

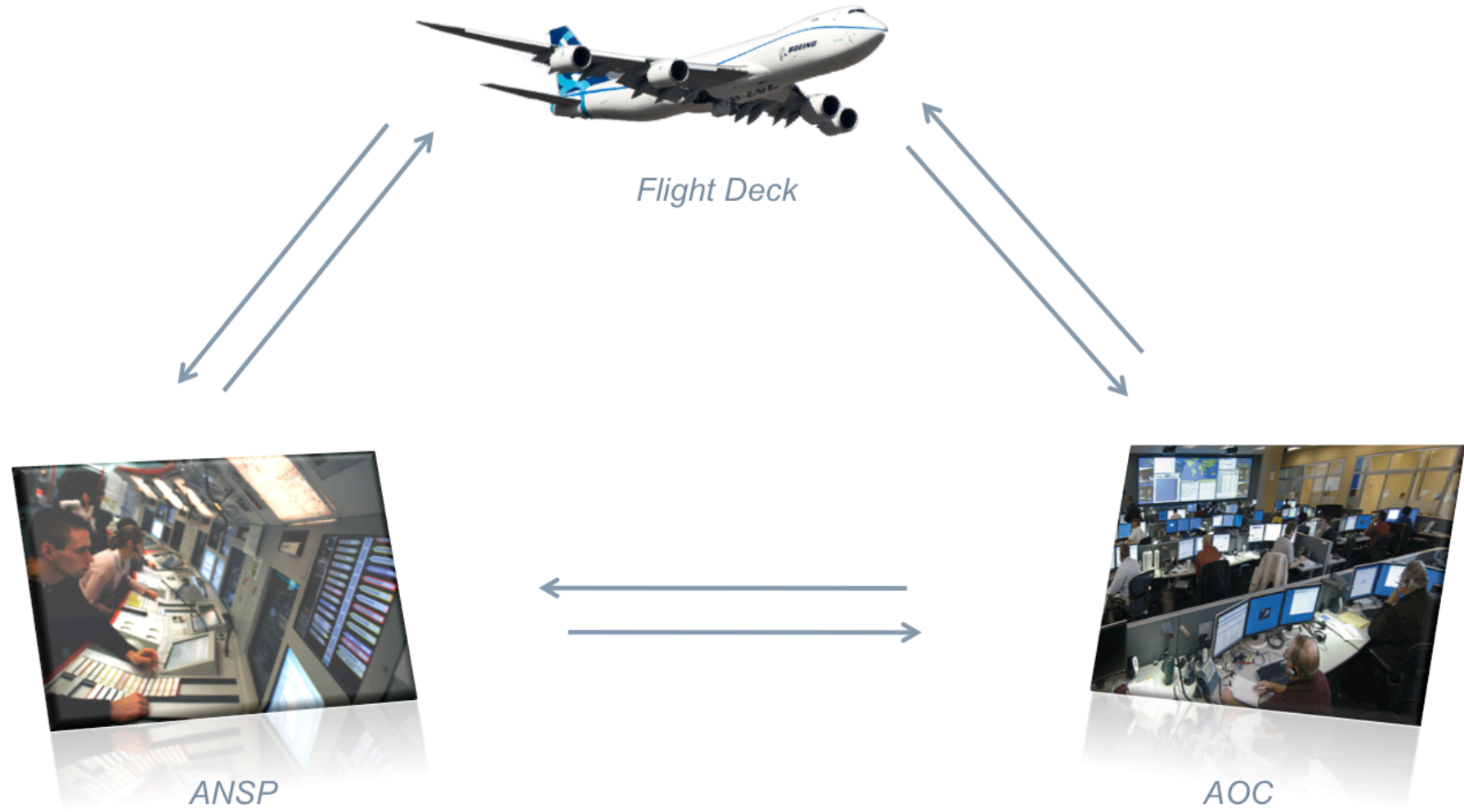
**EIWAC 2013**

# **An integrated operations solution for Gate-to-Gate airline operations**

**Thorsten Wiesemann, Andreas Sindlinger, Nico Zimmer,  
Jens Schiefele, Jason Clark, Frank Morales**

**Presented by: Dr. Nima Barraci**  
Senior Researcher, Jeppesen

# Motivation



# Operational Scenario

## NextGen & SESAR in the year 2018

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### ■ Sample Commercial Operator

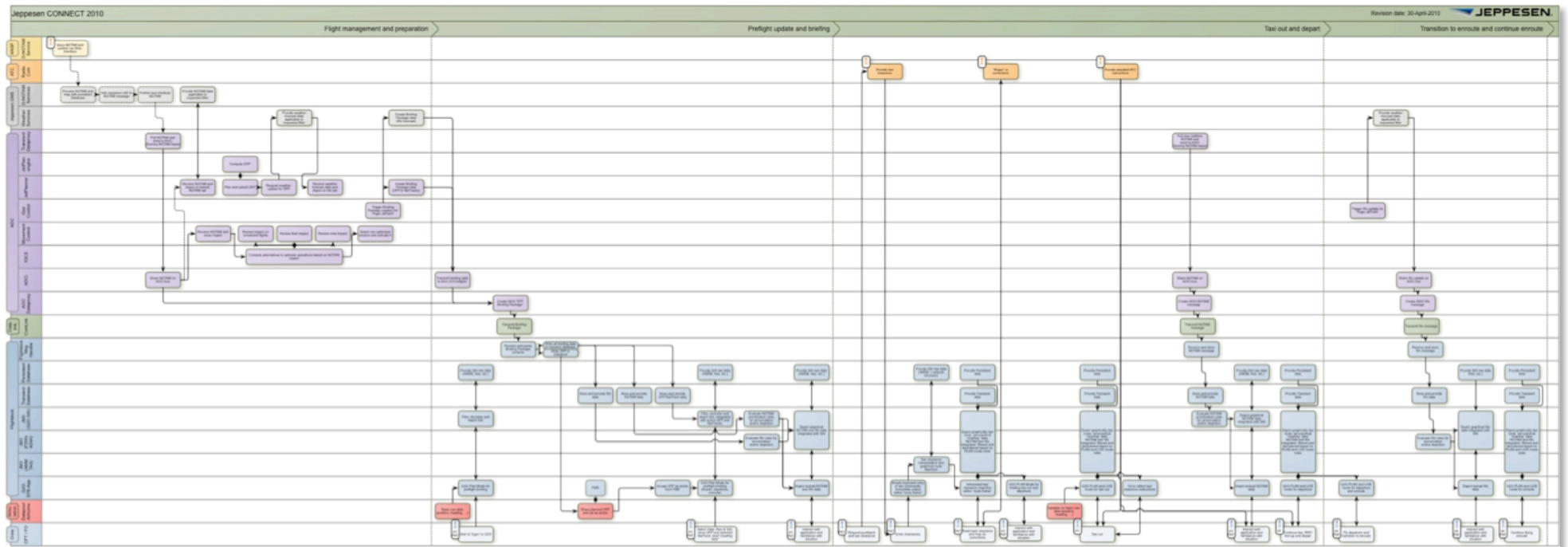
- Part 121 with scheduled flights and dispatch office
- Operating short, medium and long haul operations in Northern America and Europe
- 3 major hubs world wide (South America, North America, Europe)

