

# System Wide Information Management (SWIM): Example Operational Scenarios

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## Chapter 1

# Introduction

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## Context

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- 1.1 These Example Operational Scenarios give a high-level reflection of the role of SWIM in the context of the Future of Flight BVLOS Scenarios, and the appropriate architecture elements from the SWIM Architecture that align to those scenarios. The document assumes all appropriate SWIM infrastructure and legislative frameworks are in place to enable these BVLOS scenarios.
- 1.2 The representative examples show how and where SWIM fits into each scenario from the Future of Flight BVLOS Roadmap (CAP3182) and does not contain any Acceptable Means of Compliance (AMC) or Guidance Material (GM). The descriptions of the operational scenarios have been taken from the Concept of Operations – Future Air Traffic Management & Air Navigation Service (CAP 3269).<sup>1</sup>
- 1.3 The following examples are designed to demonstrate potential applications of SWIM in enabling the operational scenarios. They are **illustrative only** and may not be fully representative of how SWIM will be implemented in practice, given the evolving nature of the UK aviation ecosystem.
- 1.4 The SWIM Implementation Framework provides a summary of the operational scenarios (pages 30 to 33) and invites stakeholder feedback on the achievability of the scenarios. This document provides supplementary detail by including additional context and technical detail for each scenario. We request that stakeholders consider the additional information provided in this document when responding to the calls for input on the operational scenarios set out in the Implementation Framework.
- 1.5 In line with the SWIM delivery roadmap (see page 25 of the SWIM Implementation Framework), we plan to publish an updated version of the SWIM Example Operational Scenarios that incorporates crewed airspace users in an integrated environment in 2027. The plan also provides further detail on when we expect to publish AMC and Guidance Material to enable these scenarios. We will continue to seek feedback from aviation stakeholders to mature the SWIM Example Operational Scenarios. As previously stated, these are illustrative examples only. They only reflect the current working draft of the architecture and will change significantly.
- 1.6 In line with the SWIM Implementation Framework, we have adopted gender-neutral terminology in this Operational Scenarios document where possible. Although we

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<sup>1</sup> CAP (3269) Concept of Operations – Future Air Traffic Management & Air Navigation Service

acknowledge that our use of non-gender specific terminology is a departure from the terminology used in legislation and by some stakeholders, the substance of the terminology is the same. Our use of gender-neutral terminology is for the purposes of the preliminary draft SWIM Implementation Framework and supporting artefacts only. We do not intend to pre-empt the terminology to be used in the drafting of any subsequent legislation. See the SWIM Implementation Framework for further detail.

## Chapter 2

## Atypical Air Environment (AAE)

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### Introduction to Atypical Air Environment

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- 2.1 The UK Civil Aviation Authority's CAP3040 policy concept enables UAS operators to conduct BVLOS operations today by utilising an AAE (A0).<sup>2</sup> By operating in close proximity to fixed infrastructure where the presence of conventionally piloted aircraft is significantly reduced, operators can mitigate mid-air collision risks without the immediate need for complex DAA technologies.
- 2.2 Currently, CAP3040 authorisations are typically granted for a single operator within a specific "volume" of airspace. The roadmap identifies 2027 as the transition year for multi-operator AAE environments.
- Strategic deconfliction: Instead of relying on a first-come, first-served basis, operators will use UTM systems to coordinate flight paths and schedules.
  - Collaborative safety: Multiple drones (e.g. one inspecting a railway and another a nearby power line) will need to share data to ensure they maintain safe separation while both remain within the "Atypical" volume, according to the OA obtained.

### A0 – Atypical Operations with a Single Operator

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- 2.3 Single UAS operator in an environment under CAP3040 Third Edition guidance, applying Annex A smoothing techniques and Annex B principles for structured corridors.<sup>3</sup>
- 2.4 The first scenario involves BVLOS UAS operations for power line inspection purposes, which can be carried out currently by considering the operational volume as an AAE, following CAP3040 guidelines, so the ARC is set to ARC-a.

### Example SWIM Execution View

#### Pre-Tactical (Planning/Authorisation)

- 2.5 ANSP publishes AAE volume and conditions (when AAE is in controlled airspace) via SWIM-compliant AIXM service, making them available to operators and, where applicable, UTMSPs.<sup>4</sup>

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<sup>2</sup> CAP3040 (Third Edition) on Unmanned Aircraft Operations in an Atypical Air Environment: Policy Concept

<sup>3</sup> CAP3040 (Third Edition) on Unmanned Aircraft Operations in an Atypical Air Environment: Policy Concept

<sup>4</sup> The SWIM Implementation Framework provides the definition for 'SWIM-compliant'.

