



Lessons Learned from Thailand ATFM System Transition

ATFM & A-CDM/SG/16

6 – 10 April 2026

Topics



Introduction to AEROTHAI ATFM Services



Development of ATFAS v2.0



System Transition Activities



Lessons Learned from System Design & Transition



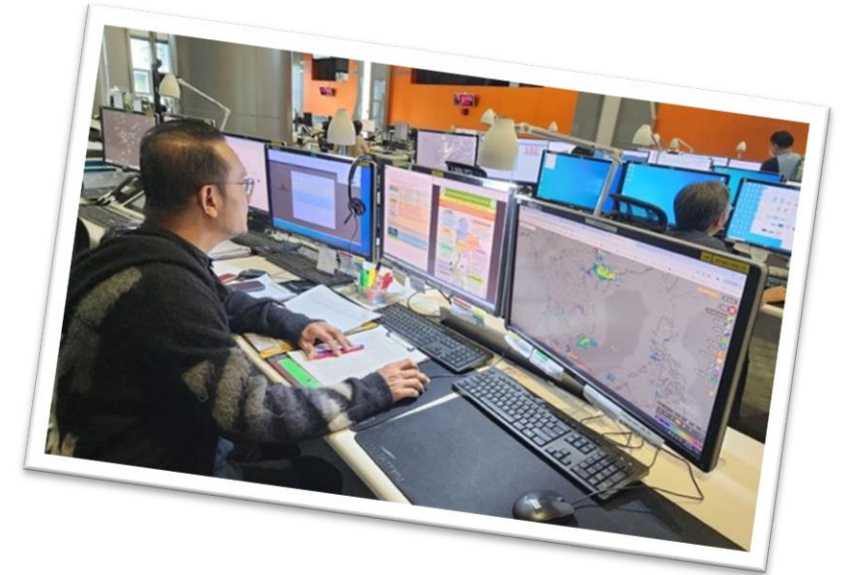
Introduction to AEROTHAI ATFM Services

AEROTHAI ATFM Services



BOBCAT Service 2000 – 2359 UTC

ATFM service for westbound
nighttime South and
Southeast Asia to Europe
flights overflying **Kabul FIR**



General ATFM Service H24

ATFM service to enable
demand-capacity balancing
within **Bangkok FIR**

BOBCAT System



2007



BOBCAT started

2010 – 2011



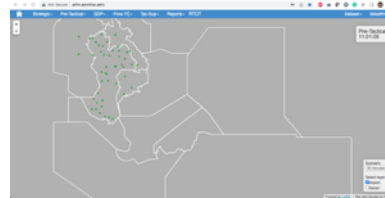
Whole-of-Flight CDM Project

2012 – 2014



Regional ATFM ConOps Development

ATFAS v1.0

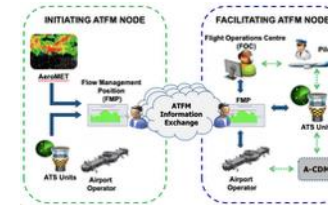


2015 – 2019



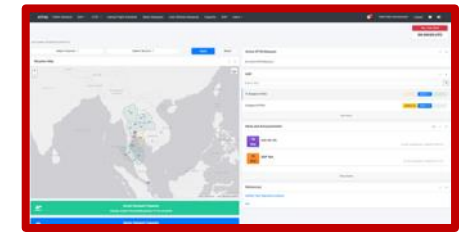
DMN-ATFM Ops Trial

2020 – 2024



Expanded AMNAC Operations

ATFAS v2.0



2025 – 2026



Ongoing ATFM Services

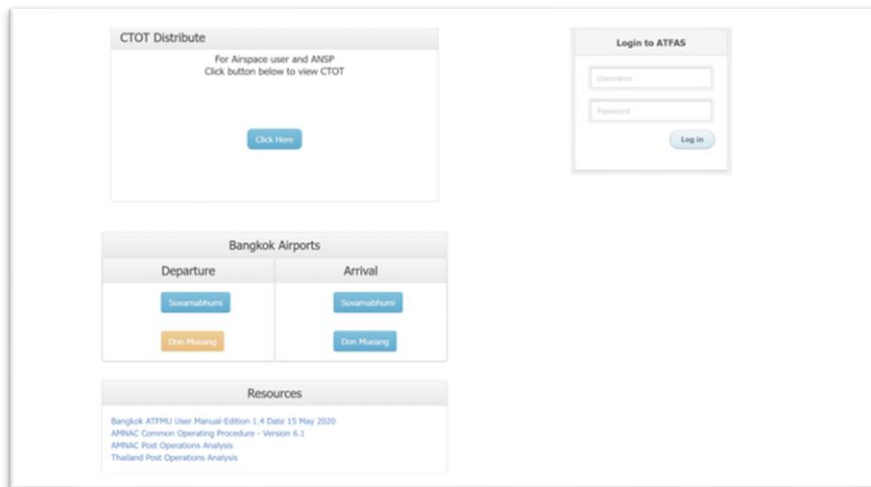


Development of ATFAS v2.0

ATFAS – Air Traffic Flow Advisory System

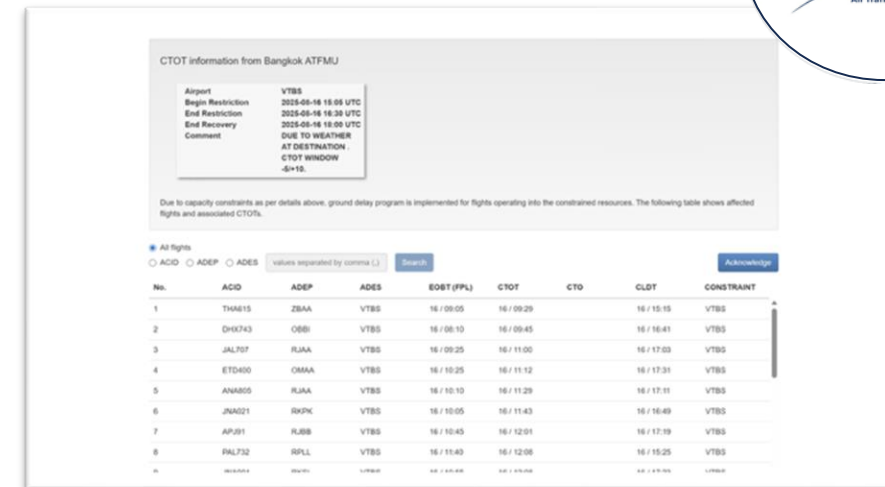
Developed by ATS Research and Development Engineering Department to support the ATFM operations in Thailand, and implemented since 2015 under the name “ATFAS v1.0”