### ■ ATM Infrastructure

- Fully automated systems
  - at an Airline Operations Center
  - in the Flight Deck for aeronautical information management (Integrated Avionics & PED)
  - for Air-Ground data exchange
  - for ground based messaging of aeronautical data (static & transient)
- Manual and semi automated systems
  - Air Traffic Control
  - Aeronautical Information Service Providers

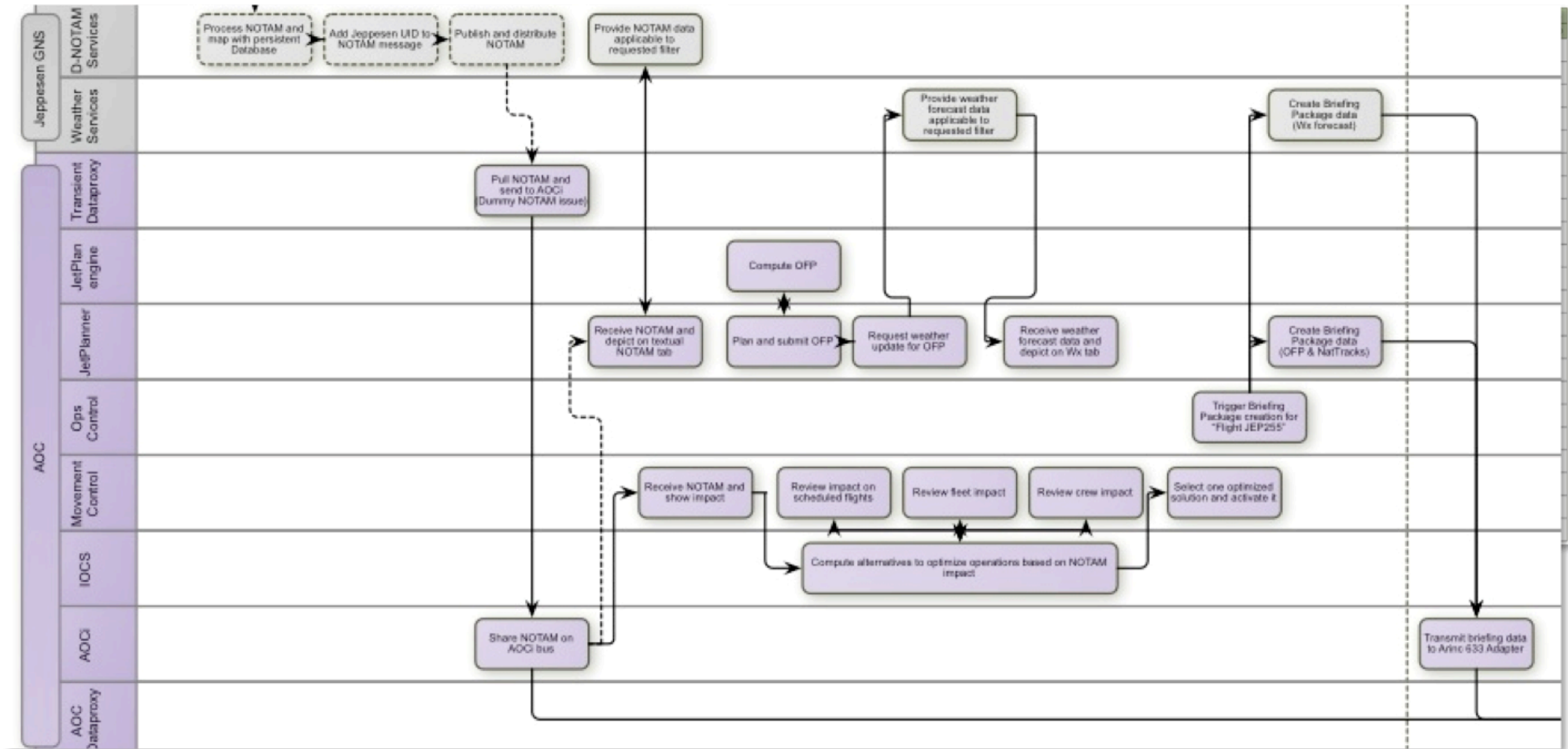
# Operational Scenario

## System Components and Workflow Diagram



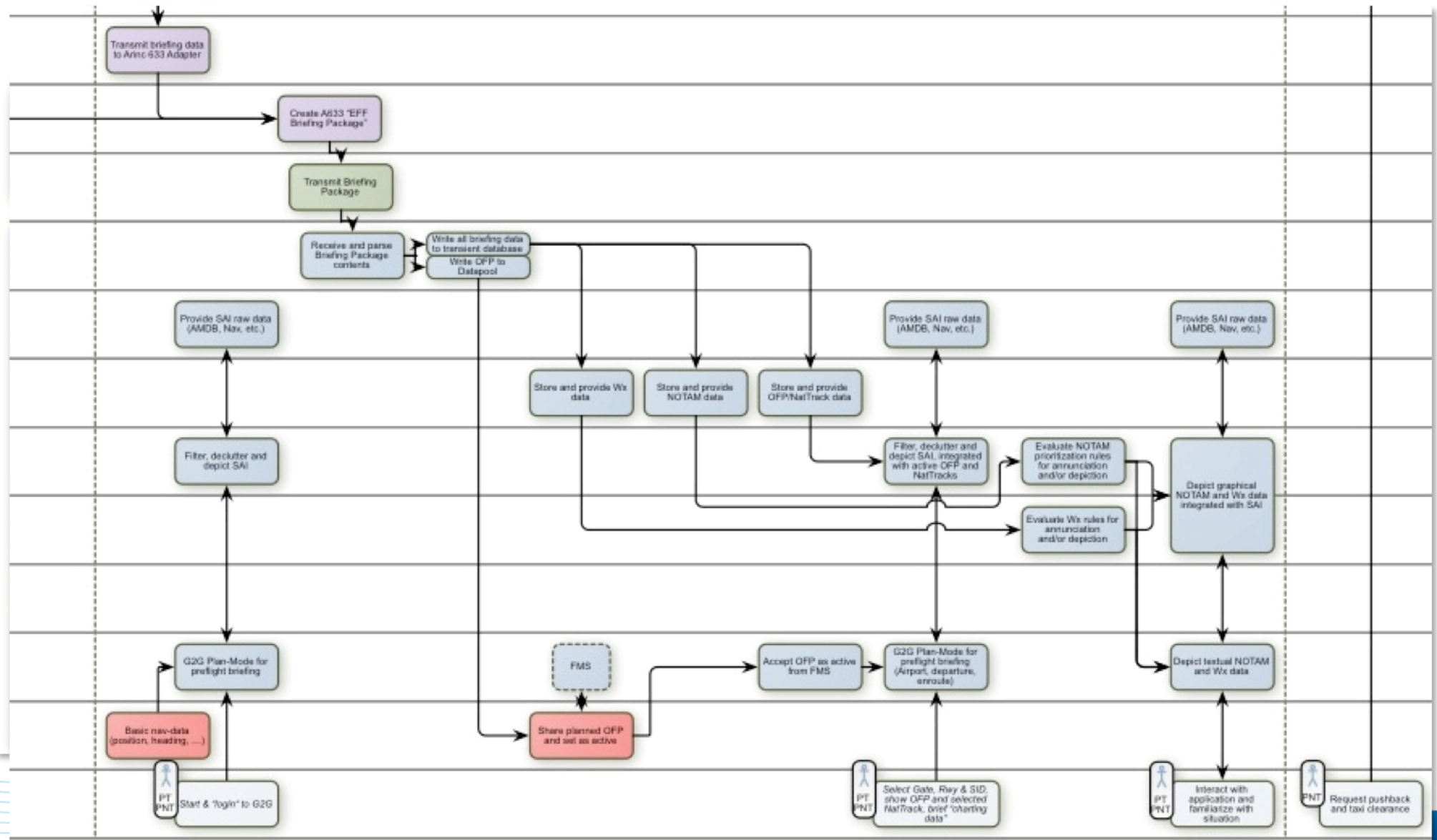