- 2.6 ANSP issues mandatory Digital NOTAM (or other forms of appropriate notifications that may be used in the future, such as an AIC) via ATM gateway, exposed through SWIM-compliant interfaces for stakeholder access and via UAS Operator request.

### **During Flight (Tactical)**

- 2.7 Surveillance & EC: Where required, UAS data service providers (UDSPs) publish ASTERIX surveillance feeds via SWIM-compliant services (data provisioned from ground infrastructure). Where used, UTMSPs consume and fuse these data into an operational picture when multiple cooperative surveillance systems are available, as part of the Traffic Information Service.
- 2.8 Conformance monitoring: Where applicable, UTMSPs perform conformance monitoring services, tracking position and deviation thresholds, and generate alerts for off-nominal conditions (e.g. loss of electronic conspicuity).

### **Post-Flight (Assurance)**

- 2.9 Exporting: ANSPs and, where applicable, UTMSPs export SWIM-compliant logs (schemas/latency), with Catalogue snapshots supporting safety case evidence.
- 2.10 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure standardised data exchange.
- 2.11 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## **A1 – Atypical Operations Multiple Operators**

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- 2.12 Concurrent AAE operations conducted by multiple operators along the same length of railway, for example, with one operator performing track inspection and another providing security or trespass monitoring, regardless of the number of UAS deployed by each operator.
- 2.13 Multiple BVLOS operations in an urban (populated areas) Class D (controlled) environment are enabled under CAP3040 Third Edition guidance, applying Annex A smoothing techniques and Annex B principles for structured corridors.
- 2.14 All UAs are equipped with ADS-B equipment. The activity is coordinated with the ANSP, or a UTMSP if available, depending on UA traffic density, supporting safe and scalable operations by multiple operators in the same urban area.

## Example SWIM Execution View

### Pre-Tactical

- 2.15 ANSP or authorised entities publish airspace management data via SWIM-compliant CISP (AIXM) services, making them available to UTMSPs.
- 2.16 Competent authorities or ANSPs load priority traffic advisories via SWIM-compliant Common Information Service Provider (CISP) / authority feeds, which are consumed by UTMSPs.
- 2.17 Discovery Synchronisation Service (DSS) service providers enable interoperability for operational intent via SWIM-compliant REST/SOAP interfaces, with UTMSPs publishing and subscribing to flight data.

### During Flight

- 2.18 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces, with UTMSPs publishing and subscribing to operational intent data.
- 2.19 Surveillance data providers publish electronic conspicuity (EC) updates via SWIM-compliant ASTERIX streams, while UTMSPs generate and distribute flight plan conformance alerts to operators (AMQP1.0).
- 2.20 Malformed or late messages are rejected at the SWIM-compliant messaging broker edge.

### Post-Flight

- 2.21 UTMSPs and service providers retain SWIM-compliant evidence (e.g. alerts, access decisions, schema validations) to support claimed residual air risk class (ARC) and delivery of a minimal-UTM configuration.
- 2.22 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure interoperability across providers.
- 2.23 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring, messaging and interoperability performance data.

## Chapter 3

## Low Level Urban

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### Introduction to Low Level Urban

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- 3.1 Today, low-level urban BVLOS operations in the UK are primarily conducted using TRA/TDA and/or TMZ (LL0). These airspace structures serve as essential stepping stones, allowing the industry to generate safety data and test new technologies.
- 3.2 However, this current model faces significant challenges regarding scalability:
- Airspace Change Process (CAP1616): Establishing these temporary volumes requires an ACP. This process is often time-consuming, with typical applications taking approximately 8 to 12 months for complex TRA/TDA. Even if reduced significantly, the requirement to use a case-by-case process to establish bespoke activity introduces repeated regulatory decision points and reduces planning certainty for operators.
  - Limited flexibility: These structures are often "bespoke" and tied to specific, short-duration missions. The rigid nature of current segregation means it is not yet possible to support multiple concurrent operators or widespread urban logistics without significant administrative overhead.
  - Resource intensity: Each operation requires an individual OA as per UK SORA and intense coordination with ANSPs, which limits the ability of the sector to move from "trials" to routine commercial services.

