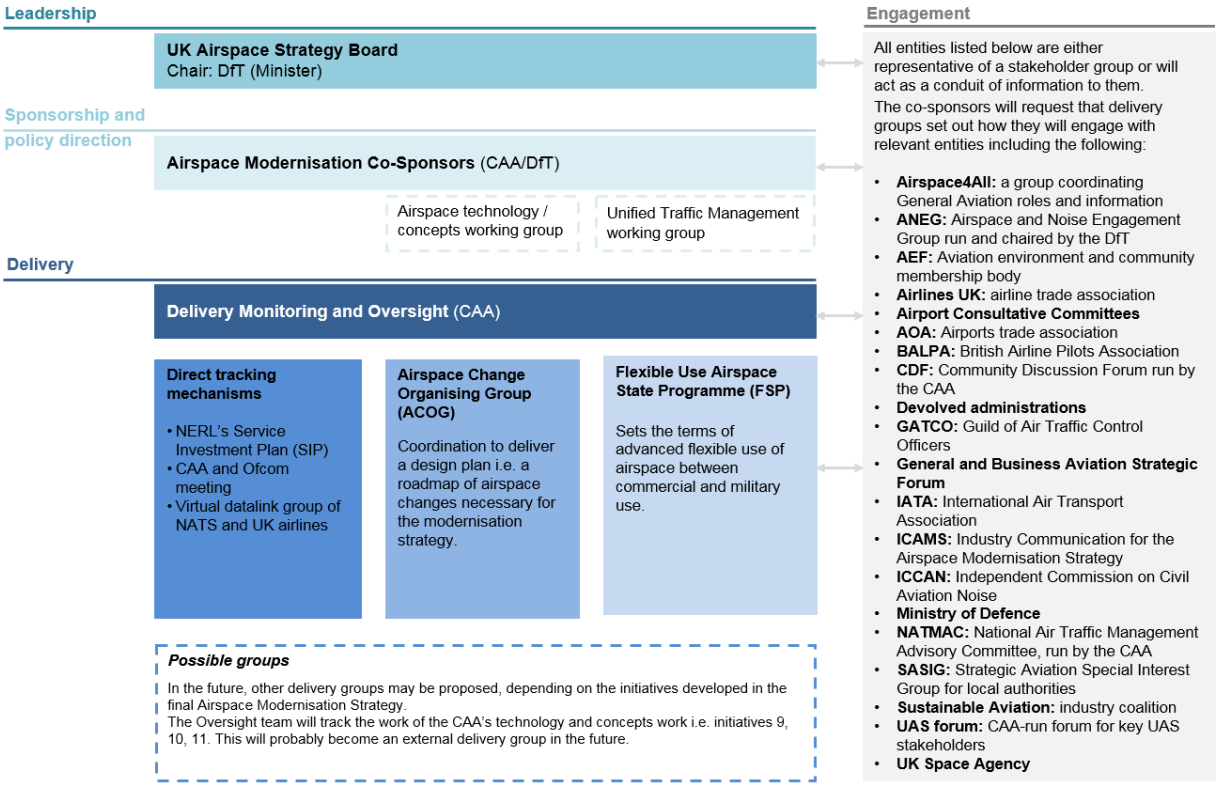
1.3 A revised structure is included below in Figure 1.1. This replaces the structure in the annex (CAP1711b)[7] to the Airspace Modernisation Strategy, jointly owned with the DfT.

1.4 The Airspace Strategy Board (ASB) sits at the top of the governance structure for the UK Airspace Modernisation and has convened three times since it was established in Autumn 2018. It is chaired by the Department for Transport Aviation Minister, and brings together a wide range of interested aviation stakeholders to discuss national airspace

[7] https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=8961

policy and the strategic objectives of modernisation. Details of membership, terms of reference and minutes are published.[8]

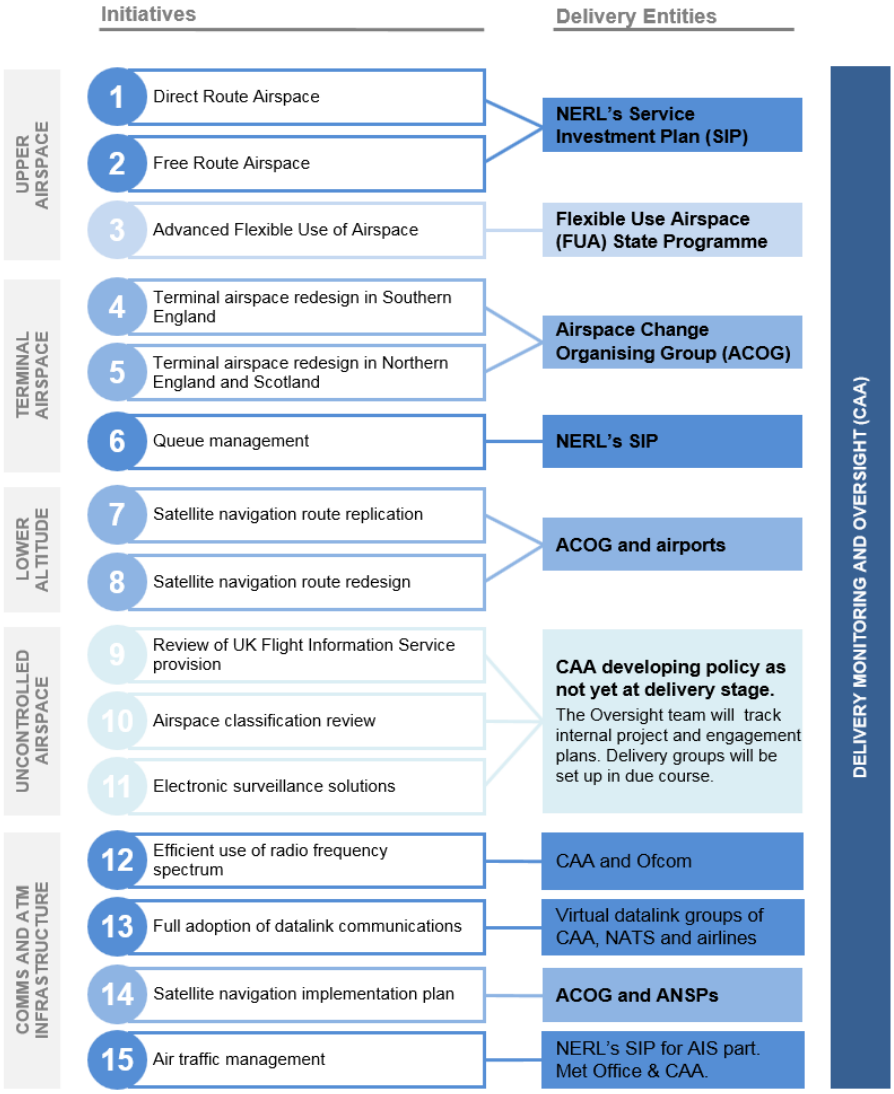
Figure 1.1 – Proposed Governance Structure Update