# Operational Scenario

## System Components and Workflow Diagram



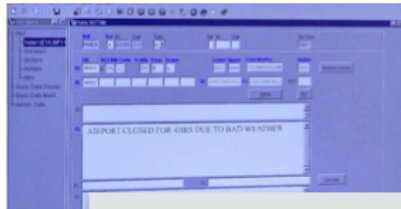
# Operational Scenario

## System Components and Workflow Diagram

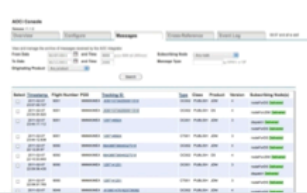


# Short term data updates

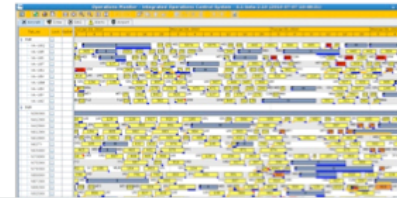
Transient information from ANSP to JAIM to AOC



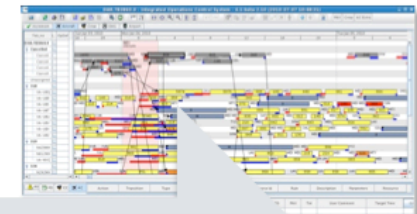
ANSP



JAIM



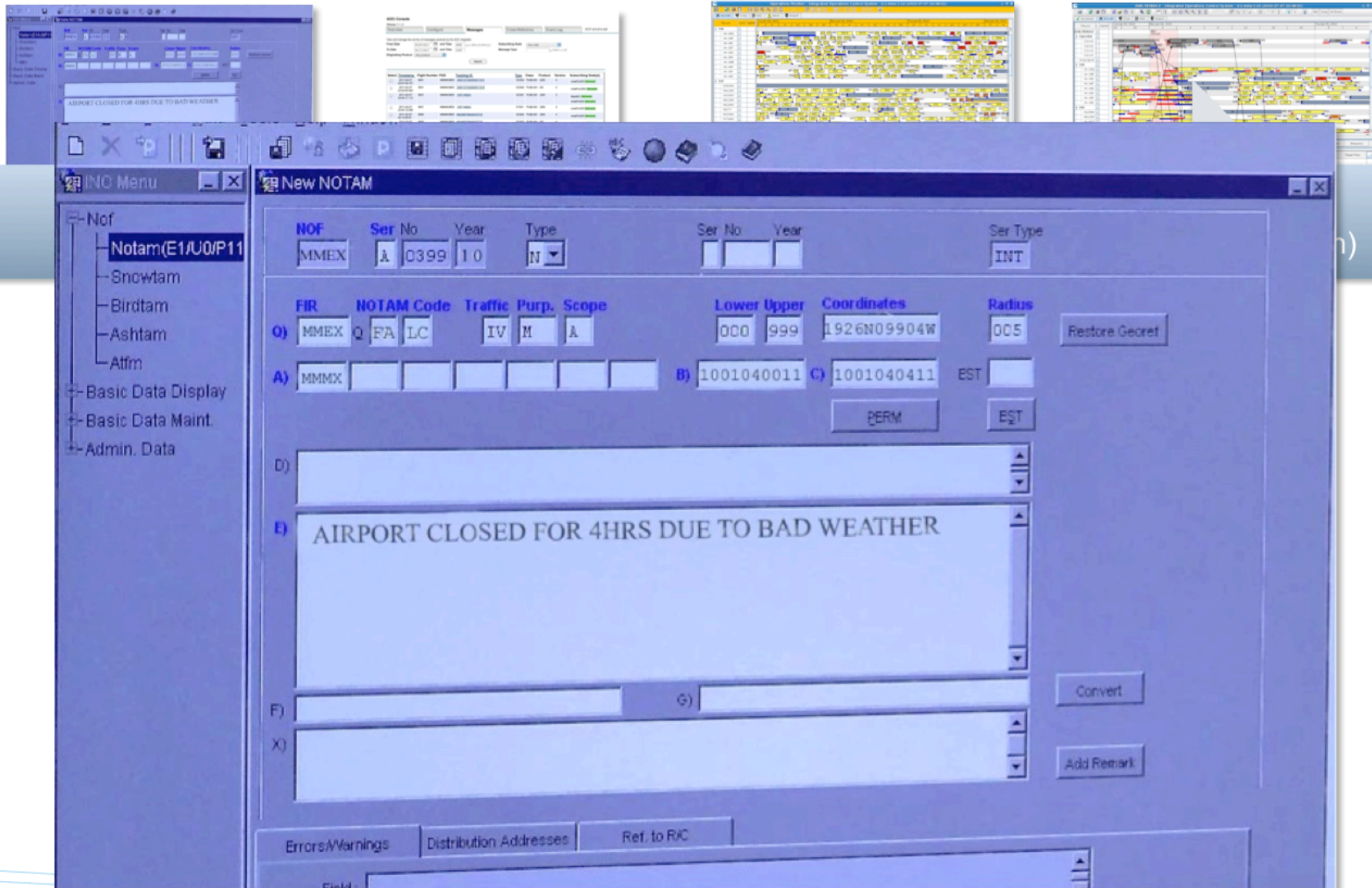
AOC  
(Disruption Mgmt)