### LL0 – Single Operator with Bespoke Entry Conditions

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- 3.3 This scenario describes a single-operator BVLOS operation conducted at low level in an urban area of Class G (uncontrolled) airspace up to 1000 ft agl. This is supported by a dedicated Temporary Reserved Area (TRA) / Temporary Danger Area (TDA) that ensures predictable access and reduces encounter likelihood with other airspace users. An example of this could be a ground surveillance operation.
- 3.4 Both uncrewed and crewed aircraft use ADS-B-based entry conditions as per a TMZ, creating a cooperative environment where traffic can be effectively managed. The nearby ANSP provides oversight and TRA/TDA access coordination, ensuring the operation remains safe and scalable.

## Example SWIM Execution View

### Pre-Tactical

- 3.5 ANSP or authorised entities publish appropriate airspace constraints via SWIM-compliant AIXM service (ATM gateway), making the information available to operators and, where applicable, UTMSPs, through Geo-consciousness Service.

### During Flight

- 3.6 UDSP publishes EC data via SWIM-compliant ASTERIX streams, which are consumed by operators and, where applicable, UTMSPs for situational awareness.
- 3.7 Conformance monitoring tracks deviation thresholds from flight plans. Where applicable, UTMSPs will provide adequate alerts.
- 3.8 UTMSPs utilise ground-based EC information, based on SWIM-ingested surveillance data, supporting situational awareness without active tactical deconfliction.
- 3.9 DSS service providers maintain cross-provider consistency for active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP).

### Post-Flight

- 3.10 ANSPs and, where applicable, UTMSPs provide airspace constraints data consumption logs, and detect-and-avoid (DAA) / EC event timelines, recorded via SWIM-compliant logging and monitoring services.
- 3.11 Models & bindings: AIXM for airspace constraints, ASTERIX for surveillance; REST/SOAP for request/update and AMQP 1.0 for streams.
- 3.12 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## LL1 – Multiple UAS Operators in Controlled Airspace

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- 3.13 This scenario describes multiple UAS BVLOS operators conducting flights at low level within an urban Class D (controlled) environment, up to 500 ft agl, where both demand and airspace complexity are higher. An example of such an operation would be delivery operations for the NHS.
- 3.14 Without the use of temporary airspace structures, the activity relies on cooperative surveillance, ADS-B-based visibility, and coordination with the ANSP and/or UTMSP, depending on traffic density. This creates a predictable, scalable operating environment where multiple operators can safely conduct routine delivery missions across a busy urban area.

## Example SWIM Execution View

### Pre-Tactical

- 3.15 ANSP or authorised entities publish airspace constraints via SWIM-compliant CISP service, making the airspace constraints available to UTMSPs and operators.
- 3.16 UTMSPs perform flight plan authorisation via SWIM-compliant REST/SOAP interfaces, based on constraints provided by ANSPs.
- 3.17 DSS service providers enable interoperability for operational intent via SWIM-compliant REST/SOAP interfaces, with UTMSPs publishing and subscribing to flight data.

### During Flight

- 3.18 UDSP publishes EC data via SWIM-compliant ASTERIX streams, while UTMSPs generate and distribute flight plan conformance alerts to UAS operators via SWIM-compliant messaging (AMQP1.0).
- 3.19 UTMSPs provide tactical deconfliction instructions to UAS operators via SWIM-compliant messaging services (AMQP1.0), based on shared situational awareness.
- 3.20 DSS service providers maintain cross-provider consistency for active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP), ensuring synchronised operational intent across UTMSPs.
- 3.21 UTMSPs and service providers perform conformance monitoring.
- 3.22 Onboard DAA supports detection and avoidance procedures using a combination of onboard sensors and, where available, SWIM-ingested traffic information, enabling response either via the remote pilot in command (RPIC) or automated manoeuvring.

### Post-Flight

- 3.23 UTMSPs and ANSPs provide airspace constraints data consumption logs, DAA/EC event timelines and compliance monitoring alerts, recorded via SWIM-compliant logging and monitoring services.
- 3.24 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure interoperability across ATM and UTM stakeholders.
- 3.25 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring, messaging and interoperability performance data.

## LL2 – Multiple UAS Operators in Uncontrolled Airspace

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- 3.26 **DISCLAIMER**: This scenario is only possible in the future (beyond 2028) with a more mature DAA solution in place and is listed here only as an outlook for future development and improvements. This is outside the medium-term objective of enabling more BVLOS operations in UK airspace and is not currently the focus of the FoF programme.
- 3.27 This scenario covers routine BVLOS operations performed by multiple operators in a rural Class G (uncontrolled) environment up to 500 ft agl, e.g. last-mile delivery with multiple operators. With no temporary airspace structure in place, the operation relies on cooperative surveillance, a permanent ADS-B TMZ, and automated air-based DAA to maintain safety.
- 3.28 Traffic density determines whether UTM services are engaged to coordinate flows and manage shared volumes of activity. This enables scalable rural delivery operations beyond 2028 without the need for segregation.

