INTERNATIONAL CIVIL AVIATION ORGANIZATION

A-CDM Frequently Asked Questions (FAQs)

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Introduction

For any organization(s) that are planning and executing an A-CDM implementation many questions will arise. These can range from very high-level questions like *"who shall lead the project", "what are benefits of A-CDM for me"* to details on *"how to update the TOBT when a flight is delayed" etc*.

Many of the questions that will arise can be "answered" in various A-CDM guidance materials and plans, e.g. ICAO Doc 9971 [1] and the Asia Pacific Airport Collaborative Decision Making (A-CDM) Implementation Plan [2] as well as documents from EUROCONTROL[3], CANSO [4], and IATA [5]. In addition, the ICAO Asia and Pacific Office, Bangkok has made available specific A-CDM Procedure materials provided by States via this link https://www.icao.int/APAC/Pages/eDocs.aspx that also may facilitate answers.

Nevertheless, it has been evidenced that many questions from organizations and stakeholders are yet frequently asked. To help with capturing these questions and provide uniform answers the Asia Pacific A-CDM Task Force meeting No. 4 agreed to *"Develop frequently asked questions as live document".* This document presents a compilation of Frequently Asked Questions (FAQs) on A-CDM.

The intention is to make this as a "living" document" as such it shall be updated based on new FAQ inputs from A-CDM implementers and stakeholders. In order to facilitate this, questions can be sent to the ICAO Asia and Pacific Office, Bangkok e-mail address apac@icao.int.

Structure of the FAQ

In the following sections, the FAQs are structured by a specific topic they are "most" applicable to. Therefore, based on the FAQs currently presented in the document, the following structure is applied:

- **Implementation Related FAQs** – these are questions and answers that relate to the planning and execution of an A-CDM implementation
- **Procedural Related FAQs** – these are questions and answers that relate to the procedural character.
- **Technical Related FAQs** – these are questions and answers that relate to the technical aspects of the solution and various systems that enables an A-CDM implementation.

Implementation Related FAQs

Q01:	Is A-CDM necessary at a small single-runway airport? What size of an airport would render A-CDM necessary?
A01:	There are different size-based models that provide guidance as to when an airport should *explore the needs* for A-CDM process. In Asia-Pacific, the regional *Seamless ANS Plan (v3.0, 2019)* recommends that all international aerodromes consider implementing A-CDM with integration to ATFM. It is important to note, however, that A-CDM is a process designed to address inefficiencies and sub-optimized operations at the airport. Thus, a needs analysis that looks beyond just the level of traffic demand should be carried out to determine the needs for A-CDM. Common problems A-CDM is designed to alleviate include, inter alia, turnaround inefficiencies, punctuality problems, lack of information transparency, congestions and inefficiencies in the movement areas (taxiways, runways), and lack of good coordination among airport stakeholders. Even if an airport is small, if these problems exist, a level of A-CDM process may be useful.
Q02:	Is it fair to say that information sharing will benefit any reasonably busy airport, while the full A-CDM process including TOBT/TSAT enforcement will only benefit extremely busy airport?
A02:	Information sharing among stakeholders will most probably benefit *any* airport, not just busy ones. The open sharing of information across stakeholders will create common situational awareness and enables smooth inter-unit collaboration, thereby improving operations at the airport. However**, Information Sharing in itself is not A-CDM** which is important to remember. Implementation of TOBT and TSAT, related procedures, and various levels of system support is equal to A-CDM, which will require specific information sharing to take place. I.e. implementation of TOBT and TSAT (best-planned best-served principles) will drive the need for information sharing in an A-CDM context. The information sharing needs are very specific and serves very specific purposes.
Q03:	In engaging stakeholders for A-CDM implementation, how can we balance between problems to be solved with wishes of the stakeholders?
A03:	The focus on “why A-CDM” in the initial stakeholder engagement is closely linked to looking at the wishes of A-CDM stakeholders. By getting all stakeholders to the same table and discuss their needs, A-CDM *strategic objectives* can be established. The strategic objectives should provide concrete and measurable goals in the A-CDM implementation process, e.g. “to reduce average taxi-out time by 3 minutes within 2023”, and should be based on the most pressing challenges agreed upon by stakeholders involved in the process.

Q04: Who should take the lead in A-CDM implementation, Airport Operator or ANSP?

A04:

Most A-CDM implementation projects to date have been led by airport operators, and with active support by all A-CDM stakeholders. However there is not a single model that definitively says which entity should be the lead in the implementation process as it very much depends on the local environment and arrangements. There are cases where the airport operator and the ANSP *together* lead the implementation; such as the case in Singapore with the A-CDM project being a joint one between Changi Airport Group (CAG) and Civil Aviation Authority of Singapore (CAAS).