AOC  
(Dispatch)

# Short term data updates

Transient information from ANSP to JAIM to AOC



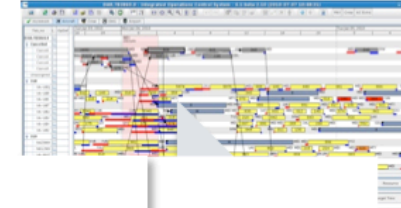
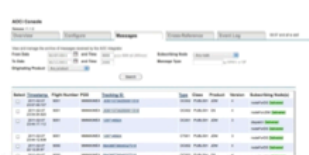
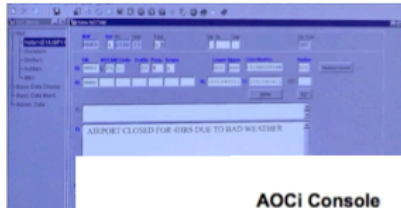
The screenshot displays the 'New NOTAM' window in a software application. The window is divided into several sections:

- Left Panel:** A tree view showing a hierarchy of data types: Nof, Notam(E1/U0/P11), Snowtam, Birdtam, Ashtam, Atfm, Basic Data Display, Basic Data Maint., and Admin. Data.
- Top Section:** Fields for 'NOF' (MMEX), 'Ser No' (A), 'Year' (0399), 'Type' (N), and 'Ser Type' (INT).
- Middle Section:** Fields for 'FIR' (MMEX), 'NOTAM Code' (FA LC), 'Traffic Purp.' (IV M A), 'Scope' (A), 'Lower Upper' (000 999), 'Coordinates' (1926N09904W), and 'Radius' (005). There are also buttons for 'Restore Secret', 'PERM', and 'EST'.
- Text Entry Area:** A large text box containing the NOTAM message: 'AIRPORT CLOSED FOR 4HRS DUE TO BAD WEATHER'. Other text boxes are labeled D), E), F), and X).
- Bottom Section:** Buttons for 'Convert' and 'Add Remark'. Below this are tabs for 'Errors/Warnings', 'Distribution Addresses', and 'Ref. to R/C'.



# Short term data updates

## Transient information from ANSP to JAIM to AOC



### AOCI Console

Release 11.1.0

Overview **Configure** Messages Cross-Reference Event Log 00:07 and all is well

View and manage the archive of messages received by the AOC Integrator.

**From Date** 02/07/2011 and Time 0000 yyyy-MM-dd [HHmm] **Subscribing Node** Any node  
**To Date** 02/11/2011 and Time 2300 **Message Type** eg DP001 or DP  
**Originating Product** Any product

Search

Select	Timestamp	Flight Number	POD	Tracking ID	Type	Class	Product	Version	Subscribing Node(s)
<input type="checkbox"/>	2011-02-07 23:57:49.727	9051	MMMX/MEX	<a href="#">-8391107342550911518</a>	OC002	PUBLISH	JDM	4	nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 23:54:54.920	9051	MMMX/MEX	<a href="#">-8391107342550911518</a>	OC002	PUBLISH	DS	4	nodeForJDM <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 23:44:17.112	9051	MMMX/MEX	<a href="#">1297146924</a>	OC001	PUBLISH	JDM	3	dispatch <b>Delivered</b> nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 23:44:12.636	9051	MMMX/MEX	<a href="#">1297146924</a>	CT001	PUBLISH	JDM	3	nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 22:12:20.97	9050	MMMX/MEX	<a href="#">664388739546327018</a>	OC002	PUBLISH	JDM	4	nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 22:10:33.693	9050	MMMX/MEX	<a href="#">664388739546327018</a>	OC002	PUBLISH	DS	4	nodeForJDM <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 22:09:38.435	9050	MMMX/MEX	<a href="#">1297141251</a>	OC001	PUBLISH	JDM	3	nodeForDS <b>Delivered</b> dispatch <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 22:09:37.783	9050	MMMX/MEX	<a href="#">1297141251</a>	CT001	PUBLISH	JDM	3	nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 21:57:15.72	9049	MMMX/MEX	<a href="#">-9159014761623739392</a>	OC002	PUBLISH	JDM	4	nodeForDS <b>Delivered</b>
<input type="checkbox"/>	2011-02-07 21:55:59.45	9049	MMMX/MEX	<a href="#">-9159014761623739392</a>	OC002	PUBLISH	DS	4	nodeForJDM <b>Delivered</b>

Select ALL DISPLAYED messages    Messages 1-10 of 322    Rows per page: 10 50 100    [Next](#) [Last](#)

Limit resending selected messages to the following node(s):

dispatch  ndOpsDataAA007  ndOpsDataAA008  ndOpsDataAA009  ndOpsDataAA010  ndOpsDataAA011  ndOpsDataAA012  ndOpsDataAA013  ndOpsDataAA015  ndOpsI