1.5 Figure 1.2 below also shows the delivery entities for each initiative and the means of tracking progress.

8 https://www.gov.uk/government/groups/airspace-strategy-board

Figure 1.2 – Delivery Entities and Progress Tracking



Policy and Regulatory Architecture

Co-ordinating a systemised airspace design for the UK

1.6 As part of our strategy and plan, the DfT and CAA (as co-sponsors of airspace modernisation) commissioned NERL to begin to develop a co-ordinated implementation plan for airspace changes (or airspace change masterplan) in the south of the UK, and to create a co-ordination group (now known as the Airspace Change Organising Group (ACOG)) to lead the airspace change implementation plan.

1.7 We stated our intention to underpin these requirements with an obligation on NERL through its licence, and our final UK RP3 (Reference Period 3, 2020-2024) performance plan[9] decisions maintain this requirement. The draft condition requires NERL to establish, maintain and manage ACOG, and create and maintain a masterplan for airspace changes in Southern England, in line with requirements or guidance provided by the co-sponsors and taking into account the expertise of airport operators and views of stakeholders. It also requires NERL to prepare and submit changes to airspace design and airspace change proposals (ACPs) where we instruct them to, and, where necessary, assist other stakeholders with preparing and submitting ACPs.

1.8 NERL have now established ACOG and have submitted Iteration one of a masterplan for changes in Southern England to the CAA. The CAA and DfT, as co-sponsors, intend to publish this along with our assessment of it in early 2020.

1.9 The CAA will need to 'accept' a future version of the masterplan into our strategy, to give the masterplan a statutory basis. The statutory basis is necessary because:

- The CAA is the regulatory decision-maker for airspace changes. Airspace changes must be developed and proposed by a change sponsor in accordance with the CAA's airspace change process, as set out in CAP 1616. The CAA must make airspace design change decisions in accordance with its statutory strategy and plan for airspace modernisation. For the CAA to know whether a proposal conflicts with, or supports, airspace modernisation it must review it against the masterplan.

9 CAP1830 UK RP3 Decision Document. Note: on 10 September 2019, NATS formally advised the CAA that it rejected our decisions in respect of the NERL UK and Oceanic price controls. On 19 November 2019 the Civil Aviation Authority referred this to the Competitions and Markets Authority to consider and report in due course.

- The proposed Bill that will create new powers for the Secretary of State[10] to decide to direct the development of an airspace change[11]. When determining whether to use the power, the Secretary of State would consider advice from the CAA. This advice would need to take account of the masterplan, and how critical that airspace change was to achieve airspace modernisation.
- Acceptance of the masterplan is a separate regulatory decision to airspace change decisions. However, individual airspace designs must still be regulated and decided upon in accordance with CAP 1616 and the AMS (with an accepted masterplan becoming part of it).[12]

1.10 The CAA will develop this new regulatory process which will set out clear points of interaction with the CAP 1616 process, and clear indications as to which decisions would be made by different CAA teams.

1.11 In the first half of 2020, the co-sponsors may also need to develop policy to help guide decisions on how trade-offs should be struck between different airspace changes. For example, between the different objectives that a single airspace design could be focused on achieving (i.e. reducing controlled airspace, increasing commercial capacity, noise reduction etc).

1.12 This guidance may also be needed to help ACOG/ the co-sponsors determine how to make trade-offs and help guide decisions where the relationship between two or more airspace changes will reduce opportunities for, or create impacts on another sponsor's airspace design regarding the following, in no particular order:

- Safety.
- Noise distribution.

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10 The Secretary of State may choose to delegate this power to the CAA.

11 The proposed Bill provides the flexibility to direct a sponsor to develop an ACP to a certain stage if required.

12 More information on airspace change decision making in the context of the AMS can be found at https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Airspace-change-proposals-in-the-FASI-S-and-FASI-N-programmes/

- Access for other users including General Aviation, military, UAS or others.
- Commercial growth (including delivering the Airports National Policy Statement, i.e. a new runway at Heathrow and best use of existing runways at all airports).
- Air quality or fuel efficiency.

1.13 The policy guidance and the acceptance of a masterplan does not override the need to consider all these factors when developing an airspace change, each of which must still follow the CAP 1616 process.

Funding

1.14 While the AMS is not the sole responsibility of NERL, it has a key role, including the provision of necessary air traffic control infrastructure and playing an overall planning and coordination role. Delivering the AMS is fundamental to furthering the interests of airspace users and the public interest. Recognising its importance, we allowed in full all of the costs NERL proposed to deliver the AMS.

1.15 Our final decisions on the UK RP3 performance plan included two support funds financed from NERL's and our own Determined Costs.