Regardless of which entity takes the initial lead, it is important that the airport operator(s), the ANSP, the airline operators and ground handlers are deeply involved in the implementation process early on. A-CDM implementation is not simply a system installation project, but requires changes (sometimes significant) to operational procedures to be performed by operational personnel.

Q05: Is it necessary to concurrently implement ATFM operations and system for A-CDM process to be successful?

A05:

A-CDM and ATFM are independent processes, and do not need to be concurrently implemented for them to be successful. Inherently, they are designed to tackle different issues. A-CDM, on the one hand, is designed to address inefficiencies and sub optimized operations at the airport. ATFM, on the other hand, is designed to ensure a proper balance of demand and an optimized use of available capacities in the airport and airspace.

However; ***once implemented, both A-CDM and ATFM should be integrated*** through mutual data exchange between the systems. By mutually exchange information across the systems, high level of flight information accuracy can be ensured, which will enable a high level of operational efficiency both at the airport and at the airport/airspace/network levels depending on how ATFM is implemented.

Q06: What tools are commonly used for education of front-line operators?

A06:

Training should be carried at 2 levels; one to provide high-level conceptual understanding of A-CDM, and the other to provide in-depth knowledge on operational procedures and support system functionalities.

1. High-level training courses on A-CDM are offered by many training institutions, international organizations and vendors. ICAO Regional Offices, IATA, and CANSO have sponsored region-specific workshops in various locations over the years. Check with training institutions and regional offices of ICAO / IATA / CANSO to find out about training courses in your areas.
2. In-depth operational training should be conducted by each organization after the procedures have been developed. ATFM and A-CDM system providers can support this by providing the training on both system functionalities and its application in the ATFM / A-CDM procedures. How this is done in practical terms needs to address in procurement agreement with ANSPs and airport operators.

Procedural Related FAQs

Q07:	When a flight departs from or going to A-CDM airports, the flight time may be adjusted while airborne due to various reasons. How will the change in flight time be handled?
A07:	One of the data elements to be exchanged in the A-CDM process is the *Estimated Landing Time (ELDT).* The ELDT can be updated several times during a flight's lifecycle, with revised estimations based on the flight plan, Actual Take-Off Time (ATOT) from the outstation, and en-route progress from surveillance system or airline's information. Updated ELDT may then trigger an update to *Estimated In-Block Time (EIBT)*, which in turn may be ground for an update to *Target Off-Block Time (TOBT)* and *Target Start-up Approval Time (TSAT)* of the next outbound flight. Having the behaviors of the flight while airborne trigger information updates to be shared with all the airport stakeholders is at the core of A-CDM process. With common updates shared, airport operations can be adjusted in preparation for the flight accordingly.
Q08:	How to enhance stakeholders' trust in the time elements provided such as TOBT?
A08:	TOBT, along with TSAT, are two cornerstone data elements in the A-CDM process and should therefore be properly implemented. If there is an apparent lack of trust in the TOBT, its root cause must be investigated. Reliabilities in TOBT and TSAT should be analyzed as part of the implementation process, and stakeholder engagement to explain the importance and proper handling of TOBT/TSAT – among other data elements – should be carried out comprehensively. Time should be allowed and support provided for all relevant personnel to familiarize themselves with these A-CDM elements in their operations.
Q09:	Is TOBT allowed to be earlier than EOBT?
A09:	Yes but this has to be carefully discussed and agreed as part of the A-CDM procedural development. Preferably and for regional and global harmonization, TOBT updates which are more than 10min before EOBT shall be ignored or rejected (by users and the CDM system). A TOBT should not be more than 10min before the EOBT and the corresponding TSAT should not be earlier than the TOBT. Start-up can be requested up to 5 min earlier than the TSAT, which results in the flight departing a total of 15 min before the flight plan EOBT.

Q10: When is TSAT made available to the pilot?

A10: If the pilot has not received TSAT earlier by other means, it recommended that it be made available from ATC at the latest at TOBT - 5 min

In order to initiate the start-up procedure, the pilot should be informed about the TSAT with sufficient notice. By doing so, the pilot would be aware of any start-up delay and take action as required.

Q11: When does the ATC issue the start-up clearance?

A11: Start-up clearance should be given by ATC in accordance with TSAT.

By ATC closely respecting the pre-departure sequence, the pilot knows he/she can rely on the TSAT being accurate. Also, it results in better predictability for the network

Q12: What happens when the pilot does not call ready or for start-up when he/she should?

A12: This item records the CDM process in case the flight fails to comply with the target ready and start-up time.

The TOBT and TSAT should be respected. When a TOBT / TSAT proves to be unrealistic the pilot will not be able to call for start-up. The target times should reflect the actual estimated ready times.

In case the TOBT / TSAT has not been met, the flight may be removed from the pre-departure sequence (TSAT removed) and the TOBT may be deleted or declared invalid.