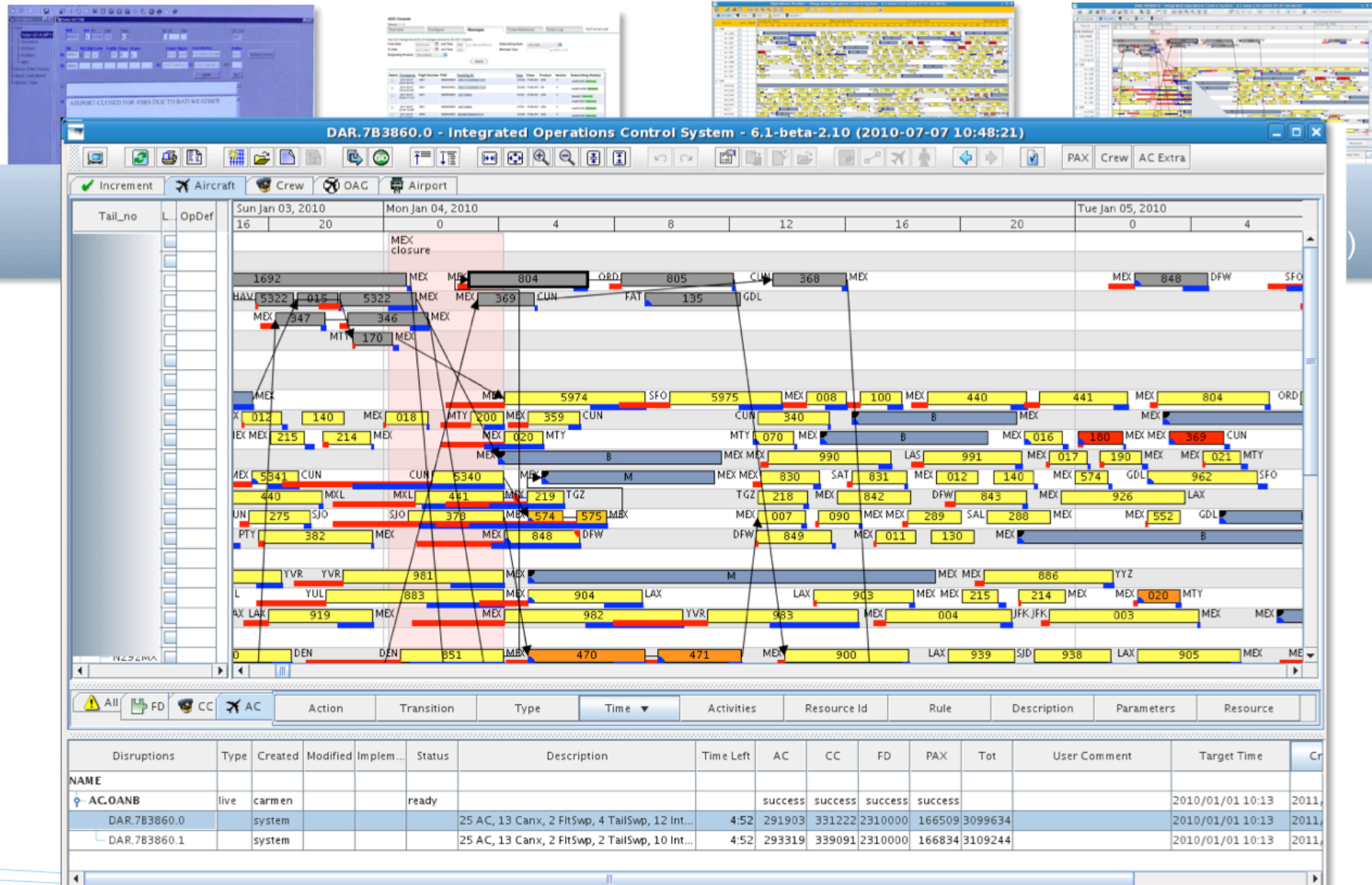
# Short term data updates

## Transient information from ANSP to JAIM to AOC

The screenshot displays the 'Operations Monitor - Integrated Operations Control System' interface. The main window shows a flight schedule grid for the period from Sunday, January 3, 2010, to Wednesday, January 6, 2010. The grid is organized by aircraft tail number (e.g., 318, 319, N390, N412, N420, N612, N618, N627, N634, N700, N750, N790, N860, N872, N882, N925) and includes columns for days of the week and specific flight times. Each cell in the grid contains flight details such as origin/destination airports (e.g., LAX, MEX, DFW, SFO, GDL, MTY, CUN, YUL, YYZ, SJC, IAD, ORD, JFK, YYC, YEG) and aircraft identifiers. The interface also features a top navigation bar with tabs for Aircraft, Crew, OAC, Alerts, and Airport, and a bottom status bar with filters for AC, CC, FD, and All.

# Short term data updates

## Transient information from ANSP to JAIM to AOC



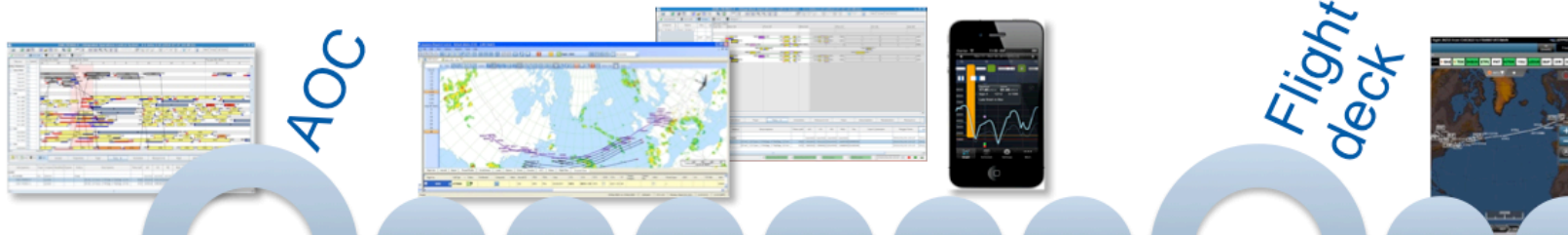
# Automatic messaging at AOC

Automation for efficient & optimized disruption management



# Automatic messaging at AOC

## Automation for efficient & optimized disruption management



Jeppesen Dispatch Control - Default Admin (122) - [JIOC Desk1]