1.16 The first is an Opex Flexibility Fund (OFF), which should primarily be the main vehicle to support uncertain costs arising from the implementation of the AMS. We have proposed to increase the OFF by £7 million to £42 million over RP3, to provide more funds to facilitate additional AMS (and possibly other) requirements that might arise.

1.17 The second is an AMS support fund (ASF) of £10 million over RP3, with an explicit focus on airspace modernisation, financed from the CAA's Determined Costs. We intend that the ASF would be utilised to address projects that are important to the success of the AMS initiatives and where there are no other appropriate mechanisms to offer funding support for these projects.

1.18 In addition to these support funds, we have also added £15 million over RP3 for the establishment and running of the ACOG function.

1.19 Our final decisions in respect of the NERL UK and Oceanic price controls have been referred to the Competition and Markets Authority and we await the outcome of this review.

Legislation

1.20 Given the benefits that modernisation can deliver, the Government expects airports to participate in the modernisation programme voluntarily, working closely with ACOG. We are encouraged that many airports are engaging well and have begun the airspace change process. Other than in respect of NERL's licence condition, neither the Government nor the CAA currently have effective levers or powers to guarantee that airspace change is taken forward, should a sponsor decide that they do not wish to participate in the programme on a voluntary basis. This means that, where ACPs are interdependent, one airspace change sponsor could hold up several others.

1.21 In December 2018, the DfT launched a consultation[13] on a new policy to address these issues, through new proposed powers for the Secretary of State to be able to direct that an ACP is taken forward.

1.22 In October 2019, the Government confirmed its new policy[14] and introduced the Air Traffic Management and Unmanned Aircraft Bill into the House of Lords.

1.23 The Bill was subsequently dropped when Parliament was dissolved on 6th November 2019. The Government may decide to reintroduce the Bill in a future Parliamentary session. The CAA remains of the view that this legislation is fundamental to the delivery of the future UK masterplan

13 DfT: Aviation 2050 – the future of UK aviation

14 DfT: Consultation Response on Legislation for Enforcing the Development of Airspace Change Proposals, October 2019.

including the potential to deliver benefits such as reductions in noise or controlled airspace.

New Directions

1.24 The CAA received amended directions[15] from the Secretary of State for Transport in October 2019. These state that the CAA should prioritise airspace changes for Global Navigation Satellite Systems (GNSS) approaches without approach control to assist in clearing the backlog that currently exists.

1.25 The amended Directions also require the CAA to regularly consider whether airspace classification should be reviewed and carry out a review which includes consultation with airspace users.

1.26 We have updated Initiative 10 'Airspace Classification Review' of the AMS to reflect this. The CAA has started this work and is publishing, in December 2019, a consultation inviting stakeholders to identify volumes of controlled airspace in which the classification could be amended to better reflect the needs of all airspace users on an equitable basis. Future work will include preparing and consulting on guidance on a new regulatory process for amending volumes of airspace identified through the review exercise.

1.27 The work previously done to deliver Initiative 10 will continue, and will form a long-term modernisation concepts plan that will be included in future reviews.

1.28 Finally, the new Directions include updates to the call-in criteria, which set out the circumstances where the SoS has the discretion to make the decision to approve an airspace change proposal or not. The most recent amendment gives the SoS a call-in role on changes that could lead to any

15 https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Legislative-framework-to-airspace-change/

volume of airspace classified as Class G[16], being reclassified as Class A, C, D or E.

1.29 Whilst CAA resources have been focussed on these new functions towards the end of 2019, we are hiring new resources to mitigate any potential risk to the delivery of airspace modernisation.

Resourcing

1.30 There has been a significant increase in the number of ACP applications made in the past three years. A skills shortage and difficult market conditions has meant that CAA airspace regulator resourcing has not grown at the same rate during this time.

1.31 We anticipate there will be a significant number of ACPs required during RP3 to support the implementation of the AMS, of varying levels of complexity that will require different amounts of resource to process.

1.32 Increases in the complexity and quantity of airspace modernisation programmes, initiatives and developments in technology have also necessitated growth in technical and policy expertise within our Safety and Airspace Regualtion Group (SARG)

1.33 These new roles are essential to the CAA successfully meeting its regulatory and statutory commitments for the duration of RP3. Increased SARG resource will also enable us to progress key programmes such as Electronic Conspicuity and Performance Based Navigation efficiently and effectively, in accordance with government strategic policy and industry and consumer expectations.

16 In the UK class G airspace is uncontrolled. This means there are no restrictions on which aircraft can enter it, what equipment the aircraft must carry, and the routes taken by the aircraft.

1.34 We planned to increase SARG Airspace staff resources in three tranches to deal with the workload, and to prepare for the anticipated future increase in ACP workload and airspace modernisation:

- Tranche one relates to immediate posts. In 2019 this has been funded by an increase in the CAA Schemes of Charges and the DfT. Tranche one was dedicated to addressing the existing business demand for ACPs and the requirements of implementing the AMS.
- Tranche two will increase resources in 2020, and tranche three in 2021. These tranches are aimed at addressing additional ACP applications beyond the level currently experienced and necessary to support airspace modernisation.

1.35 The CAA has made good progress recruiting these additional resources whilst managing existing staff turnover. The recruitment process or new posts in tranche one is 90% complete, and tranche two roles are expected to be in place during Q2 2020.

1.36 The CAA's new delivery, monitoring and oversight role will be carried out by a new oversight team in the Strategy and Policy Department. The CAA has commenced a phased recruitment process for this team with three hires being made in 2019, including:

- A new Head of Oversight.
- Policy expertise to assist the oversight team and co-sponsor role.
- An Associate to deliver a secretariat to the team.

1.37 Further hires will be considered by the new Head of Oversight in due course.

1.38 The new oversight team will will work directly with CAA colleagues and industry groups that are undertaking work necessary to deliver the 15 initiatives. It will oversee and track delivery plans, reporting regularly to the co-sponsors and annually to the Secretary of State. The oversight team will develop more rigorous milestone reporting processes and will provide a more comprehensive progress report by the end 2020.