<https://atfm.aerothai.aero>



The screenshot shows the ATFAS home page with the following sections:

- CTOT Distribute:** For Airspace user and ANSP. Click button below to view CTOT. [Click Here](#)
- Bangkok Airports:** Departure and Arrival sections, each with [System Status](#) and [Don't Miss](#) buttons.
- Resources:** Links to Bangkok ATFM User Manual Edition 1.4 Date 15 May 2020, ATRAC Common Operating Procedure - Version 6.1, ATRAC Post Operations Analysis, and Thailand Post Operations Analysis.
- Login to ATFAS:** A separate login form with Username and Password fields and a [Log In](#) button.



The screenshot displays CTOT information from Bangkok ATFMU for VTBS. It includes a summary box and a table of affected flights.

CTOT information from Bangkok ATFMU

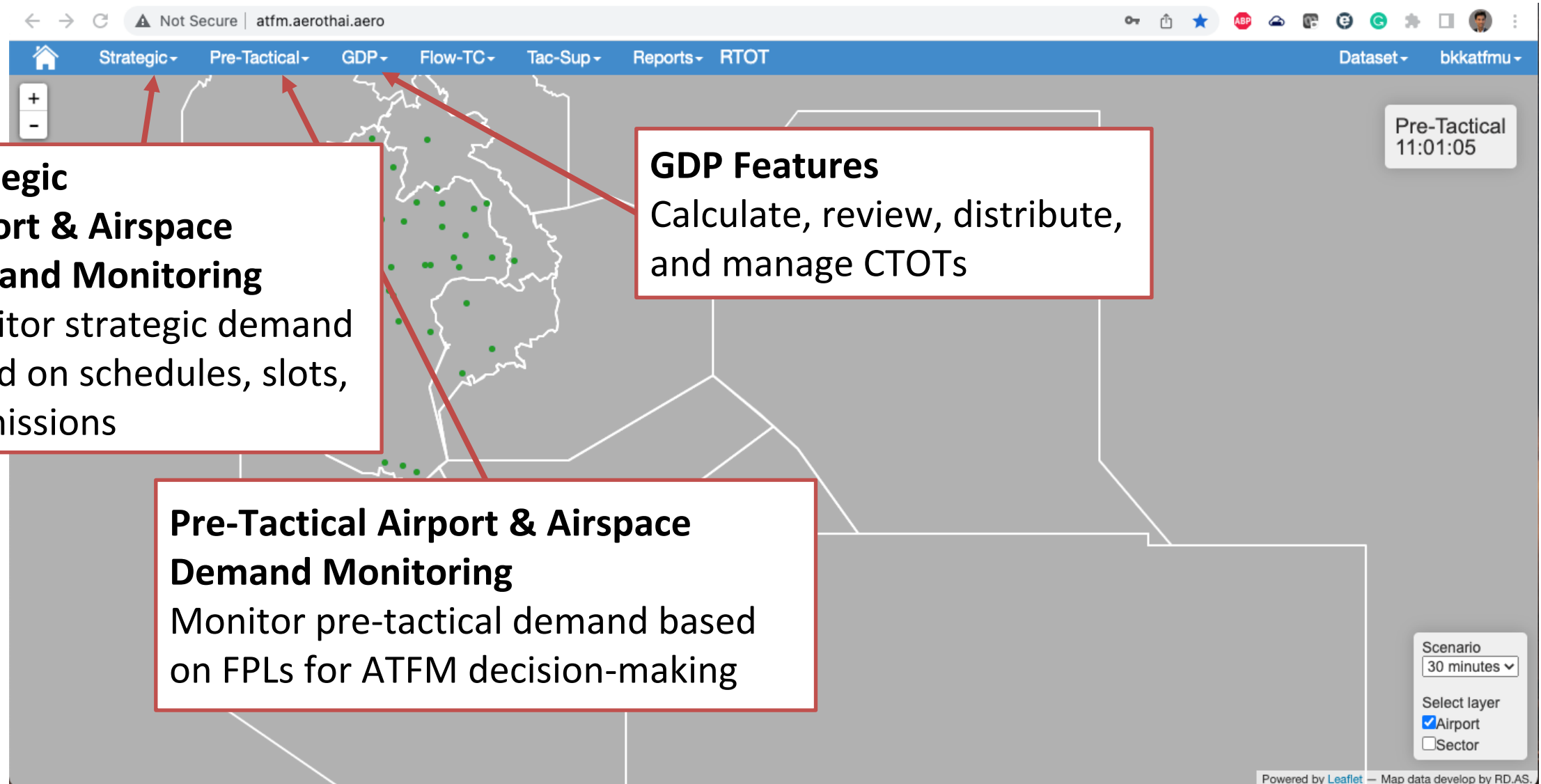
Airport: VTBS
Begin Restriction: 2025-05-16 16:00 UTC
End Restriction: 2025-05-16 18:30 UTC
End Recovery: 2025-05-16 18:00 UTC
Comment: DUE TO WEATHER AT DESTINATION
CTOT WINDOW: -5/+15.

Due to capacity constraints as per details above, ground delay program is implemented for flights operating into the constrained resources. The following table shows affected flights and associated CTOTs.