File Edit View Options Reports Tools Help

Flight: 8080 No reroutes

JIOC Desk1 8080 ORD - FRA

Period: +0h, +1h, +3h, +6h, +9h, +12h, +18h, +24h, Loop, Icing Alt (feet): 1k, 5k, 10k, 15k, 20k, 25k, All

Map showing flight routes and weather patterns over Europe and North Africa. Key locations include DUFEE, KORD, ELX, HAACK, TOC, SOSIC, JHW, WILET, MEHMS, LOXKE, VIEV, ALOR, SQUAM, BGR, YHZ, FRIAR, BGR, CETTY, NAT EAST W, NAT EAST X, NAT EAST Y, NAT EAST Z, URTAN, BANC, EPJMS, MODEL, 4936N, 5020N, SAMON, UNDK, VABIX, PIPEP, UNEPI, REMBA, MANUV, FERD, BORIN, MTH, IRASVD, KOK, KONAN, RAMOR, PESUV, BUPAL, TOD.

Active Route: 4650N, 4740N, 4936N, 5020N

Scale: 0 200 400 600 800 NAUTICAL MILES

Flight Info Aircraft Airport Route/Profile Avoid Areas Load Options Divert Enroute ATC Notes Flight Plan Enroute Chart

Flight No	Call Sign	Status	Distributed	Computed	Alerts	Aircraft ID	POD	POA	Date	STD	STA	ETD	DCN	ETA	FF	Tanker Analysis	Tanker Rec	MSA	Route Input	ADD	CA	T/O Alt	Alt1
8080	JEP8080					332	ORD	FRA	03/28/2011	1815	0515 / 29	1815		0221 / 29	NR				J				NONE

Ready 28 Mar 0000 -to- 29 Mar 0000 <Default> WT = LB Monday, March 28, 2011 13:23 (LCL) 12:23 (GMT)



# Automatic messaging at AOC

## Automation for efficient & optimized disruption management

**AOC**

**Flight deck**

**Jeppesen Dispatch Control - Default Admin**

Carrier 11:36 AM  
Nov 11 - Nov 30, 2010 (UTC+2)

Departure: 17:45 UTC+2 Actual: 01:43 UTC+2  
legs: 4 +2/+2 A:1596  
Late finish in Abo

**KORD/USA flight 255 (CHICAGO - FRANKFURT/MAIN)**

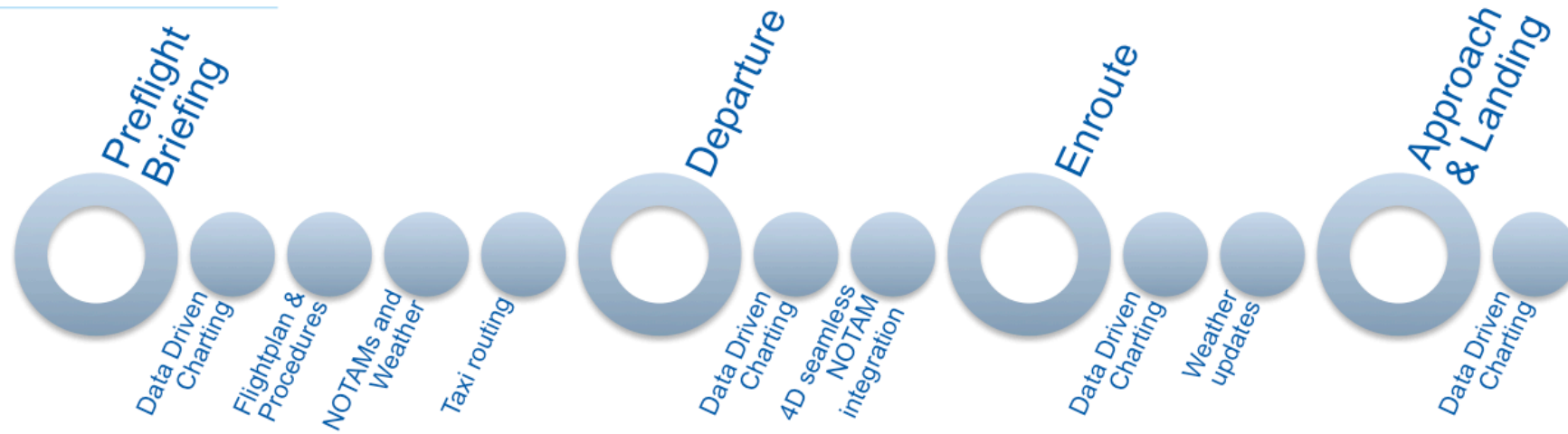
CHICAGO 118.22

FREQ	BUF	ATC FIR at 129.3	BUF
WX	ENE	Frequent Thunderstorm forecasted South of N52 and East of E01 Top: FL400 moving South-East SIGMET 1 valid from 2010/01/01 07:00 Z to 09:00 Z	ENE
FREQ	YYG	ATC FIR at 136.5	YYG
NTM	KBUU	BUU VOR unserviceable Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	KBUU
NTM	KZAU	MINNOW military operations area activated. Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	KZAU

Disruptions	Type	Created	Modified	Implem...	Status
AC0ANB	live	carmen			ready
DAR.783860.0	system				
DAR.783860.1	system				

# Integrated Information Depiction to Crew

Context sensitive static & transient aeronautical information





# Integrated Information Depiction to Crew

## Context sensitive static & transient aeronautical information

Preflight Briefing

Departure

Enroute

Approach & Landing

KORD/USA flight 255 (CHICAGO - FRANKFURT/MAIN)

ATI	CLD	GND	TWR	FIND
135.4	119.25 121.6	121.675 121.75	120.75 126.9	

NTM	KORD	Taxiway T9 closed due to inoperative taxiway shoulder lights. Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	NEW				
NTM	KORD	Runway 04L/22R closed du to work in progress. Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	WX				
WX	EGRR EGTT	Frequent Thunderstorm forecasted South of N52 and East of E01 Top: FL400 moving South-East SIGMET 1 valid from 2010/01/01 07:00 Z to 09:00 Z	NTM				
FREQ	INTERNATIONAL RAMP CONTROL	D-ATIS 129.05	ACARS 135.4	O'HARE CLEARANCE (CPT) 121.6	METERING 121.67	MAIN GROUND OUTBOUND 121.75	FREQ
FREQ	MAIN TOWER	NORTH TOWER RWY 9L/27R	CHICAGO DEPARTURE (R)				TAXI
	126.9	128.15	125.0 (340° - 159°) 127.4 (160° - 219°) 125.4 (220° - 339°)				
	120.75						
	132.7 ALTERNATE						