1.39 It will also have a key role to play in problem solving modernisation delivery and advising on the potential use of powers (should these be re-introduced into the legislative programme) to direct sponsors to prepare and submit airspace changes that are required as part of the CAA's strategy and plan.

Chapter 2

Delivery plans and progress 2019

2.1 The means of delivering airspace modernisation, such as the resources needed to bring in changes, ultimately rests with the industry organisations that will use airspace. For example, the CAA can set out why airspace redesign is needed and the policy ends it must achieve, but we cannot do that airspace change ourselves. Delivery plans must be set out by the organisations that will undertake this design, or integrate the concepts and technologies.

2.2 Table 2.1 below provides a summary of the delivery plan status for each initiative along with progress towards completion is indicated by a green, amber or red status:

- green status indicates that the initiative is on track to be completed in the timescales expected;
- amber status indicates that the initiative needs attention from key stakeholders to ensure completion in the timescales expected, or that there may be merit in reconsidering deadlines where possible;
- red status indicates there are major issues with the initiative and a significant risk that completion will not be achieved in the timescales expected.

2.3 Key dependencies and risks to the realisation of modernisation benefits are also summarised in Table 2.1. The risks are assessed on a 1 (low) to 5 (high) scale against likelihood (L), and severity (S).

Table 2.1 Initiative plan and progress status - December 2019

	Direct Route Airspace 1		**NERL's SIP**
UPPER AIRSPACE	**Description:** deployment of additional waypoints to the existing route network.		→ **Implemented**
	1.1 New waypoints	1.2 Established procedures	1.3 Airline flight planning system
	Timescale: by 2022	**Driver:** Single European Sky legislation	
	Stage: Delivery	**Mechanism:** NERL's SIP	
	Plan and progress The implementation of Direct Route Airspace was mandated in European Law under the EU Implementing Regulation EU716/204 as a stepping stone towards Free Route Airspace (See Initiative 2). Direct Route Airspace has been introduced by NERL and optimised ahead of the required timescales. However, there is a reliance on airlines investing in and using flight planning systems, in order to maximise the benefits. NERL will continue to monitor usage and engage with users as appropriate.		
	Risks to benefit realisation That aircraft operators do not invest in the flight planning system upgrades required to use Direct Route options effectively and maximise the benefits of implementation.		**Score:** 6 (Likelihood:2) * (Severity:3)

Free Route Airspace	2	NERL's SIP

UPPER AIRSPACE

Description: removal of all fixed routes so aircraft can fly fully optimised routes.		**On track**
2.1 Remove fixed route network	2.2 New procedures	2.3 Airline flight planning system
Timescale: by 2022-24	**Driver:** Single European Sky legislation	
Stage: Delivery	**Mechanism:** NERL's SIP	

Plan and progress
The implementation of FRA was mandated in European Law under the EU Implementing Regulation EU716/204. NERL are intending to cover legal requirements and Borealis Alliance[17] ambitions for the UK, whilst managing the deployment in line other simultaneous airspace modernisation projects. NERL are currently consulting[18] on the scope of deployment and are proposing a phased approach over the whole RP3 period to end of 2024.

Phase 1: Scotland/Northern Ireland
Phase 2: South West England/most of Wales
Phase 3: Northern England/North Wales
Phase 4: South East England

NERL have initiated the CAP1616 airspace change process for deployment phases 1 & 2. Phase 1 is at stage 3c (commence consultation) and Phase 2 is at stage 1b (design principles). Deployment phase 4 is dependent on the iTEC platform installation, which is part of Initiative 15.

New procedures will need to be developed, and in order to maximise the benefits there is a reliance on airlines investing in/using flight planning systems, which will need to be monitored by NERL in due course.

Risks to benefit realisation That aircraft operators do not invest in the flight planning system upgrades required to use Free Route options effectively and maximise the benefits of implementation.	**Score:** 12 (Likelihood:3) * (Severity:4)

17 The Borealis Alliance is a group of ANSPs collaborating on a major programme to deliver free route airspace across the whole of Northern Europe.

18 https://consultations.airspacechange.co.uk/nats/fra-d1/

Advanced Flexible Use of Airspace 3 — **FUA State Programme**

UPPER AIRSPACE

Description: to increase airspace configuration options supporting more efficient use.

Needs attention

3.1 New airspace structures	3.2 New procedures	3.3 Airspace management tools

Timescale: 2022-24 **Driver:** SES legislation and UK state requirements

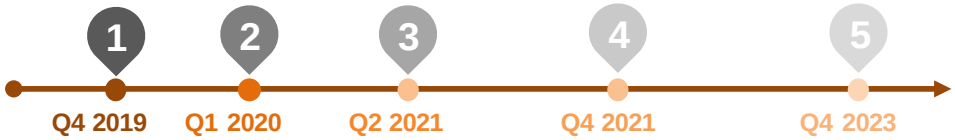
Stage: Delivery **Mechanism:** Flexible Use of Airspace State programme Working Group

Plan and progress

AFUA consists of improvement to the management of special use airspace (SUA) and flexible airspace structures (FUA) for commercial and military use. The FSP Working Group have developed the concepts and a co-ordinated plan. The main activities that will deliver this initiative include:

- A programme of airspace changes and redesign of airspace structures to offer more flexibility locations to support Military requirements and civil traffic flows.
- Extending Airspace Management tools, processes and data sharing through access and use of LARA.[19]
- Implementing a new performance framework to provide statistics and trend analysis

Both MOD and NATS will ensure that stakeholders develop their current procedures and extend the use of LARA throughout their organisations and operational areas. The deployment plan includes the following key milestones:



1: FUA State Programme RP3 Delivery and Performance Improvement Plan (complete).
2: Launch AFUA: Flexible Airspace Operations Programme and initiate Performance Management programme.
3: Full adoption of LARA at key Military Units.
4: Transition key volumes of Special Use Airspace into a managed environment to enhance Airspace management, meet the requirements of AF3 of the PCP and contribute to the optimisation of FRA.
5: Develop and Implement Future Military Operations ACP.