All flights
 ACD ADEP ADES values separated by comma (,) [Search](#) [Acknowledge](#)

No.	ACD	ADEP	ADES	EOBT (P/L)	CTOT	CTO	CLDT	CONSTRAINT
1	THAI15	ZBAA	VTBS	16 / 09:05	16 / 09:25		16 / 15:15	VTBS
2	DH1743	OSBI	VTBS	16 / 09:10	16 / 09:45		16 / 16:41	VTBS
3	JAL707	RUAA	VTBS	16 / 09:25	16 / 11:00		16 / 17:03	VTBS
4	ETD400	OMAA	VTBS	16 / 10:25	16 / 11:12		16 / 17:31	VTBS
5	ANA805	RUAA	VTBS	16 / 10:10	16 / 11:29		16 / 17:11	VTBS
6	JNA021	RKPK	VTBS	16 / 10:05	16 / 11:43		16 / 16:49	VTBS
7	APJ01	RUAB	VTBS	16 / 10:45	16 / 12:01		16 / 17:39	VTBS
8	PAL732	RPLL	VTBS	16 / 11:43	16 / 12:06		16 / 15:25	VTBS

ATFAS v1.0 Key Features



The screenshot shows the ATFAS v1.0 web application interface. The browser address bar displays "atfm.aerothermal.aero". The navigation menu includes "Strategic", "Pre-Tactical", "GDP", "Flow-TC", "Tac-Sup", "Reports", and "RTOT". The main content area is a map of Thailand with green dots representing demand points. Three callout boxes provide details for the "Strategic", "GDP", and "Pre-Tactical" features. A "Pre-Tactical 11:01:05" timestamp is visible in the top right. A "Scenario" dropdown is set to "30 minutes", and a "Select layer" section has "Airport" checked and "Sector" unchecked. The footer indicates "Powered by Leaflet - Map data develop by RD.AS."

**Strategic
Airport & Airspace
Demand Monitoring**
Monitor strategic demand based on schedules, slots, permissions

GDP Features
Calculate, review, distribute, and manage CTOTs

**Pre-Tactical Airport & Airspace
Demand Monitoring**
Monitor pre-tactical demand based on FPLs for ATFM decision-making

ATFAS v1.0 Key Features

Not Secure | atfm.aerothermal.aero/CTOTForwardReport

Strategic - Pre-Tactical - GDP - Flow-TC - Tac-Sup - Reports - RTOT Dataset - bkkatfmu -

Date from 10/07/2022 to 10/07/2022 Search

No.	ACID	ADEP	ADES	EOBT	CTOT	Originator	REGUL	REGCAUSE
1	HKC332	VTBS	VHHH	07 / 02:55	07 / 03:15	VHHKZDZX		WA 84
2	CPA750	VTBS	VHHH	07 / 04:00	07 / 04:20	VHHKZDZX		WA 84
3	HKE783	VTBS	VHHH	07 / 05:25	07 / 05:45	VHHKZDZX		WA 84

© 2022 - ATFAS v0.1
Developed by RDAS

CTOT Forwarding

Verify and forward CTOTs from other ATFMUs received via AFTN

CTOT information from Bangkok ATFMU

Sector	1S
Begin Restriction	2023-04-05 02:00 UTC
End Restriction	2023-04-05 04:30 UTC
End Recovery	2023-04-05 05:00 UTC
Comment	DUE TO TRAFFIC CONGESTION. CTOT WINDOW -5 / +5.

Due to capacity constraints as per details above, ground delay program is implemented for flights operating into the constrained resources. The following table shows affected flights and associated CTOTs.

All flights
 ACID ADEP ADES values separated by comma (,)

Search Acknowledge

No.	ACID	ADEP	ADES	EOBT (FPL)	CTOT	CTO	CLDT	CONSTRAINT
1	MAS784	WMKK	VTBS	05 / 01:00	05 / 01:26	05 / 02:45	05 / 03:22	1S
2	NOK611	VTSR	VTBD	05 / 01:25	05 / 01:31	05 / 02:03	05 / 02:47	1S
3	NOK521	VTSP	VTBD	05 / 01:20	05 / 01:33	05 / 02:09	05 / 02:38	1S
4	AIQ3002	VTSP	VTBD	05 / 01:15	05 / 01:41	05 / 02:17	05 / 02:55	1S
5	TLM703	VTSS	VTBD	05 / 01:20	05 / 01:51	05 / 02:31	05 / 03:18	1S
6	AIQ3103	VTSS	VTBD	05 / 01:40	05 / 01:53	05 / 02:33	05 / 03:06	1S
7	BKP262	VTSG	VTBS	05 / 01:40	05 / 01:54	05 / 02:29	05 / 03:03	1S
8	AIQ4113	VTSP	VTBS	05 / 01:35	05 / 02:00	05 / 02:37	05 / 03:17	1S
9	BKP106	VTSM	VTBS	05 / 01:50	05 / 02:04	05 / 02:24	05 / 02:56	1S

CTOT Distribution via Web, Emails, AFTN
Distributes CTOTs via web, emails, and AFTN slot messages

Why the Change?



Segregated strategic, pre-tactical, and tactical demand pictures



Inability to support multi-constraint ATFM measure



Limited options of airspace volumes for monitoring and management



Manual CTOT revision through Bangkok ATFMU, increasing the workload



Batch CTOT delivery limiting the ability to re-optimize after activation



Separate and manual ADP process

ATFAS v2.0 Key New Features



ATFAS Traffic Demand GDP CTOT Upload Flight Schedule Static Airspaces User Defined Airspaces Capacity ADP Trajectory View Users