KORD TAXI OUT DEPARTURE ENROUTE

PRKG TAXI RWY SID ENR **BAE TOC DABJU**

LIVE PLAN **KORD** TAXI DEP ENR ARR APCH TAXI EDDF

Data Driven Charting

4D seamless NOTAM integration

Data Driven Charting

Weather updates

Data Driven Charting

# Integrated Information Depiction to Crew

## Context sensitive static & transient aeronautical information

**Preflight Briefing**  
Data Driven Charting

**Departure**

**Enroute**  
Data Driven Charting  
Weather updates

**Approach & Landing**  
Data Driven Charting

KORD/USA flight 255 (CHICAGO – FRANKFURT/MAIN) JEPPESEN

CHICAGO 118.22 FIND

FREQ	BUF	ATC FIR at 129.3	BUF
WX	ENE	Frequent Thunderstorm forecasted South of N52 and East of E01 Top: FL400 moving South-East SIGMET 1 valid from 2010/01/01 07:00 Z to 09:00 Z	ENE
FREQ	YYG	ATC FIR at 136.5	YYG
NTM	KBUU	BUU VOR unserviceable Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	KBUU
NTM	KZAU	MINNOW military operations area activated. Valid from 2010/01/04 06:00 Z to 2010/01/06 06:00 Z	KZAU

INFO ▲ JOBS ★

1000NM

PROFILE ▲

ENROUTE

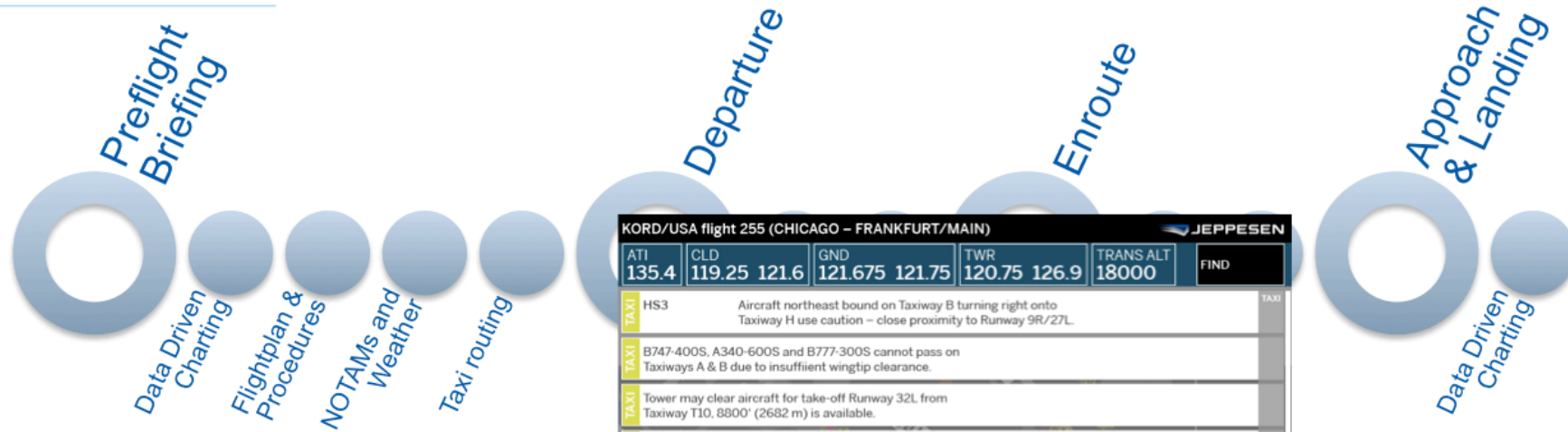
ENR BAE TOC **DABJU** ETP1 FNT **KITOK** YXU **LESUB** BUF SYR CAM

LIVE PLAN KORD TAXI DEP ENR ARR APCH TAXI EDDF



# Integrated Information Depiction to Crew

## Context sensitive static & transient aeronautical information



KORD/USA flight 255 (CHICAGO – FRANKFURT/MAIN) JEPPesen

ATI	CLD	GND	TWR	TRANS ALT	FIND
135.4	119.25 121.6	121.675 121.75	120.75 126.9	18000	

**TAXI** HS3 Aircraft northeast bound on Taxiway B turning right onto Taxiway H use caution – close proximity to Runway 9R/27L.

**TAXI** B747-400S, A340-600S and B777-300S cannot pass on Taxiways A & B due to insufficient wingtip clearance.

**TAXI** Tower may clear aircraft for take-off Runway 32L from Taxiway T10. 8800' (2682 m) is available.

**TAXI** Avoid building with high power jet blast.

**INFO** KORD Runway 32L, Elev 666'. Runway 14R, Elev 649'.

Map controls: N, +, -, MAP AUTO

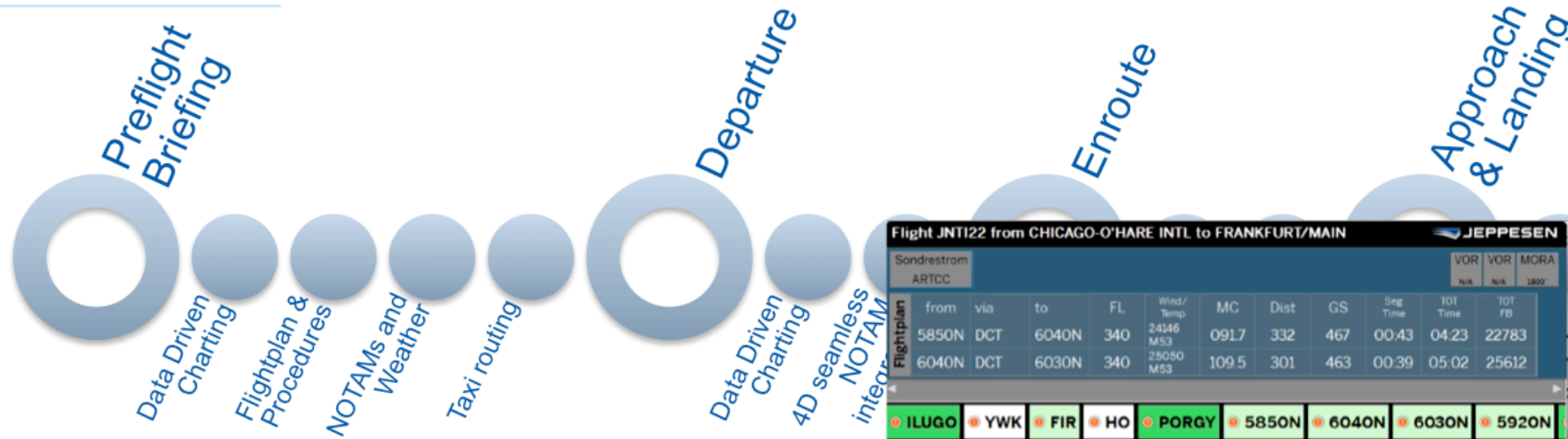
Bottom navigation: KORD TAXI OUT DEPARTURE

