



ED-146A

GUIDELINES FOR TEST AND VALIDATION RELATED TO AIRPORT COLLABORATIVE DECISION MAKING (A-CDM) INTEROPERABILITY

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SUPERSEDES ED-146

FOREWORD

1. This document was developed by EUROCAE Working Group 111 “Airport Collaborative Decision Making” and was approved by the Council of EUROCAE on 29 January 2025.
2. This document supersedes ED-146 ‘Guidelines for Test and Validation Related to Airport CDM Interoperability’ (2008).
3. The following steps were taken to update the EUROCAE ED-146 document:
 - Reviewing the existing test and validation guidelines and available test documentation for Airport CDM (A-CDM) using the ED-146 documentation and comparing them with the contents of the Airport CDM Specification and Airport CDM Implementation Manual published by EUROCONTROL.
 - During the review and the update of this document, coordination took place with the EUROCONTROL Airport Integration Coordination and Harmonization WG (AICH WG). Also experience from large implementation programs was obtained and considered. It was agreed to focus the content of the guidelines in ED-146A on the technical and non-functional requirements and to reference the EUROCONTROL Specification for Airport Collaborative Decision Making for the procedural and functional A-CDM requirements.
 - Finally, the chapters of ED-146A were restructured and relevant sections were adapted or added.
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CHAPTER 1

GENERAL

1.1 INTRODUCTION

Airport Collaborative Decision Making (A-CDM) is an important enabler of Air Traffic Management (ATM) capacity and efficiency. A-CDM is a set of processes to enhance common situational awareness and operational decision making. This concept is supported by integration of enabling functions and automation of data exchange.

The concept of A-CDM does not imply any particular system or architecture since the concept may be implemented independently of any specific technology. Rather, A-CDM is therefore an approach to using aeronautical data, based on sharing data between all partners, ensuring a common view of the ATM and airport environment on all levels. A-CDM also addresses the need for operational decisions to be made collaboratively thus providing a substantial contribution to maximising capacity and efficiency. The implementation of A-CDM may use a variety of architectures and technologies that require tests and validation to enable a successful implementation of the concept.

A-CDM is about improving aircraft operations at airports and the alignment with the European ATM or regional network, at an operational level.

A-CDM enables an A-CDM partner to make the optimal operational decisions with other A-CDM partners, knowing their preferences and constraints and actual status and predicted situation. The decision making by the A-CDM partners is dependent on sharing of accurate and timely information and adapted start-up procedures, defined in operations manual and automated in various functions.

While the implementation of A-CDM operations requires an organisation and operational change of the way flight planning data is used and decisions are made, it nevertheless requires that the A-CDM partners possess certain capabilities or systems that enable them to share data and make and implement decisions collaboratively.

The EUROCONTROL Airport CDM Implementation Manual [2] points out that:

“To enable the operational use of Airport CDM, partners’ existing systems will have to be adapted at least to a level where they can seamlessly communicate with each other”.

1.2 A-CDM DOCUMENTS

Much of the key development work in the A-CDM field has been conducted by EUROCONTROL in cooperation with operational experts from airports and Air Navigation Service Providers (ANSPs) within Europe already operating A-CDM at their airports. This document therefore builds upon the key outputs of the EUROCONTROL Airport Integration Coordination and Harmonization WG (AICH WG), namely the EUROCONTROL Specification for Airport Collaborative Decision Making [1], and the Airport CDM Implementation Manual [2], to derive an updated set of EUROCAE standards (comprising this document, ED-141A and ED-145A¹).

The first document of the updated EUROCAE A-CDM set is the Minimum Technical Specifications for Airport Collaborative Decision Making (A-CDM) Systems (ED-141A). It describes the minimum requirements for the technical aspects of A-CDM systems.

The second document of the EUROCAE A-CDM set is the Airport CDM Interface Specification (ED-145). It describes the minimum requirements on the data exchanged with an A-CDM system. This document will be updated to the Airport Collaborative Decision Making (A-CDM) Data Model Specification (ED-145A), to be published later.

The final document of the EUROCAE A-CDM set is the Guidelines for Test and Validation Document (ED-146A – this document) that provides a basis from which an A-CDM implementer can develop testing specifications to ensure their installation is compliant with ED-141A.

¹ At the time of publication of this document, ED-145A is not published, but is being developed by EUROCAE WG-111

The relationship between the relevant documents described above is captured in the figure below.