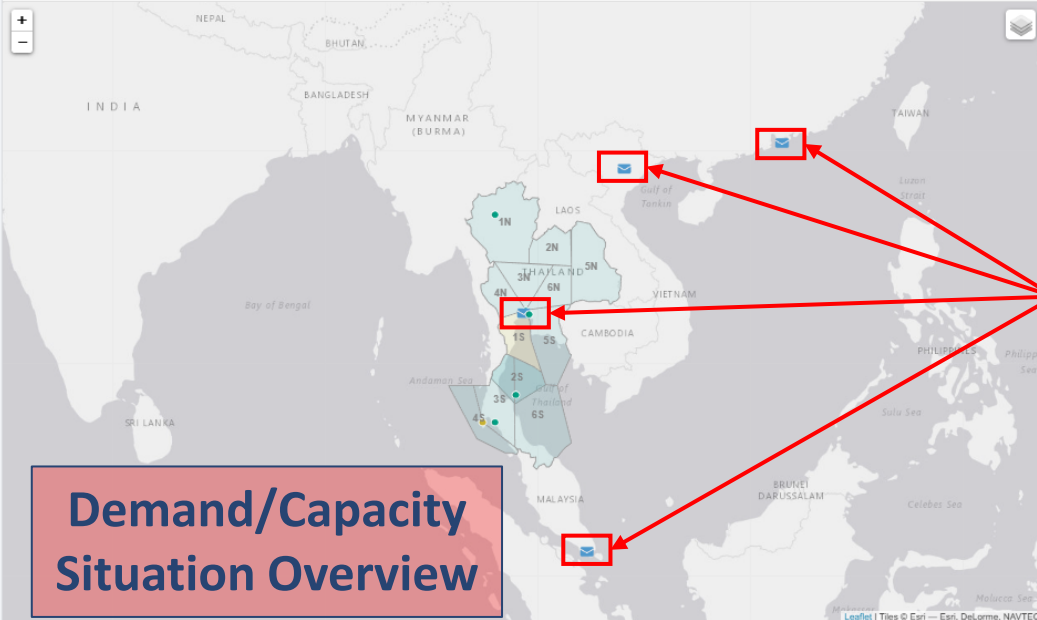
100 Hello SSO-wasoontra! Logout

Thu, 19 Feb 2026
02:51:57 UTC

Last Update: 19/02/2026 02:51 UTC

Select Airports Select Sectors Apply Reset

Situation Map



Listing of Active Measures

VTBS19FEBM	0300 - 0400 UTC	Airport VTBS
VTBD19FEBM	0300 - 0420 UTC	Airport VTBD

Automated ADP Processing

Search ADP...	18/02 V. 1	19/02 V. 1	Unavailable
Bangkok ATFMU	Unavailable	Unavailable	Unavailable
Fukuoka ATMC	Unavailable	Unavailable	Unavailable
Hong Kong ATFMU	Unavailable	Unavailable	Unavailable
Hanoi ATFMU	Unavailable	Unavailable	Unavailable
CAAM ATFMU	Unavailable	Unavailable	Unavailable
Singapore ATFMU	Unavailable	Unavailable	Unavailable

Demand/Capacity Situation Overview

Announcements, References

AMNAC Common Operating Procedure, v7.0

Airport Demand / Capacity
Display Airport Demand/Capacity 12 hrs onwards

Sector Demand / Capacity

ATFAS v2.0 Key New Features

Traffic Demand

Manage

Last Updated: 09:50:17

Designator

ATM Resource

Location Designator

Dep Arr Combined

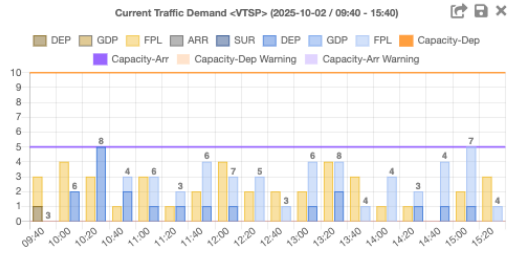
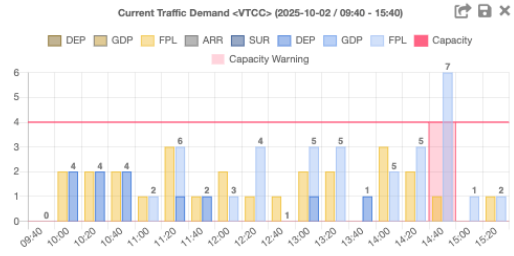
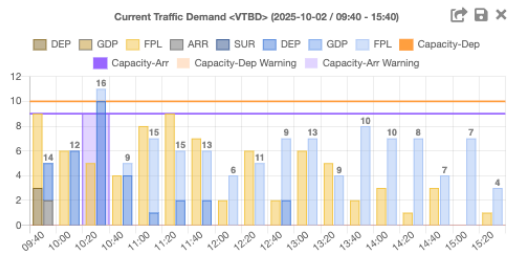
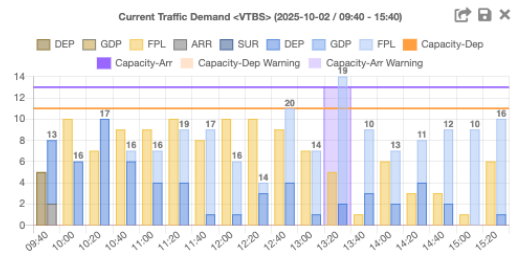
Specify Current

Hours Ahead

Minutes Interval

Flight Rule IFR VFR

Source SCH FPL GDP DEP SUR ARR



Ability to monitor both “static” and “user-defined” ATM resources

Integrated traffic demand view with scheduled, planned, managed/regulated, and surveilled flights with over-capacity warning

ATFAS v2.0 Key New Features

Ability to manage multiple constraints (e.g. VTBS arrivals + sector 1S) concurrently, with single CTOT per flight

ATFAS Traffic Demand GDP CTOT Upload Flight Schedule Static Airspaces User Defined Airspaces Capacity ADP Users

Ground Delay Program (GDP) Information Management
 Create GDP | Manage Flight-Specific Exemption Last Updated: 02:06:09

ATM Resource: --- SELECT --- Location Designator: Start: End: Designator: <Executed measure designator> Minutes Interval: 20

Graph Timeline Add ?