If a new TOBT is provided, the flight will be re-sequenced and the stakeholders are informed about the new TSAT and TTOT.

Q13: What happens if the aircraft isn't off-blocks following ASAT

A13: A monitoring mechanism of the actual pushback event should be in place in a full A-CDM implementation.

In case the aircraft if not off-blocks by ASAT+5 min, the flight should be excluded from the pre-departure sequence until a new reliable TOBT is provided, resulting in a new TSAT.

However it should be mandatory for an A-CDM airport to protect any flight held at gate by ATC after ASAT (e.g. due to ramp congestion etc.)

Monitoring pushback/taxi clearance compliance enforces execution of the gate, taxiway and runway occupancy according to the planned sequence.

Q14: Procedures published in the AIP?

A14: It is important that the procedures for the provision of TOBT / TSAT / TTOT in the CDM implementation are formally agreed and covered by official documents. The National AIP is one such document.

The AIP provides a recognized AIS channel, in which published procedures are readily available to all interested parties.

Q15: Can A-CDM procedures to be applied in case of adverse conditions?

A15: In simple terms the answer is "*yes*" and in general the approach should be that procedures for handling adverse conditions should be integrated with A-CDM processes.

In an ideal scenario the an adverse condition should not lead to reduced use or even a temporary interruption of A-CDM processes, where A-CDM should in fact provide the backbone for operations on the basis of accurate status information for each aircraft.

However, applying A-CDM procedures with procedures developed to handle adverse conditions will require thorough analysis on how they inter-relate and provide benefits.

Technical Related FAQs

Q16: What is the most accurate source of at-gate milestones e.g. AIBT, AOBT?

A16: When available, automated Visual Docking and Guidance System (VDGS) that collects at-gate data (e.g. AIBT, AOBT) should be the most accurate source of information. However, if such a system is absent, there are other means of obtaining at-gate information ranging from surface surveillance system (A-SMGCS based on cooperative surveillance info from MLAT or ADS-B) to manual input by official observers or data operators. The accuracy levels of these alternative solutions will depend on their implementations and technical requirements & capabilities.

Q17: Use of docking guidance system or other display

A17: If a DGS or other display is available and it is configurable, then the TOBT and TSAT values should be displayed on such system. The time format (UTC, local times) should also be displayed

Q18: Alert to TWR/Apron ctrl at start-up clearance issue if TTOT outside Slot Tolerance Window

A18: For regulated flights, the A-CDM / TWR system should alert TWR/Apron Control at start-up clearance and pushback clearance in case the TTOT would be outside the STW.

This function would assist the TWR controller in his/her mission to ensure adherence to the STW.

Q19: Is the provision of TSATs exclusive to the pre-departure sequencer / A-CDM system or can the TWR provide TSAT values manually, when needed?

A19: If the TWR cannot comply with the TSAT, due to unforeseen local conditions or failure of the pre-departure sequencer to issue realistic TSATs, the system should support the provision of a manual TSAT by TWR

Q20: Auto generation of TOBT in the CDM platform?

A20: It is recommended that the A-CDM Stakeholders are provided a TOBT value that is based upon the ELDT of the inbound flight. For the purpose of this description, a distinction is made between **proposed_TOBT, auto_TOBT and TOBT.**

Before the inbound flight is airborne:

- **A default proposed_TOBT = SOBT** is advised only until the flight plan has been filed. **After flight plan filing, the default for proposed_TOBT should be EOBT**.

After the inbound flight is airborne:

- When the inbound flight is airborne, **the proposed_TOBT value should be automatically calculated based on the ELDT (TOBT = ELDT + EXIT + Turnaround Time)** in order to account for any inbound delay. The dynamic recalculation of the proposed_TOBT as soon as the parameter values change (e.g. ELDT, EXIT, Turnaround Time) is desired.

- Furthermore, the proposed_TOBT should be based upon the ELDT as follows:
  - If ELDT + EXIT + Turnaround Time < EOBT + OBT_upd_param then proposed_TOBT should be set to EOBT as the earliest value.
  - In case ELDT + EXIT + TurnaroundTime > EOBT + OBT_upd_param then proposed_TOBT should be set to ELDT + EXIT + TurnaroundTime.

It will be a local decision if the proposed_TOBT is automatically copied to the TOBT field (auto_TOBT) or if an action is required from the "TOBT responsible person".

Note: OBT_upd_param is recommended to be set to 15min.

Automatically calculating the TOBT based on the ELDT makes the stakeholders (e.g. Ground Handler and Stand & Gate Management) aware of the earliest possible off-block time. Should the inbound flight be delayed, the Ground Handler would know from the EIBT when it can expect the flight and can thereafter update the TOBT taking into account the estimated turnaround time.
An automatic TOBT will reduce the workload for the entity responsible for the management of TOBTs. The early availability of such a TOBT is also an advantage for the local TSAT calculation.