Dependencies on technical solutions, service and user agreements and enhanced airspace management processes have been articulated and agreed in order to facilitate any future airspace changes. The detail of these activities will be developed as the programme moves forward. Funding arrangements for airspace management tools need to be confirmed before procedures can be developed.

[19] The Local and sub-regional airspace management support system (LARA) is a software package which supports and enhances the airspace management process according to advance flexible use of airspace (AFUA) principles. This enables collaborative decision-making and provides live situational awareness to civil and military partners.

	Risks to benefit realisation That the implementation of new airspace structures restricts the access of civil and/or military traffic to key routes or volumes of airspace, generating inefficiencies and capacity constraints in certain areas of the UK; and that AFUA will not deliver sufficient airspace to facilitate military activity.	**Score:** 9 (Likelihood:3) * (Severity:3)

FAS implementation South 4 **ACOG**

TERMINAL AIRSPACE

Description: redesign of the terminal network in Southern England.		**Needs attention**
4.1 Terminal airspace redesign	4.2 New procedures	4.3 New tools for controllers
Timescale: by 2024	**Driver:** SES legislation and airports NSPs	
Stage: Delivery	**Mechanism:** Airspace Change Organising Group	

Plan and progress

NERL have submitted their masterplan iteration one (for southern UK) to the CAA. NERL (upper airspace) and airport (lower airspace) ACPs have commenced the CAA's CAP1616 process.

Having now been established, ACOG is leading the co-ordination of all airspace changes, including NERL's upper airspace proposals with individual airports, and identifying opportunities for additional benefits covering areas such as noise or general aviation.

The Air Navigation Directions require the CAA to make airspace change decisions in accordance with CAP1616 and the AMS (CAP1711). Co-ordination is important for both FASI-S and FASI-N. For FASI-S, a masterplan will add further scrutiny to that coordination. Once such a masterplan has been prepared and also accepted into our AMS, airspace change decisions will be made in accordance with it.

ACOG are expected to develop a second iteration of the southern UK masterplan, co-ordinated with a preferred implementation plan. However, it has been NERL's view that this will only be possible after all sponsors have reached Stage 2b of the process (all initial options appraisal complete) after mid-2020.

If this is not accepted yet when FASI-S sponsors reach CAP1616 stage 2, and waiting for the masterplan would risk holding up the modernisation programme, we will discuss other options for satisfying ourselves that there has been sufficient coordination with both FASI-S sponsors and ACOG/NERL. We will also potentially hold any FASI-S sponsors at a gateway in the airspace change process whilst we wait for information related to other sponsors proposals to demonstrate coordination.

The establishment of ACOG should reduce the risk likelihood of ineffective co-ordination reported in the AMS. The CAA will monitor this in 2020.

Risks to benefit realisation That the large number of co-dependent airspace changes required to modernise terminal airspace in the south of England (involving 16+ different sponsors) are not co-ordinated effectively, leading to sub-optimal airspace designs, poor engagement with affected stakeholders, inefficient network integration and implementation delays.	**Score:** 20 (Likelihood:4) * (Severity:5)

FAS implementation North 5 — **ACOG**

TERMINAL AIRSPACE

Description: redesign of the terminal network in Northern England and Scotland

Needs attention

5.1 Terminal airspace redesign	5.2 New procedures	5.3 New tools for controllers

Timescale: by 2021 **Driver:** SES legislation and NERL RP3 plan

Stage: Delivery **Mechanism:** Airspace Change Organising Group

Plan and progress

ACOG have taken on the co-ordination of FASI-N. In due course DfT and CAA will co-commission the creation of masterplans covering modernisation of the rest of UK airspace. Until we have a masterplan that includes the north of the UK, the coordination necessary for FASI-N airspace changes is that described in CAP 1616 only.

Individual sponsors must engage and consult relevant stakeholders, and when doing so should take account of airspace changes which are linked in any way to another airspace change proposal. We expect individual sponsors within FASI-N to consider all other FASI-N sponsors as potential stakeholders in their engagement and consultation plans.

A number of changes were deployed successfully in May 2019 including Doncaster (STARs)[20], Birmingham (SIDs)[21] and Newcastle (STARs). Further changes were expected to Leeds and Doncaster airspace in Nov 2019 but these, in conjunction with Glasgow and Edinburgh ACPs have been delayed. The CAA decided not to approve both Leeds and Edinburgh ACPs CAA due to inadequate consultation, Glasgow must now follow the requirements of CAP1616 following delays, and our decision on Doncaster (SIDs) has recently been published[22] following revisions made by the sponsor.

The establishment of ACOG should reduce the risk likelihood of ineffective co-ordination reported in the AMS. The CAA will monitor this in 2020.

Risks to benefit realisation
That the large number of co-dependent airspace changes required to modernise the terminal airspace in the north of England and Scotland are not co-ordinated effectively, leading to sub-optimal airspace designs, poor engagement with affected stakeholders, inefficient network integration and delays to implementation.