EXE TESTFOR3ACM2-VTBS-SF Regulated Demand <VTBS> (2025-10-03 / 04:00 - 10:00)

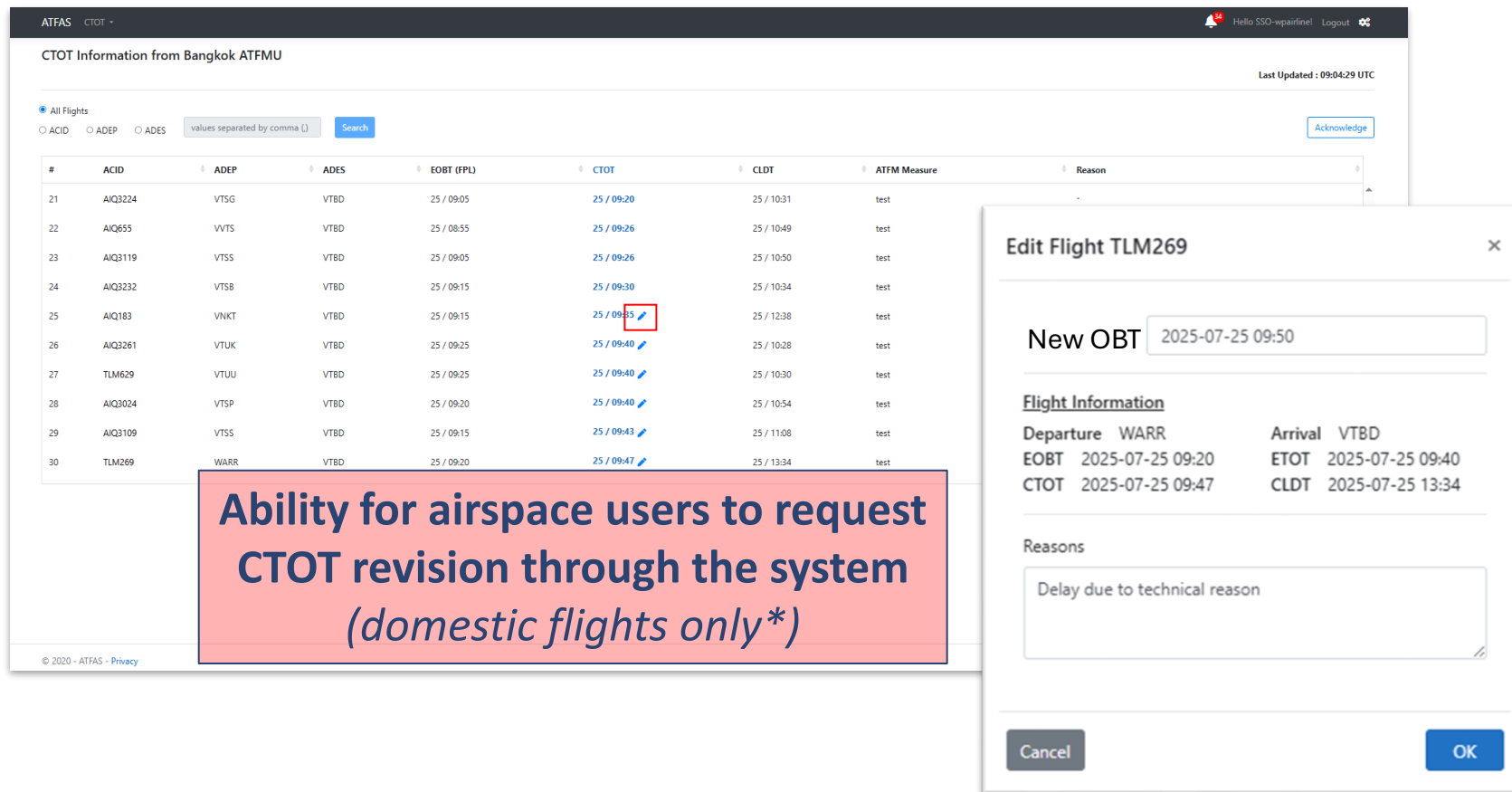
ACKNOWLEDGE

#	ACID	TOT	LDT	Status
1	IGO1051	23:50 (DEP)	04:02 (DEP)	Sent
2	CXA853	01:08 (DEP)	04:05 (DEP)	Sent
3	THA202	02:55 (GDP)	04:06 (GDP)	Sent Edit Exempt Exclude
4	ETH608	20:00 (GDP)	04:12 (GDP)	Sent Edit Exempt Exclude
5	EVA211	01:04 (DEP)	04:13 (DEP)	Sent
6	BKP124	03:20 (GDP)	04:14 (GDP)	Sent Edit Exempt Exclude
7	BKP924	03:00 (GDP)	04:18 (GDP)	Sent Edit Exempt Exclude
8	CPA755	01:57 (DEP)	04:20 (DEP)	Sent
9	CQH7279	00:34 (DEP)	04:23 (DEP)	Sent

Automatic re-optimization with changing situations
(Affecting only flights which haven't received their initial CTOTs)

ATFAS v2.0 Key New Features

Delivery of CTOT one-by-one at EOBT – 90 minutes
✓ Still delivering with web, e-mail, and AFTN



The screenshot displays the ATFAS v2.0 interface. The main window shows a table of flight information with columns for #, ACID, ADEP, ADES, EOBT (FPL), CTOT, CLDT, ATFM Measure, and Reason. The CTOT column for flight TLM269 is highlighted with a red box and a pencil icon, indicating it can be edited. An 'Edit Flight TLM269' modal window is open, showing the 'New OBT' field set to '2025-07-25 09:50'. Below this, the 'Flight Information' section shows: Departure WARR, Arrival VTBD, EOBT 2025-07-25 09:20, ETOT 2025-07-25 09:40, and CTOT 2025-07-25 09:47, CLDT 2025-07-25 13:34. The 'Reasons' section contains a text area with 'Delay due to technical reason'. The modal has 'Cancel' and 'OK' buttons at the bottom.