### Example SWIM Execution View

#### Pre-Tactical

- 3.29 ANSP or authorised entities publish airspace constraints via SWIM-compliant AIXM service, making the information available to UTMSPs and operators.
- 3.30 UTMSPs perform flight plan authorisation via SWIM-compliant REST/SOAP interfaces, based on shared airspace constraints.
- 3.31 DSS service providers enable interoperability for operational intent via SWIM-compliant REST/SOAP interfaces, with UTMSPs publishing and subscribing to flight data.

#### During Flight

- 3.32 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP), ensuring synchronised operational intent across UTMSPs.
- 3.33 UDSPs publish EC updates via SWIM-compliant ASTERIX streams, while UTMSPs generate and distribute flight plan compliance alerts to UAS operators via SWIM-compliant messaging (AMQP1.0).
- 3.34 UTMSPs perform conformance monitoring and generate alerts for off-nominal conditions.

**Post-Flight**

- 3.35 UTMSPs and ANSPs export airspace constraints data consumption logs, EC presence, DAA alerts and SWIM-compliant logs (schemas/latency), with catalogue snapshots supporting safety case evidence.
- 3.36 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure interoperability across multiple UTMSPs.
- 3.37 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring, messaging and interoperability performance data.

## Chapter 4

# Fully Integrated

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## Introduction to Fully Integrated

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- 4.1 Today, fully integrated BVLOS operations in the UK (FI0) are primarily conducted using TDA. These airspace structures serve as essential stepping stones, allowing the industry to generate safety data and test new technologies.
- 4.2 However, the current model faces significant challenges regarding scalability:
- Airspace Change Process (CAP1616): Establishing these temporary volumes requires a formal Airspace Change Proposal (ACP). This process is often time-consuming and costly, making it impractical for routine commercial use.
  - Limited flexibility: These structures are often "bespoke" and tied to specific, short-duration missions. The rigid nature of current segregation means it is not yet possible to support multiple concurrent operators or widespread urban logistics without significant administrative overhead.
  - Inefficient airspace use: segregation blocks volumes of airspace for other users, which is contrary to the long-term goal of a "Fully Integrated Scenario" where drones and crewed aircraft coexist safely.

## FI0 – Segregated Operations

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- 4.3 This scenario describes a segregated operation conducted up to 500 ft agl in Class G (uncontrolled) airspace, e.g. maritime inspection over coastal waters.
- 4.4 The activity is protected by a TDA, ensuring that uncrewed flights remain separated from other airspace users. With the airspace fully segregated while the TDA is active, no DAA capability is required.
- 4.5 The nearby ANSP supports the operation by providing information on TDA status and, when inactive, coordinates possible crossings for other types of traffic.
- 4.6 The setup enables simple, safe, and predictable UAS BVLOS inspection missions without the need for UTM services.

## Example SWIM Execution View

### Pre-Tactical

- 4.7 ANSP or authorised entities publish appropriate airspace constraints via SWIM-compliant AIXM service, making the information available to operators and, where applicable, UTMSPs.
- 4.8 If UTM services are used, UTMSPs handle flight plan notification via SWIM-compliant REST/SOAP interfaces.
- 4.9 DSS service providers enable interoperability for operational intent, with UTMSPs publishing and subscribing to flight data.

### During Flight

- 4.10 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP).
- 4.11 Surveillance and EC: UDSPs publish ASTERIX feeds from ADS-B in/out via SWIM-compliant services. Where UTM services are used, UTMSPs consume these data and provide an operational picture via SWIM-compliant messaging (AMQP1.0).
- 4.12 Where applicable, UTMSPs or service providers perform conformance monitoring and generate alerts for off-nominal conditions.

### Post-Flight

- 4.13 ANSPs and, where applicable, UTMSPs provide airspace constraints data consumption logs and EC event timelines, recorded via SWIM-compliant logging and monitoring services.
- 4.14 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure standardised data exchange.
- 4.15 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## FI1 – Specific Volumes with Bespoke Entry Conditions

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- 4.16 This scenario describes survey operations conducted at 750 ft agl within rural Class D (controlled) airspace, e.g. wildlife or environment survey.
- 4.17 The activity takes place inside a defined TRA, creating a structured and predictable operating volume for uncrewed flights while still allowing controlled access for crewed aircraft under bespoke entry conditions.