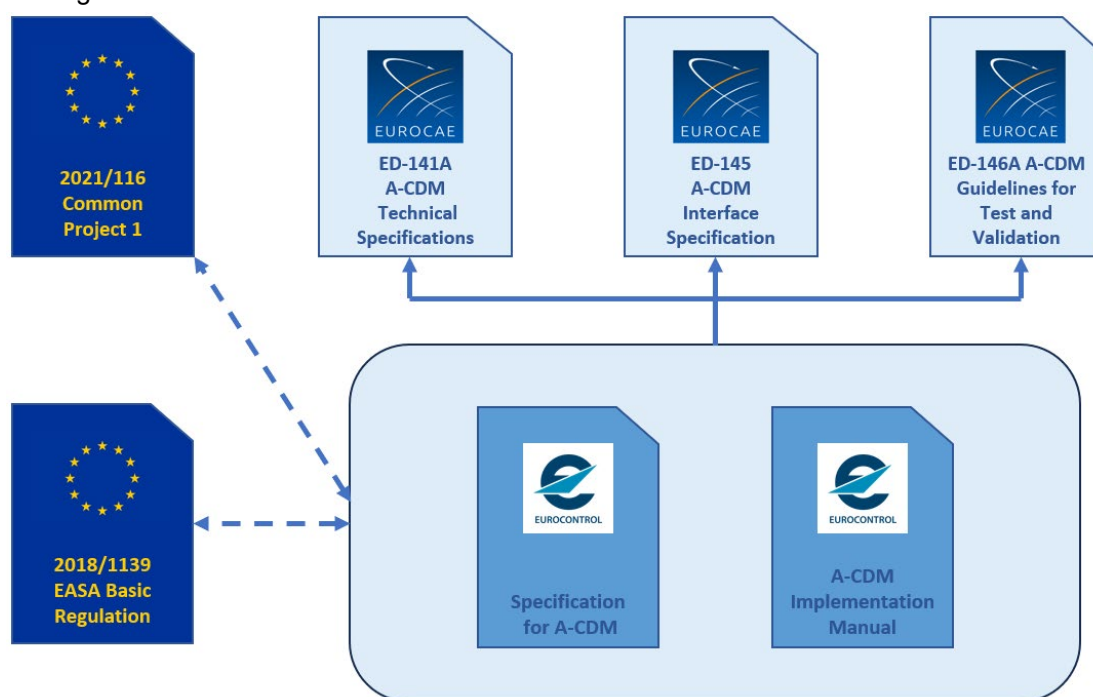


FIGURE 1-2: A-CDM DOCUMENT RELATIONSHIPS

1.3

PURPOSE, SCOPE, APPLICABILITY

No two airports are alike as they vary in terms of geography, capacity and other attributes. Nevertheless, there is a need to provide a common approach to A-CDM implementation to ensure system interoperability. The intention of this document is to provide such guidance for an A-CDM system.

This document provides guidance to support the development and execution of test procedures necessary to verify that an implemented A-CDM system operates according to the standards outlined by related requirements documents and the needs of A-CDM partners at any specific airport.

The extent of this document is limited to test procedures for the minimum requirements of a generic A-CDM system as specified by ED-141A Minimum Technical Specifications for Airport Collaborative Decision Making Systems [3].

Only a subset of requirements identified as necessary for compliance with ED-141A will be addressed. Further, only those requirements identified as mandatory, via a “shall” statement, are considered.

Since each A-CDM system can be implemented as a set of multiple manual and automated functions or systems using existing airport technology and resources, the design, development, deployment, and acceptance of an A-CDM system for any given airport and set of partners will be unique. Given that each A-CDM system will be realized differently, no single test document can cover all cases and variations of software, support systems and new equipment. Consequently, the procedures documented herein are limited to test recommendations that each A-CDM system should address and be uniquely tested against. It is expected that the actual number of tests performed for any single A-CDM system will be far greater than the tests enumerated in this document. The scope and nature of the actual tests to be conducted for a specific A-CDM system are left to the responsible A-CDM partners involved in each A-CDM system design, development, and deployment.

NOTE: *This document references requirements by a number prefixed by the document ID, for example [REQ:ED141-DM-06] refers to requirement DM-06 found in ED-141().*

The intended audience includes test experts of generic A-CDM systems (industry) and/or specific implementations for A-CDM at airports, cooperating closely with developers, designers, installers, manufacturers, service providers, and users. This document assumes knowledge of A-CDM.

This document, ED-146A, is organized as follows:

CHAPTER 1 presents this document, the terminology, terms, conventions and references used.