Ability for airspace users to request CTOT revision through the system (domestic flights only*)



System Transition Activities

System Transition Activities



Bangkok ATFMU Training



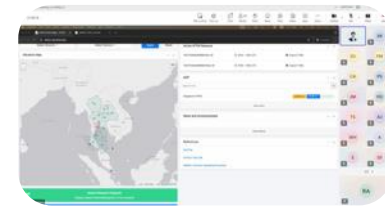
Meeting with ATC unit (VTCC)



Workshop with Airspace Users (VTBS)



Airspace Users – ANSP Meeting 2025



Workshop for Int'l ATFMUs

Ops Trial Commences 22 Jan 2026



CAAT Approval



Workshop with Airspace Users (VTBD)



Meeting with ATC unit (VTSP)

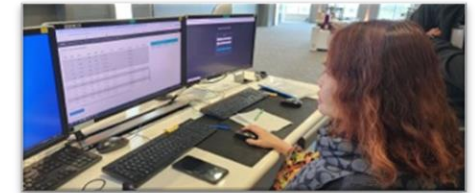
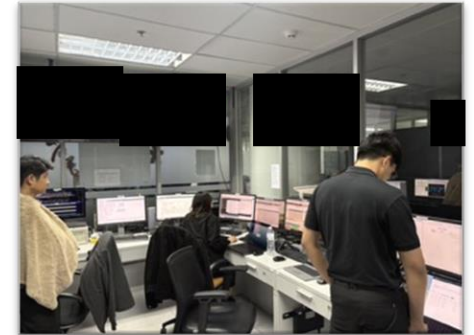
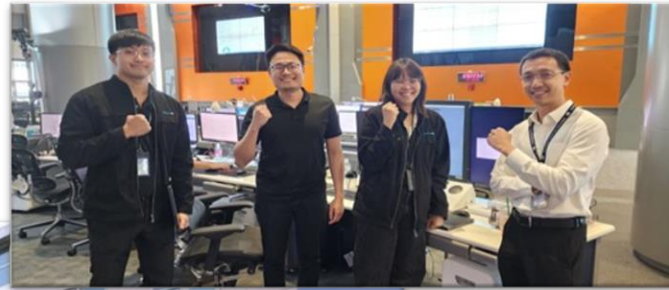
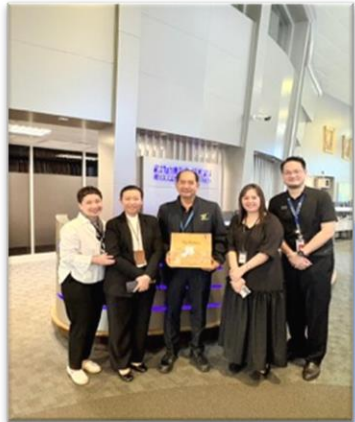


Annual ATFM Meeting 2025

Additional System Fixes

Transition Completed!

ATFAS 2.0 Trial Commenced: 0000 UTC, 22 Jan 2026





Lessons Learned from System Design & Transition











Lessons Learned



Importance of appropriate sector definition for traffic count

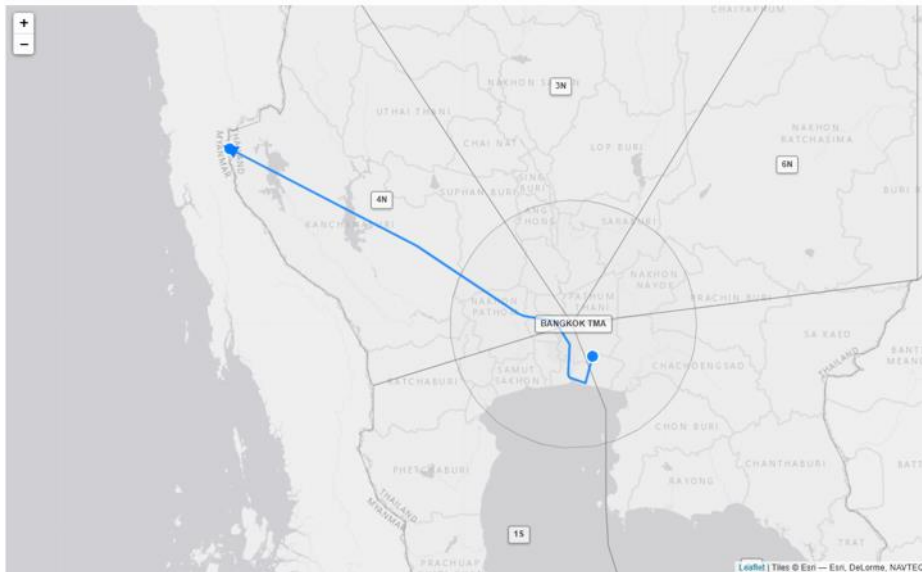
- Counting traffic in the airspace sector requires appropriate counting parameters, beyond latitude/longitude
- Consultation with ATC units, and considering ATC procedures, is necessary

Static Airspaces + New Airspace

<input type="checkbox"/>	Name	Airspace type	Designator	Lower Limit	Upper Limit	Minimum Distance	
<input type="checkbox"/>	1S	SECTOR		0	51000	60	 
<input type="checkbox"/>	2S	SECTOR		27000	51000	60	 
<input type="checkbox"/>	3S	SECTOR		0	51000	66	 
<input type="checkbox"/>	4S	SECTOR		0	51000	30	 
<input type="checkbox"/>	5S	SECTOR		0	51000	60	 

Accuracy of FPL2012-derived trajectory

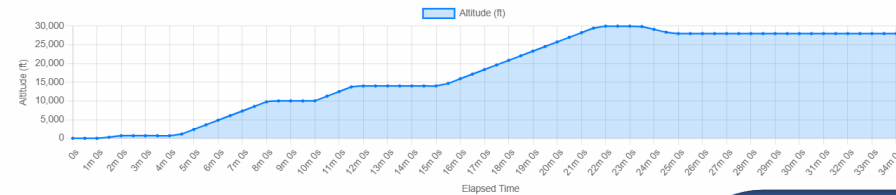
- Modeling of flight trajectory based on FPL2012 can be challenging
- Accuracy trajectory prediction is vital