- 4.18 A permanent TMZ ensures cooperative visibility across all users, while DAA requirements remain limited to residual ARC-b environments.
- 4.19 With ANSP oversight and controlled TRA access, the operation becomes safe and scalable under the 2027 integrated airspace model.

## Example SWIM Execution View

### Pre-Tactical

- 4.20 ANSP or authorised entities publish appropriate airspace constraints via SWIM-compliant CISP service (REST/SOAP), making them available to UTMSPs and operators.
- 4.21 Operators submit flight plans to UTMSPs via SWIM-compliant REST/SOAP interfaces for processing and authorisation.
- 4.22 DSS service providers enable interoperability for operational intent, with UTMSPs publishing and subscribing to flight data.

### During Flight

- 4.23 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP).
- 4.24 Surveillance and EC: UDSPs publish ASTERIX feeds from ADS-B in/out via SWIM-compliant services. UTMSPs consume these data and provide an operational picture via SWIM-compliant messaging (AMQP1.0).
- 4.25 UTMSPs and service providers perform conformance monitoring, and generate alerts for off-nominal conditions.
- 4.26 UTMSPs provide information-only DAA display as a tactical mitigation, based on SWIM-ingested surveillance data, supporting operator situational awareness (residual ARC-b), as part of the tactical deconfliction service.

### Post-Flight

- 4.27 UTMSPs and ANSPs provide airspace constraints data consumption logs, and EC/DAA event timelines, recorded via SWIM-compliant logging and monitoring services.
- 4.28 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure standardised data exchange.
- 4.29 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## FI2 – UAS Operations in Controlled Airspace

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- 4.30 This scenario describes operations conducted up to 500 ft agl within urban Class D airspace, with the absence of temporary airspace structures, e.g. point to-point freight delivery operations.
- 4.31 A permanent ADS-B TMZ ensures cooperative visibility for both uncrewed and crewed aircraft in accordance with CAP3140, fostering a collaborative environment.
- 4.32 Separation from crewed traffic is provided through a UTM-delivered service, received only by the UA, adding an extra safety layer that supports onboard DAA.
- 4.33 As traffic density increases, activity is coordinated with the ANSP via UTM flight authorisation and supporting UTM services, enabling multiple operators to conduct routine freight operations safely and efficiently.

### Example SWIM Execution View

#### Pre-Tactical

- 4.34 ANSP or authorised entities publish appropriate airspace constraints via a SWIM-compliant CISP service, making them available to UTMSPs and operators.
- 4.35 UTMSPs perform flight plan authorisation via SWIM-compliant REST/SOAP interfaces, based on airspace constraints provided by ANSPs.
- 4.36 DSS service providers enable interoperability for operational intent, with UTMSPs publishing and subscribing to flight data.

#### During Flight

- 4.37 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP).
- 4.38 Surveillance and EC: UDSPs publish ASTERIX feeds from ADS-B in/out and/or radar data via SWIM-compliant services. UTMSPs consume this data to provide an operational picture and generate compliance alerts distributed via SWIM-compliant messaging (AMQP1.0).
- 4.39 UTMSPs and service providers perform conformance monitoring and generate alerts for off-nominal conditions.
- 4.40 UTMSPs provide tactical deconfliction instructions based on SWIM-ingested surveillance and operational intent data, distributing guidance to operators via SWIM-compliant messaging services (AMQP1.0), as part of the UTM Tactical Deconfliction Service.

## Post-Flight

- 4.41 UTMSPs and ANSPs provide airspace constraints data consumption logs, and EC/tactical deconfliction event timelines.
- 4.42 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure standardised data exchange.
- 4.43 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## FI3 – UAS Operations in Controlled and Uncontrolled Airspace

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- 4.44 **DISCLAIMER:** This scenario is only possible in the future (beyond 2028) with a more mature DAA solution in place and is listed here only as an outlook for future development and improvements. This is outside the medium-term objective of enabling more BVLOS operations in UK airspace and is not currently the focus of the FoF programme.
- 4.45 This scenario describes operations flown along fixed routes at around 1,200 ft agl, across both controlled and uncontrolled airspace, e.g. middle-mile logistics between distribution centres.
- 4.46 In the urban Class D (controlled) segment, located near airfields with IFPs, the initial ARC-d is reduced to residual ARC-c through operational restriction by boundary, while in the rural Class G (uncontrolled) portion, the initial ARC-c remains unchanged.
- 4.47 Operations rely on automated, ground-based multi-sensor DAA capable of detecting both cooperative and uncooperative traffic, providing the tactical mitigation required at ARC-c.
- 4.48 Activity is coordinated with the ANSP via UTM flight authorisation, with additional UTM services applied based on traffic density, enabling predictable, scalable logistics movements across mixed airspace environments.