Q21: What is the minimum support infrastructure/systems needed for the initial implementation of A-CDM?

A21:

This question is almost impossible to answer when not knowing more precisely what is required to be "A-CDM compliant" in the APAC region. If you look what is required in Europe versus what is required in APAC the answer will be different. Same applies for the US.

However, at the core of A-CDM it will require you to establish the use of Target Off Block Times (TOBTs) and Target Start-up Approval Times (TSATs) and procedures around how this shall work. A solution or solutions with specific features will also be needed to support the procedures as well as information inputs. This is done in Europe as well as in APAC. The US model does almost the same but due to division of responsibility between ramp and air traffic control it is slightly adapted. To elaborate on this further here is more details related to the TOBTs and TSATs:

The TOBT:

- **Automatic/Proposed TOBT:** To be able to establish the TOBT well in advance of the actual departure (e.g. 3 hours prior EOBT) of an aircraft one will need a system that can calculate this based on information updates that are triggered at certain milestones (this related to milestones 1, and 3-6 in the Milestone Approach). To drive automatic updates of the Proposed TOBT one will need information updates related to the Estimated Landing Time (ELDT) at various stage of the arriving flight. The ELDTs are typically derived from an ATFM system, ATM automation system and AMAN system depending on which phase of the flight the arrival aircraft is. This information can also come from the aircraft operators' system who also, sometimes, has ELDT information about the arrival flights. Once landed accurate Actual Landing and In-block Times can be obtained from e.g. an A-SMGCS or Aircraft Communications Addressing and Reporting System (ACARS) (ON and IN messages). Important to point out is also that if automatic calculations of proposed TOBT are done one need to have the Estimated Taxi-in times established as part of the A-CDM solution/system.

- **No Automatic/Proposed TOBT:** If the TOBT only needs to be established once the actual (physical) aircraft is at the gate there is no real need for a system to automatically calculate TOBTs as this can be put in manually into a system by either the Airline or designated Ground Handler. The drawback of this is that one loses certain level of early predictability, as there is no information about the arrival flight. For example, if the arrival flight is 30 minutes late this will not be reflected in the EIBT, TOBT, TSAT and TTOT.

So, in short related to the TOBT: the earlier one starts the predictions and calculations of TOBTs the more information inputs are needed (from various external systems) that then need to be processed by the A-CDM solution. With automated calculations of TOBT the requirement for Estimated Taxi In-times are also necessary or it will not work.

The TSAT:

- To be able to establish the TSAT (and Target Take-Off Times (TTOTs)) one will, with most certainty, need a function to facilitate these calculations. This function is usually referred to as a Pre-Departure Sequencer (PDS) or a Departure Manager (DMAN) that can vary in how advanced it is in terms of how the TSAT and TTOT are calculated based on various parameters. Important to note is that the PDS or DMAN function can be an integral part of the A-CDM solution/system or a standalone system that exchanges the key information with an A-CDM system. Both set-ups works and are implemented around the globe. One key-decision to make as part of the definition phase is how this "A-CDM

architecture" will look like and determine who has the responsibility to define and develop or procure the system or systems.

The following list provides some of the inputs that are used to be able to calculate TSATs and TTOTs:

Parameter/information Inputs	Required or Optional
TOBT	Required
Estimated Taxi Out Times (EXOT)	Required
Runway configurations	Required
Departure Rates	Required
ATFM CTOT	Optional
Aircraft type/Wake turbulence category	Optional
Arrival flights (taking ELDT/ALDT into account)	Optional
Airborne restrictions (closed fixes, minutes or miles in trail restrictions)	Optional
Runway closures and other closures (e.g. taxi ways etc.)	Optional
Standard Instrument Departures (SIDs)	Optional
Routing from A-SMGCS	Optional

NOTE – the basic principle is that the more parameters and information inputs that are taken into account the more advanced the PDS/DMAN will have to be, but with that more accurate TSATs and TTOTs will be calculated, which should result in better pre- and departure sequencing. How advanced the PDS or DMAN has to be must be assessed based on the airport traffic density, taxi patterns, congestion, traffic operations, mix and flow, etc.

References

Ref No	Document Name & Edition
1	Manual on Collaborative Air Traffic Flow Management (Doc 9971), Third Edition, 2018
2	Asia Pacific Airport Collaborative Decision Making (A-CDM) Implementation Plan, Edition 1, 2019
3	EUROCONTROL A-CDM Implementation Manual, Version 5, March 2017
4	Airport Collaborative Decision-Making: Optimisation through Collaboration, CANSO
5	IATA Recommendations for A-CDM Implementation