CHAPTER 2 presents lessons learned from multiple implementation projects with emphasis on test management.

CHAPTER 3 introduces generic test methodologies and identifies the validation methods.

CHAPTER 4 lists a set of test examples.

APPENDIX A provides a list of WG-111 members.

1.4 TERMINOLOGY

When used in this document, the following words have the meaning specified hereunder:

Shall – Denotes a mandatory requirement that must be met if the Functional Group to which it belongs is implemented.

Should – means that this constitutes good practice and is therefore recommended.

Best practice – In some cases, already existing A-CDM implementations may have identified cost efficient ways of meeting particular requirements. These are listed as best practice for guidance only. Best practices shall not be considered as representing a requirement.

NOTE: *Denotes explanatory text that supports the requirement to which it belongs but is not part of the requirement.*

Procedure – Refers to procedures defined for use of a given Functional Group. Procedures are not part of the Functional Requirements; however, they may impact the processing in which case the corresponding Functional Requirements are included.

Abbreviations – Abbreviations and acronyms used in this document shall have the meaning specified in EUROCONTROL Specification for Airport Collaborative Decision Making [1].

Figures and Diagrams – Figures and diagrams in this document are used to illustrate a concept and/or relationships and data flows. In NO case do they imply a particular architecture or implementation solution.

1.5 GLOSSARY OF DEFINED TERMS

1.5.1 A-CDM Definitions

Refer to EUROCONTROL Specification for Airport Collaborative Decision Making definitions [1].

1.5.2 General Definitions

Refer to the EUROCONTROL Airport CDM Implementation Manual [2] and relevant ICAO documents.

1.5.3 A-CDM Abbreviations

For a complete listing of abbreviations used in A-CDM, refer to the EUROCONTROL Specification for Airport Collaborative Decision Making [1]. Abbreviations used in this document are described below.

A-CDM	Airport Collaborative Decision Making
ACISP	Airport CDM Information Sharing Platform
ADEXP	ATS Data Exchange Presentation

AICH WG	Airport Integration Coordination and Harmonisation Working Group
ANSP	Air Navigation Service Provider
API	Application Planning Interface
ATC	Air Traffic Control
ATS	Air Traffic Services
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
CDM	Collaborative Decision Making
CONOPS	Concept of Operations
CBA	Cost Benefit Analysis
DMAN	Departure Manager
ICAO	International Civil Aviation Organisation
iTeam	Implementation Team
IT	Information Technology
PMO	Project Management Office
PDS	Pre-Departure Sequencer
TOBT	Target Off Block Time
UTC	Universal Coordinated Time
VTT	Variable Taxi Time

1.6

REFERENCE DOCUMENTS

- [1] EUROCONTROL Specification for Airport Collaborative Decision Making (A-CDM) v1.0, EUROCONTROL-SPEC-198 (31 January 2025).
- [2] EUROCONTROL Airport CDM Implementation Manual, v5 (31 March 2017).
- [3] EUROCAE ED-141A Minimum Technical Specifications for Airport Collaborative Decision Making (A-CDM) Systems, February 2025.
- [4] EUROCAE ED-145 Airport CDM Interface Specification, 2008.
- [5] Network Manager Business-to-Business Services Manual, v4 (30 May 2023)
- [6] EUROCONTROL Specification for SWIM Service Description: EUROCONTROL-SPEC-168, v2.0 (15 March 2022).
- [7] ICAO Global Air Navigation Plan, Doc 9750, Edition 6, 2020.

CHAPTER 2

LESSONS LEARNED

This chapter aims to list a set of common pitfalls, lessons learned, and recommendations acquired through earlier initiations, developments and implementations of A-CDM, as context for specific test and validation activities. Its purpose is to support stakeholders and prepare them to avoid pitfalls made elsewhere.

The general recommendations range from collaboration, organisation, procurement, performance and risk management as well as collaborative definition of concept of operations. The specific recommendations anticipate test and validation stages and product release management.

Each section describes a pitfall followed by a generic lesson learned with recommendation(s). More recommendations can be found in the EUROCONTROL Airport CDM Implementation Manual [2].

2.1 GENERAL RECOMMENDATIONS

2.1.1 Stakeholder Collaboration

Common Pitfall

Airport and stakeholders may consider implementing A-CDM for purpose of internal strategy or guided by international A-CDM documentation such as the ICAO Global Air Navigation Plan [7]. Unfortunately, not all stakeholders are aware or prepared for decisions to consider implementing A-CDM, or their strategic agenda is not aligned.