Score: 12
(Likelihood:3) * (Severity:4)

20 Standard Terminal Arrival Routes

21 Standard Instrument Departure Routes

22 https://www.caa.co.uk/Commercial-industry/Airspace/Airspace-change/Decisions/Permanent-airspace-change-proposals-under-CAP725/

	Queue management 6		**NERL's SIP**
TERMINAL AIRSPACE	**Description:** new capabilities to stream the flow of traffic.		**On track**
	6.1 Linear holding structure	6.2 New procedures	6.3 Queue management tools
	Timescale: by 2024	**Driver:** Single European Sky legislation	
	Stage: Delivery	**Mechanism:** NERL's SIP	
	Plan and progress Queue management tools and procedures are relatively well developed and understood, with NATS an active member of the SESAR Deployment Alliance. Arrivals manager (AMAN) is planned to be deployed in 2021 in Manchester and Stansted by their respective ANSPs. Time Based Separation (TBS) is already in place at Heathrow. This is planned to be enhanced to TBS 'pairwise' which optimises the separation based on wake vortex minima between different pairs of aircraft in the arrivals sequence. This is planned for deployment at the end of 2022. TBS is planned to be deployed at Gatwick by the end of 2023. Extended arrivals management (XMAN) is in place at Heathrow and went live at Gatwick in December 2019. Further deployments will subject to prioritisation as it will be influenced by the FASI-S programme design and timing. This will need careful consideration and co-ordination by ACOG and NERL in order to meet legislative requirements.		
	Risks to benefit realisation That the implementation of multiple arrival and departure management systems focused on different airports are not integrated effectively at a network level, leading to pinch points & inefficiencies.		**Score:** 6 (Likelihood:2) * (Severity:3)

Satellite navigation route replication 7 — **ACOG and airports**

LOWER ALTITUDE

Description: replication of existing arrival and departure routes with satellite navigation upgrades. → **On track**

7.1 Route replications	7.2 New procedures	7.3 Aircraft avionics upgrades

Timescale: by 2024 **Driver:** ICAO GANP, EU PBN implementing rule

Stage: Delivery **Mechanism:** ACOG / Airports

Plan and progress
Most airports required to upgrade their arrival and departure routes to PBN (either by replicating existing or developing new routes) are doing so as part of the FASI-N and FASI-S programmes.

There is therefore a significant dependency with Initiatives 4 and 5, including the successful co-ordination of ACPs by ACOG and the quality of the ACPs by sponsors following the CAP1616 process before submission to the CAA's airspace regulators for a decision.

The CAA will be asking other airports not covered by these programmes to submit their plans via an online template which will be launched in 2020.

Risks to benefit realisation
That many conventional arrival and departure routes at airports cannot be accurately replicated using satellite navigation capabilities (especially in the turn), creating new, or more concentrated noise impacts at lower altitudes and deterring sustainable improvements.

Score: 9
(Likelihood:3) * (Severity:3)

Satellite navigation route redesign 8 — **ACOG and airports**

LOWER ALTITUDE

Description: deployment of new arrival and departure routes designed to satellite navigation standards.

Needs attention

8.1 Route upgrades	8.2 New procedures	8.3 Aircraft avionics upgrades

Timescale: 2024 **Driver:** Single European Sky legislation

Stage: delivery **Mechanism:** ACOG / Airports

Plan and progress

Most airports required to upgrade their arrival and departure routes to PBN (either by replicating existing or developing new routes) are doing so as part of the FASI-N and FASI-S programmes.

There is therefore a significant dependency with Initiatives 4 and 5, including the successful co-ordination of ACPs by ACOG and the quality of the ACPs following the CAP1616 process before submission to the CAA's airspace regulators for a decision. In some circumstances new routes may be more difficult to achieve, and this will be monitored as ACPs progress.

The CAA will be asking other airports not covered by these programmes to submit their plans via an online template which will be launched in 2020.

Risks to benefit realisation

That the redesign of arrival and departure routes at low altitudes create new, more frequent or more concentrated noise impacts that deter implementation of sustainable improvements.

Score: 12
(Likelihood:4) * (Severity:3)

Review of air traffic service provisions in the UK — 9 — CAA developing policy

UNCONTROLLED AIRSPACE

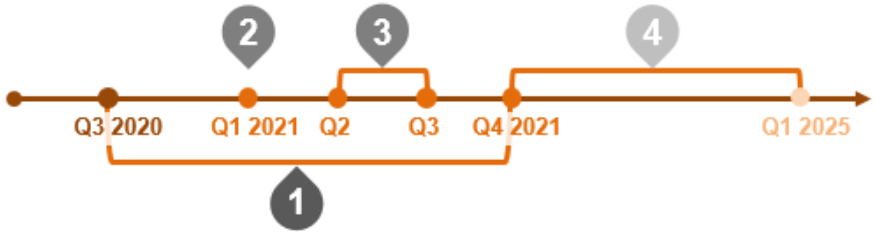
Description: review of air traffic service provision in the UK to ensure alignment with international standards and interoperability across airspace boundaries.		**On track**
9.1 Define ATS requirements	9.2 ATS framework	9.3 Not applicable
Timescale: by 2022		**Driver:** EU-Part-ATS
Stage: CAA policy		**Mechanism:** tbc

Plan and progress
Initiative 9 requires the CAA to review air traffic service (ATS) arrangements in uncontrolled airspace. Specifically, it requires the following.

(a) A review of the (ATS) arrangements in uncontrolled airspace which includes achieving increased alignment with ICAO's provisions on flight information service (FIS) (and thus comply with EU Part-ATS). Key milestones include:

1: Develop draft FIS procedures (complete).
2: Refine draft FIS procedures.
3: Engagement with external stakeholders.
4: Publish revised FIS procedures.
5: Develop implementation timelines. Undertake safety oversight activity.

(b) consideration of the mechanisms and arrangements by which ATS are provided to aircraft in the en-route phase of flight (currently delivered through the lower airspace radar service (LARS) concept). Key milestones include:



1: Develop LARS replacement/funding concepts with relevant stakeholders (input from Initiative 10 also required)
2: Stakeholder engagement.
3: Agree funding with DfT & publish Future Service Requirement.
4: Contract process; licence and enable successful bidder to implement.

Note: Initiative 9 has key interdependencies with Initiatives 10 and 11. Implementation for Initiatives 9, 10 and 11 will also need to be reviewed/co-ordinated to ensure safety is maintained.