## Example SWIM Execution View

### Pre-Tactical

- 4.49 ANSP or authorised entities publish appropriate airspace constraints via SWIM-compliant CISP service while operating in controlled airspace, making them available to UTMSPs and operators.
- 4.50 UTMSPs perform flight plan authorisation via SWIM-compliant REST/SOAP interfaces, based on applicable airspace constraints and operational intent data.

- 4.51 DSS service providers enable operational intent interoperability via SWIM-compliant REST/SOAP interfaces, with UTMSPs publishing and subscribing to flight data across controlled and uncontrolled airspace.

### **During Flight**

- 4.52 DSS service providers maintain cross-provider consistency of active flights and temporary restrictions via SWIM-compliant interfaces (REST/SOAP), ensuring synchronised operational intent across UTMSPs.
- 4.53 UDSPs publish ASTERIX feeds from ADS-B in/out via SWIM-compliant services. UTMSPs consume this data to provide an operational picture and distribute compliance alerts via SWIM-compliant messaging (AMQP1.0).
- 4.54 UTMSPs and service providers perform conformance monitoring, and generate alerts for off-nominal conditions.
- 4.55 UTMSPs provide tactical deconfliction instructions based on SWIM-ingested surveillance and operational intent data, distributing guidance via SWIM-compliant messaging services (AMQP1.0), as part of the tactical deconfliction services, supporting onboard DAA.

### **Post-Flight**

- 4.56 UTMSPs and ANSPs provide airspace constraints data consumption logs, and EC/tactical deconfliction/DAA event timelines, recorded via SWIM-compliant logging and monitoring services.
- 4.57 Models & bindings: All models and bindings are exposed via SWIM-compliant interfaces to ensure standardised data exchange.
- 4.58 Execution KPIs: These KPIs are derived from SWIM-compliant monitoring and assurance data collected during execution.

## Annex A

## Abbreviations

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|         |                                                                      |
|---------|----------------------------------------------------------------------|
| AAE     | Atypical Air Environment                                             |
| ADS-B   | Automatic Dependent Surveillance-Broadcast                           |
| AIC     | Aeronautical Information Circular                                    |
| AIXM    | Aeronautical Information Exchange Model                              |
| AMC     | Acceptable Means of Compliance                                       |
| AMQP    | Advanced Message Queuing Protocol                                    |
| ANSP    | Air Navigation Service Provider                                      |
| ARC     | Air Risk Class                                                       |
| ASTERIX | All Purpose Structured EUROCONTROL Surveillance Information Exchange |
| ATM     | Air Traffic Management                                               |
| BVLOS   | Beyond Visual Line of Sight                                          |
| CAA     | Civil Aviation Authority                                             |
| CAP     | Civil Aviation Publication                                           |
| CISP    | Common Information Service Provider                                  |
| ConOps  | Concept of Operations                                                |
| DAA     | Detect and Avoid                                                     |
| DSS     | Discovery and Synchronisation Service                                |
| EC      | Electronic Conspicuity                                               |
| FI      | Fully Integrated                                                     |
| GI      | Ground Infrastructure                                                |
| ICAO    | International Civil Aviation Organization                            |
| KPI     | Key Performance Indicator                                            |
| LL      | Low Level                                                            |

|       |                                             |
|-------|---------------------------------------------|
| MAC   | Mid-Air Collision                           |
| NOTAM | Notice to Air Missions                      |
| REST  | Representational State Transfer             |
| RPIC  | Remote Pilot in Command                     |
| SOAP  | Simple Object Access Protocol               |
| SORA  | Specific Operations Risk Assessment         |
| SWIM  | System Wide Information Management          |
| TDA   | Temporary Danger Area                       |
| TMZ   | Transponder Mandatory Zone                  |
| TRA   | Temporary Reserved Area                     |
| UA    | Uncrewed Aircraft                           |
| UAS   | Uncrewed Aircraft System                    |
| UDSP  | UAS Data Service Provider                   |
| UTM   | Uncrewed Aircraft System Traffic Management |
| UTMSP | UTM Service Provider                        |