Flight Trajectory: THA916

Aircraft Type: B77W
Route Portion: TARED P646 BETNO N895 PTN/N0505F300 P646 DOPID Q26 CEA R460 LKN R594 DPN G333 MERUN L750 MURLI/N0488F320 L750 RANAH B449 MARAD/K0896F320 B449 MAMED B450 BIBIM A909 RODAR/N0480F320 M11 AMOKU/N0476F340 M11 ERLEV T923 SUBUT T916 MATAL M11 REBLO UM11 CRM UL746 ODERO L746 LUGEB DCT PEXAL DCT TIXIP DCT TEGRI/N0474F360 DCT ARSIN DCT RENKA DCT INBED DCT BOMBI DCT ADKUV DCT BUB L608 LOGAN LOGAN2H

Altitude Over Time



Speed Over Time

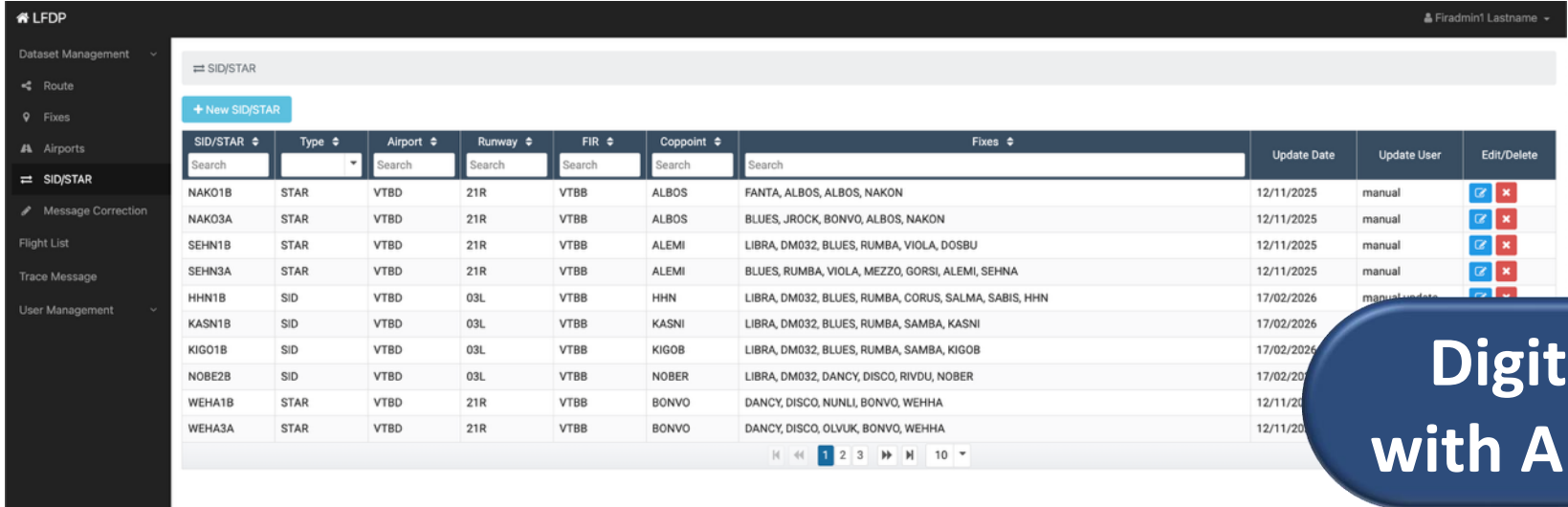






















Time for FF-ICE? 😊

Lessons Learned

Well-maintained Aeronautical Information Database is crucial

- Well-maintained aeronautical information database is crucial to the processing of FPL information and the accuracy of demand prediction, which requires either high manpower for “analog” system or good “digital” database



SID/STAR	Type	Airport	Runway	FIR	Cppoint	Fixes	Update Date	Update User	Edit/Delete
NAK01B	STAR	VTBD	21R	VTBB	ALBOS	FANTA, ALBOS, ALBOS, NAKON	12/11/2025	manual	 
NAK03A	STAR	VTBD	21R	VTBB	ALBOS	BLUES, JROCK, BONVO, ALBOS, NAKON	12/11/2025	manual	 
SEHN1B	STAR	VTBD	21R	VTBB	ALEMI	LIBRA, DM032, BLUES, RUMBA, VIOLA, DOSBU	12/11/2025	manual	 
SEHN3A	STAR	VTBD	21R	VTBB	ALEMI	BLUES, RUMBA, VIOLA, MEZZO, GORSI, ALEMI, SEHNA	12/11/2025	manual	 
HHN1B	SID	VTBD	03L	VTBB	HHN	LIBRA, DM032, BLUES, RUMBA, CORUS, SALMA, SABIS, HHN	17/02/2026	manual	 
KASN1B	SID	VTBD	03L	VTBB	KASNI	LIBRA, DM032, BLUES, RUMBA, SAMBA, KASNI	17/02/2026		 
KIG01B	SID	VTBD	03L	VTBB	KIGOB	LIBRA, DM032, BLUES, RUMBA, SAMBA, KIGOB	17/02/2026		 
NOBE2B	SID	VTBD	03L	VTBB	NOBER	LIBRA, DM032, DANCY, DISCO, RIVDU, NOBER	17/02/2026		 
WEHA1B	STAR	VTBD	21R	VTBB	BONVO	DANCY, DISCO, NUNLI, BONVO, WEHHA	12/11/2025		 
WEHA3A	STAR	VTBD	21R	VTBB	BONVO	DANCY, DISCO, OLVUK, BONVO, WEHHA	12/11/2025		 