PRKG: B9 TAXI: A A9 B F T12 RWY: 32L SID: ER

Bottom bar: LIVE PLAN KORD TAXI DEP ENR ARR APCH TAXI EDDF

# Integrated Information Depiction to Crew

## Context sensitive static & transient aeronautical information



Flight JNT122 from CHICAGO-O'HARE INTL to FRANKFURT/MAIN

Sondrestrom ARTCC VOR VOR MORA  
N/A N/A 1800

Flightplan	from	via	to	FL	Wind/Temp	MC	Dist	GS	Sig Time	TOT Time	TOT FB
	5850N	DCT	6040N	340	24146 M53	091.7	332	467	00:43	04:23	22783
	6040N	DCT	6030N	340	25050 M53	109.5	301	463	00:39	05:02	25612

ILUGO YWK FIR HO PORGY 5850N 6040N 6030N 5920N

FL350 Risk Area filter SEVERE ON MODERATE ON LIGHT ON Weather Forecast for 22:00Z

RISK AREA: LIGHT, MODERATE AND SEVERE  
METAR: available  
TAF: available

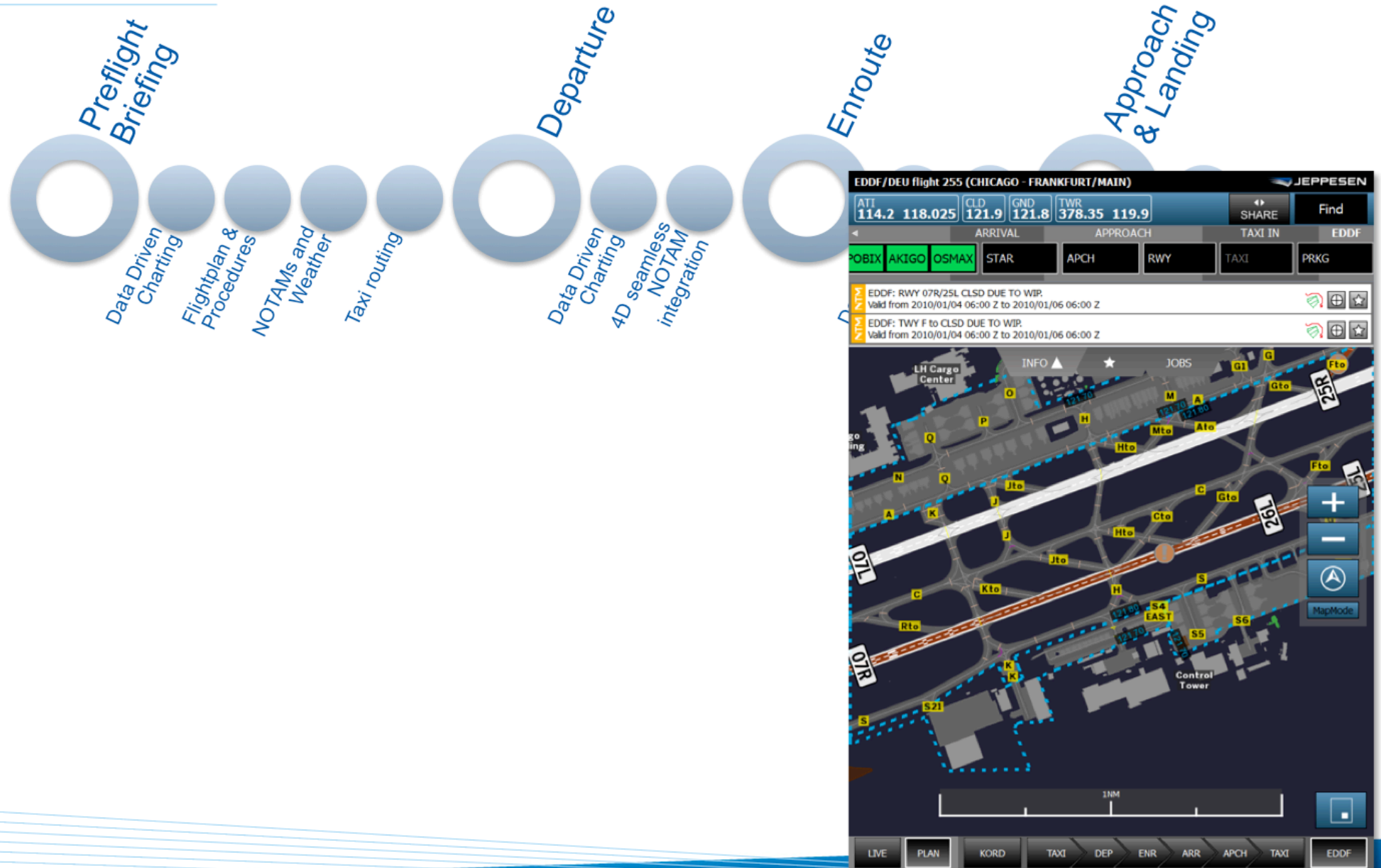
5850N - 6040N AT 22:00

1000NM PROFILE

PLAN LIVE KORD TAXI DEP ENR ARR APCH TAXI EDDF

# Integrated Information Depiction to Crew

## Context sensitive static & transient aeronautical information



# Integrated Operations Solution