Lesson Learned

A-CDM focuses on optimising operational efficiency for the aircraft process and as such, all stakeholders interacting on an aircraft or flight need to be part of such an implementation and therefore implementation decision making.

Collaboration between stakeholders requires:

- Accepting all stakeholders are equal and need to participate in one common A-CDM program. Equality should be warranted throughout programs and operations.
- Joint teams and working together in strategic, technical and operational boards and working groups.
- Accepting difference in interest and finding the common objectives to determine joined ambitions and strategies.
- Transparent sharing of needs, interests, decisions, knowledge and data, for purpose of the collaborate interests.
- Overcoming disagreements through learning from factual data analysis and finding common ground to proceed.
- Common understanding of risks and joined development of mitigations.

2.1.2 Program Management Organisation

Common Pitfall

Where decisions are made to initiate implementation of A-CDM, airports often may not involve staff with sufficient expertise for setting up an efficient and effective program. Rather, enthusiastic staff may be tasked with preparing some documentation or technology, which has not been coordinated sufficiently with other stakeholders, mandated to deliver, or received adequate resources. As a result, progress is slow and prone to resistance or subject to other priorities.

Lesson Learned

To deliver on expectations for enhanced operational efficiency, an A-CDM program is required with sufficient mandate and resources. Such an A-CDM program is best governed by a Steering Board and executed under a Program Management Office (PMO) through one or more implementation teams (iTeam) with various working groups.

The Steering Board is the platform where collaboration is achieved on executive level by stakeholder directors. To ensure collaborative decisions are informed and high-quality decisions can be taken, the Steering Board needs multiple sources of information about the status, risks, benefits and performance of the A-CDM program.

To avoid a single source of information for Steering Board, next to the PMO lead implementation there should be independent Change and Performance Boards reporting directly to the Steering Board. These boards should not contain resources active in the Program or iTeam, to avoid conflict of interests.

Separate reporting entities reporting to the Steering Board are described in the next sections.

2.1.3 Assignment of Resources

Common Pitfall

Common in large implementation projects is the underestimation or unavailability of sufficient resources to conduct the endeavour. Staff assigned yet not sufficiently freed from other obligations may compromise the quality of deliverables or not attend meetings where their input is needed.

The Steering Board will risk effectiveness of delivery and success when insufficient or inadequate resources are assigned (or not assigned) into the various boards, teams and working groups. This causes delay of results, disrupts operations and potentially impact expected benefits.

Lesson Learned

The Steering Board increases the chances for successful implementation and achieving benefits during live operations when it understands the need to provide sufficient resources in the program constantly.

A program needs to be executed under leadership by a Program Manager in the PMO and a Project Leader in the iTeam, supported with working groups of experts, and administrative capability.

2.1.4 Determination of Concept of Operations

Common Pitfall

When airports omit any Concept of Operations (CONOPS) or determine such a vision document without other stakeholders involved, understanding of other stakeholders' operational processes, timing and need for information, as well as mutual confidence is not developed. Also, when stakeholders are represented with experts not sufficiently knowledgeable of operations, challenges are not well analysed, and solutions may not be feasible (partially or completely).

The result is a vision with large risks of not being supported or approved by other stakeholders or operational experts. Consequently, stakeholders lose confidence and reduce commitment, delaying progress of A-CDM implementation.

Lesson Learned

The Concept of Operations is the founding document describing the future vision of operations which requires agreement, support and approval from operational experts and all airport stakeholders, in order to allow following documentation and test or validation activities to be supported as well.

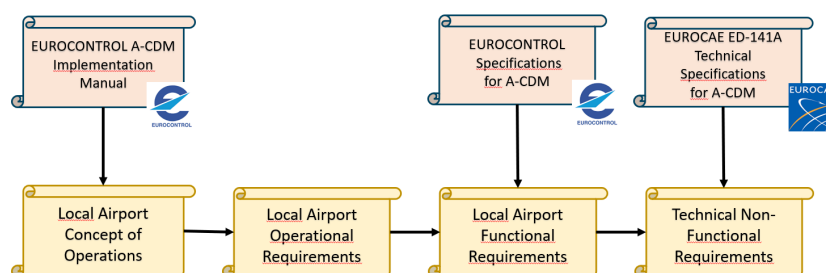


FIGURE 2-1: CONOPS AND REQUIREMENTS RELATIONSHIPS