Risks to benefit realisation That the funding model required to deliver a service that serves the needs of users will not be possible.	**Score:** 8 (Likelihood:2) * (Severity:4)

Airspace classification review 10

CAA developing policy

UNCONTROLLED AIRSPACE

Description: review of airspace classification to optimise the integration of all classes of aircraft.

…eeds attention

10.1 Optimised classification	10.2 New procedures	10.3 Electronic conspicuity

Timescale: by 2022 **Driver:** EU-Part-ATS

Stage: CAA policy **Mechanism:** tbc

Plan and progress: This initiative has been enhanced following new Air Navigation Directions from the government. The Directions (available on the CAA website) mean that the CAA will:

- Regularly consider whether to review airspace classifications;
- consult airspace users as part of that review;
- where we consider an amendment to airspace classification might be made, amend it in accordance with a new process that we must develop and publish;
- in developing that procedure and our usage policy, seek to ensure that the amount of controlled airspace is the minimum required to maintain a high standard of air safety and, subject to overriding national security or defence requirements, that the needs of all airspace users are reflected on an equitable basis.

The CAA has started this work by publishing in December 2019 a consultation inviting stakeholders to identify volumes of controlled airspace in which the classification could be amended to better reflect the needs of all airspace users on an equitable basis. Future work will conclude preparing and consulting on guidance on a new regulatory process for amending volumes of airspace identified through the review exercise.

The work previously done to deliver this initiative – a working group to develop broad airspace concepts to meet the airspace objective of the AMS – will continue, and will produce a long-term modernisation concepts plan. This work will provide the background to develop the service provision necessary to enable initiative 9.

Key milestones include:

1: CAA's classification review consultation closes.
2: CAA prepares guidance on new regulatory process and consults on it.
3: CAA publishes modernisation concepts plan for wider aviation engagement.
4: CAA publishes the outcome of the review consultation, i.e. identified priority volumes of airspace that could be amended.
5: The CAA will commence its new process to amend airspace classifications in airspace volumes identified in the review and/or the modernisation concepts plan.

Note: Some changes will be reliant on the EC mandate in Initiative 11. Implementation for Initiatives 9, 10 and 11 will also need to be reviewed/co-ordinated to ensure safety is maintained. This scale of change cannot be delivered by the 2022 timescale, EASA and the European Commission are aware.

	Risks to benefit realisation That industry cannot support the level of service provision aspired to within a revised airspace structure.	**Score:** 12 (Likelihood:3) * (Severity:4)

Deployment of electronic surveillance solutions 11 **CAA developing policy**

UNCONTROLLED AIRSPACE

Description: deployment of electronic surveillance solutions to aircraft and at airports to aid integration of traffic.		**Needs attention**
11.1 New airspace structures	11.2 New procedures	11.3 Electronic conspicuity
Timescale: mandate likely 2022-24	**Driver:** safe and efficient airspace	
Stage: CAA policy	**Mechanism:** tbc	

Plan and progress
The CAA is developing a strategy that looks at the part Electronic Conspicuity can play as an enabler in addressing mid-air collisions and airspace infringements, airspace modernisation and unmanned aircraft systems (UAS) integration. This work will be a key enabler for Initiatives 9 and 10. This strategy will build on work undertaken by the CAA and the inputs from a cross section of stakeholders via a Call for Evidence[23] and focus on the technical solution required to progress:

1: Call for evidence (complete).
2: Potential testing/trial (tbc).
3: Publish strategy for government review.
4: Likely EC mandate.

Risks to benefit realisation That the adoption of electronic surveillance solutions on board aircraft and on the ground at airports is not considered commercially viable and competitive.	**Score:** 9 (Likelihood:3) * (Severity:3)

23 https://publicapps.caa.co.uk/docs/33/CAP1837ResponsetoElectronicConspicuityCallforEvidence.pdf

Efficient use of radio frequency spectrum 12 — CAA and Ofcom

COMMS AND ATM INFRASTRUCTURE

Description: cross-industry plan for the efficient use of radio-frequency spectrum to support growing demand from aviation.

Needs attention

12.1 Airspace structures	12.2 New procedures	12.3 Develop standards
Timescale: ongoing	**Driver:** EU Part-ATS and surveillance implementing rule	
Stage: Delivery	**Mechanism:** CAA / Ofcom	

Plan and progress

Communications (including datalinks), Navigation (terrestrial and space-based) and Surveillance (primary, secondary and ADS-B) systems all require appropriate radio spectrum to operate safely and efficiently.

At a global level, the United Nation's International Telecommunications Union (similar to ICAO) defines global and regional spectrum allocations and radio regulations, through the World Radio Conference. The WRC meets approximately every 4 years to review studies and determine changes and new allocations. There are two scheduled WRCs in the 2020s for which there are a number of issues relating to aeronautical systems that we are seeking global agreement and inclusion within the overarching international radio regulations. UK spectrum assignments are made and licensed by Ofcom, the UK's telecommunications regulator. These frequencies are subject to regulatory protection (i.e. protected from interference from others). The key milestones for Initiative 12 are therefore:

1: Agree use of 978 MHz for Electronic Conspicuity devices with Ofcom.
2: Agree global spectrum frequency allocation for UAS World Radio Conference.
3: Define and secure spectrum requirements for UK space operations.
4: Define requirements for future and plan for removal of legacy systems.
5: Support Ofcom to protect spectrum allocations for aeronautical systems.

Risks to benefit realisation
That a lack of available spectrum for the aviation sector constrains the widespread adoption of new technologies and procedures that can improve airspace safety, efficiency and capacity.

Score: 9
(Likelihood:3) * (Severity:3)

Full adoption of datalink communications

13

Virtual datalink groups of CAA, NATS and airlines

COMMS AND ATM INFRASTRUCTURE

Description: cross-industry plan for the full adoption of datalink communications.