Digital information with AIXM, anyone? 😊

Lessons Learned

Consistent stakeholder engagement is of very important

- Multiple meetings and workshops were conducted with ATFMU staff, ATC units, and Airspace Users
- “ATFAS Help Desk” LINE Open Chat for ATC units
- “ATFAS Feedback Form” for Airspace Users & ATC units



BANGKOK ATFMU

ATFAS v2.0 Suggestion and Problem

Please kindly provide any problems you encounter or suggestions with regards to ATFAS v2.0

stfuharsen@gmail.com [Switch account](#)

The name, email, and photo associated with your Google account will be recorded when you upload files and submit this form

* Indicates required question

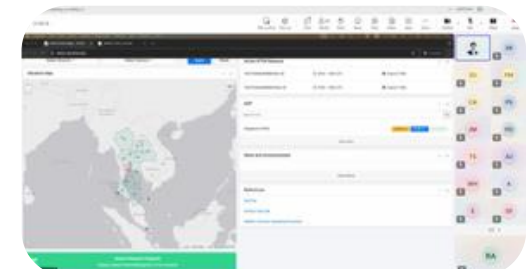
Email *

Your email

Date and Time of Issue/Suggestion *

Date

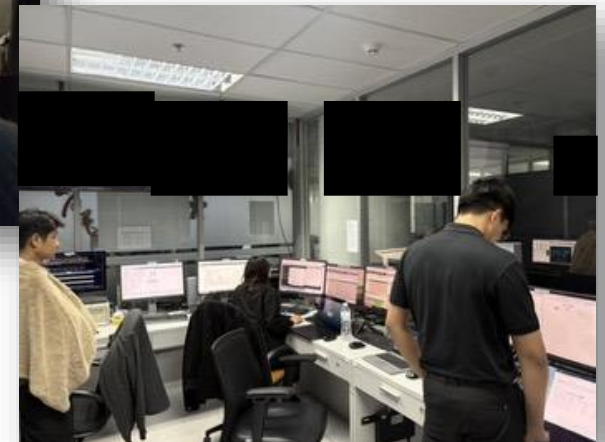
yyyy-mm-dd



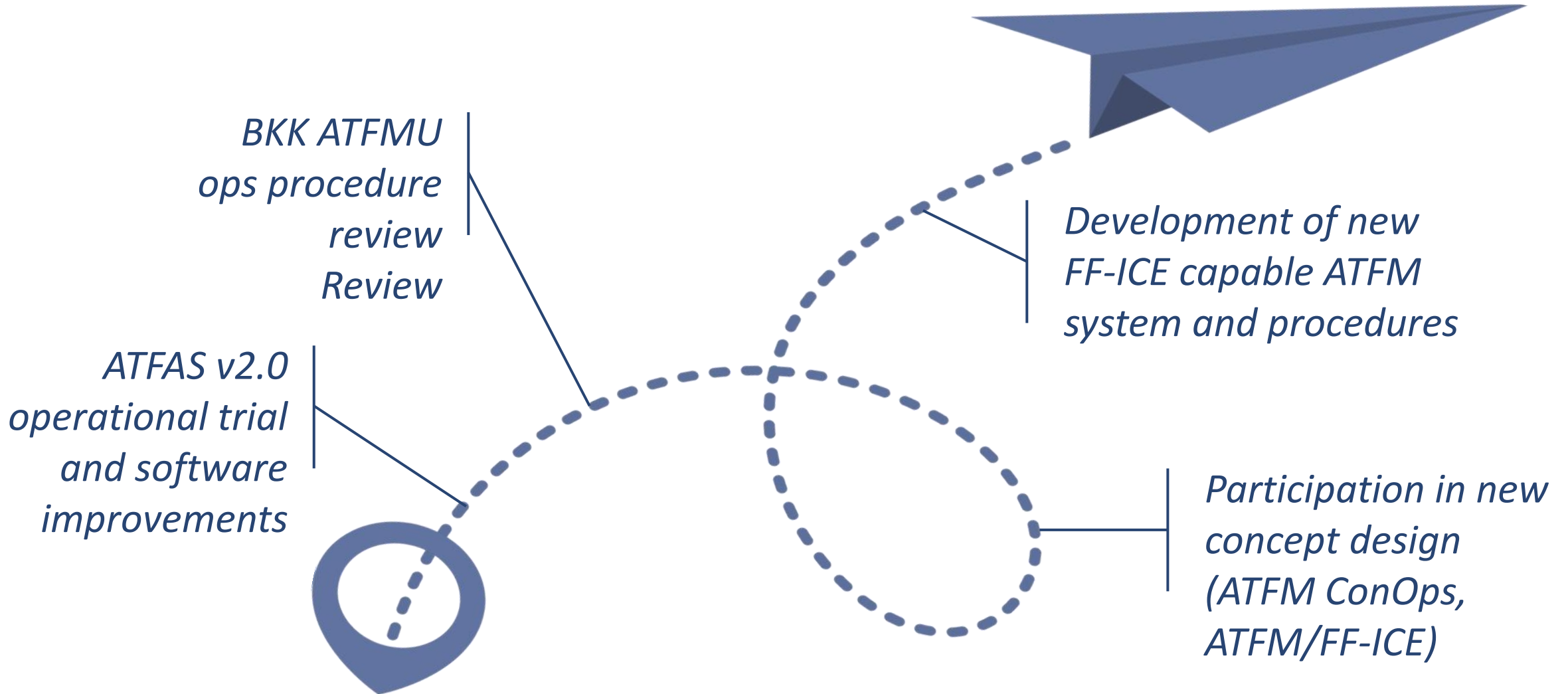
Lessons Learned

Expect troubles during and after the transition!

- Unforeseen trouble arose during the transition period despite extensive testing
- “All Hands on Deck” arrangement of team resources during transition *week*
- Regular check-in with ATFMU staff to collect and resolve software issues



What's Next for Us?





AEROTHAI 
BANGKOK
ATFMU



Thank You!