Needs attention

13.1 Not applicable	13.2 New procedures	13.3 Develop standards

Timescale: by 2019

Driver: EU datalink implementing rule

Stage: delivery

Mechanism: CAA, NATS and UK Airlines

Plan and progress

Datalink refers to a system of text message transmission between the aircraft and ground. Controller–pilot datalink communications (CPDLC) allows certain non-urgent ATC messages to be communicated via text message, rather than voice. The use of CPDLC messages provides several advantages over traditional voice communications. Datalink also plays a centre role in the implementation of trajectory-based operations. There is a strong link between data link services and trajectory information sharing envisaged under the Pilot Common Project.

European Commission Regulation No. 29/2009 on data link services applies to all flights operating as general air traffic in accordance with instrument flight rules in all airspace above FL285, although there are exceptions. Some technical problems have been identified in the deployed systems and a number of actions to address the issues are in train.

In 1983 ICAO began an effort to establish a data link architecture under its Future Air Navigation System (FANS) structure. This advance became the architecture and protocol standard of an oceanic communications network. ICAO have developed FANS to different baseline standards. 'Baseline 2' includes advanced services such as:

- 4D Trajectory Negotiation & Synchronization.
- Flightdeck-Based Interval Management (aircraft spacing).
- Taxi Clearance.
- Hazardous Weather Reporting.
- Runway Visual Range.
- Operational Terminal Information.

'Baseline 3' will drive performance improvements to enable a global airborne network for air traffic control and related services that uses multiple down-links to the ground network. The key milestones for this initiative are as follows:

1: Ensure implementation of the EC Regulation No. 29/2009 on Data Link Services.
2: Initial trajectory information sharing using ICAO Baseline 2.
3: Implementation of data link over new systems (LDACS & AeroMACS).
4: Implementation of ICAO Baseline 3.

Risks to benefit realisation
That a lack of co-ordination in the adoption of datalink solutions across airports, aircraft operators and air traffic control reduces the benefits of the technology.

Score: 9
(Likelihood:3) * (Severity:3)

Satellite navigation implementation plan 14 — **ACOG and ANSPs**

COMMS AND ATM INFRASTRUCTURE

Description: a satellite implementation plan that includes the retention of sufficient ground navigation aids, communications and surveillance capability to ensure the continued provision of air services in the event of GNSS loss.

Needs attention

14.1 National standards	14.2 National standards	14.3 Rationalise ground infrastructure

Timescale: 2020-24 **Driver:** EU PBN implementing rule

Stage: Delivery **Mechanism:** ACOG / ANSPs

Plan and progress

Performance Based Navigation (PBN) provides the opportunity to design more efficient routes that can improve the environmental impacts of air transport, and to fit more aircraft into less controlled airspace

The focus of both implementing regulations and the AMS is on the airport arrival and departure routes as well as final approach for airports with a non-precision approach. A non-precision approach provides lateral guidance only, these will be replaced with PBN approach procedures with lateral and vertical guidance. Current precision approach procedures such as ILS will be augmented by PBN approaches by 2025.

The CAA will be asking airports and ANSPs to update their plans via an online template which will be launched in Q1 2020 to highlight potential co-ordination issues. The milestones below illustrate how the PBN IR is planned to be achieved.

1: CAA publish guidance material and gather industry plans.
2: PBN deployment at non-precision and non ATS (Air Traffic Service) airfields.
3: Precision approach and SID/STAR implementation.
4: Conventional navigation removed.

The removal of conventional navigation aids will be complex as there needs to be appropriate contingency, particularly due to potential space weather interference.

Risks to benefit realisation	**Score:** 12
That ongoing reliance on legacy ground navigation infrastructure by minority of aircraft operators deters transition to a fully satellite-based infrastructure.	(Likelihood:4) * (Severity:3)

COMMS AND ATM INFRASTRUCTURE

Description: air traffic management to modernise systems, tools and procedures.		**On track**
15.1 Not applicable	15.2 New procedures	15.3 New systems and tools
Timescale: by 2024	**Driver:** SESAR Pilot Common Project	
Stage: Delivery	**Mechanism:** NERL's SIP and Met Office	

Plan and progress

Key milestones are based on the ICAO Global Air Navigation Plan ("GANP") and Regulation (EU) No 716/2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan ("PCP").

GANP provides Aviation System Block Upgrades (ASBUs), Modules and Roadmaps. The ASBU framework defines 6-years' timeframes & deadlines for each block to be available for implementation.

Block 0 – 2013, Block 1 – 2019, Block 2 –2025, Block 3 – 2031 and Block 4 – 2037.

Aeronautical Information Model (AIM) and Meteorological (MET) related activities have been/are planned in the following ASBUs:

- DAIM – Digital Aeronautical Information Management – Blocks 1 & 2
- SWIM – System Wide Information Management – Blocks 2 & 3
- AMET – Meteorological information – Blocks 0 – 4

The PCP requires Operational stakeholders and the Network Manager to provide and operate the **initial SWIM as of 1 January 2025.** This will enable new air traffic management systems and tools to connect and share flight information.

In RP2 iTEC (flight data processing system and toolset) in Prestwick upper airspace and ExCDS (electronic flight strips) have been the key NERL deployments from the DSESAR programme to date. The future will see a common service and tools at both Prestwick and Swanwick centres, delivering a level of contingency not currently available.

The target dates for the delivery of iTEC at each of the NATS units are as follows:

- Prestwick Upper Airspace – Full Operational Service. Completed June 2016
- London Area Control– end 2021
- Prestwick Lower Airspace– end 2023
- London Terminal Control (TC) – early RP4.

Once iTEC is fully deployed at all units a number of legacy systems will be decommissioned to reduce on-going operating costs.

Risks to benefit realisation That the requirements to change the airspace and upgrade air traffic management systems, tools and procedures in the same timeframe creates complex interdependencies that require significant resources, funding and additional development time to resolve.	**Score:** 12 (Likelihood:4) * (Severity:3)